Resources Safety matters

VOL. 2 NO. 1 JANUARY 2014
ISSN 2201-5604

Print post approved 100015687

Government of **Western Australia**
Department of **Mines and Petroleum**
Resources Safety

HEEDING THE MESSAGES FROM DMP'S FATALITY STUDY

IMPROVING SHOTFIRING PRACTICES IN WA

TAKING AIM AT ASSET INTEGRITY

QUICK HITCHES

IN THIS ISSUE

Scan this QR code for past issues of *MineSafe* and *Resources Safety Matters*

Welcome to the first issue of *Resources Safety Matters* for 2014. The magazine is published by the Department of Mines and Petroleum's Resources Safety Division to improve safety and health outcomes for the Western Australian resources sector.

The articles aimed to:

- update readers about regulatory matters
- share investigation outcomes to raise awareness and promote effective controls and continued vigilance
- encourage communication, consultation and a risk management approach to support a positive cultural change.

WHEN THINGS GO WRONG

When a worker tragically died at Christmas Creek Mine in the Pilbara in mid-August 2013, it had been nearly two years since the Western Australian mining industry experienced a workplace fatality. Several months later, in early December, a worker was killed in a mining workplace accident at Telfer. In late December, there was another fatal accident at Christmas Creek. Serious injuries have also been sustained in the past year. How can we close the gap between reality and our aspirational goal of "zero harm"?

The Department of Mines and Petroleum's Investigations Team is working tirelessly to determine what happened in these fatal incidents. We want to provide answers to the workers' families, and share the lessons learned so industry can act to prevent a similar accident from happening again.

The first stage of a mining fatality investigation involves inspectors travelling to the mining operation, where they spend days collecting and reviewing information. However, their first task is to ensure the area has been safeguarded, with any hazards that may still be present being identified and controlled.

Witnesses and supervisors are interviewed to determine what may have happened, and how. As part of this process, we look at the measures in place to manage risks in the workplace.

In all cases, we carry out the investigation as quickly and thoroughly as we can, but there can be unforseen delays when collecting evidence and conducting interviews with third parties. Our investigations are detailed and take time to complete.

While we may not have all the answers yet, these incidents are a stark reminder that there is always a risk when working in a high-energy environment.

To eliminate hazards or reduce risk, there must be effective controls, adequate training and safety procedures, and supervisors and workers must remain vigilant.

We must all work together to reduce the likelihood of such incidents happening again. I urge everyone to remain aware of your surroundings and what you are doing at all times.

Equally, companies must not only ensure their safety procedures are thorough and up-to-date, but also that everyone is fully aware of them and put them into practice. The best procedures in the world are useless if no one knows about them or they are not followed.

CLOSING THE GAP

We should ask ourselves a series of basic questions to ensure we are safe at work and will continue to be so.

Firstly, "Do I have the knowledge to identify and understand the hazards in my workplace?"

If I can answer "Yes" then the next question is, "What are the critical tasks I or my team must perform?"

I can now conduct the risk management process:

- What unwanted events or consequences could the workplace hazards create?
- What controls must be in place to eliminate or effectively reduce my exposure to these hazards and potential consequences? Are we applying the hierarchy of control?
- How will I verify the presence and ongoing effectiveness of these controls as work proceeds?

This is not "rocket science" or "black magic". We go through this process every day as we go about our lives. Think about a simple everyday task such as driving up to an intersection or crossing a road. This entails an almost subconscious risk assessment process to achieve a safe outcome.

In essence, it comes down to awareness and taking a little time to consciously think about our work environment and tasks. The subconscious mind may work well in less threatening situations, but in an inherently more hazardous workplace, we must train ourselves to bring the risk management process to the front of our consciousness. We will then become more aware of the hazards and our human limitations. Ultimately, we need to make well informed judgements and decisions that will keep us safe.

Simon Ridge
Executive Director, Resources Safety
10 January 2014

RADARS
Reform and Development at Resources Safety

REGULATORY REFORM PROGRESS

Based on model laws developed under the harmonisation process driven by Safe Work Australia and the National Mine Safety Framework, new workplace health and safety legislation for Western Australia is expected to be introduced in late 2014. It is hoped that this will be a single piece of legislation that will provide for the whole resources sector, including major hazard facilities (MHF), petroleum and mining industries.

A Ministerial Advisory Panel (MAP) has been formed with representation from stakeholder groups across the resources sector to facilitate the consultation process. It will meet bimonthly, with the first meeting held on 22 January 2014.

Regulatory impact statements (RIS) will be undertaken. The first will seek industry opinion on the concept of a single statute for the resources sector.

The expectation is that, under the proposed single piece of legislation, the regulator's resources will then be applied where they can have a more efficient and effective influence in driving cultural change across the sector.

Pooling the specialist skill sets will also attain a critical mass, allowing inspectors' skills to be applied where required. An example is the provision of electrical engineering input, a resource present within the mining inspectorate but not currently available in the petroleum or MHF teams. Under the proposed legislative framework, this resource could be utilised in any part of the resources sector according to need.

Within this new regime, the regulator would provide a two-pronged approach to its engagement on resource sites:

- a "critical control" audit, similar to a safety case audit process
- an occupational health and safety audit program.

These would operate in tandem, with resources being applied accordingly.

Such an approach would enable individual inspectors to specialise in either area, or transition from one to the other according to their skill set, experience and career aspirations. This approach should also drive consistency and ensure that appropriate skill sets are brought to issues at the critical time.

This proposed regulatory reform is another step towards fulfilling the vision for a leading practice regulator that supports industry as it strives to improve safety outcomes, and achieve the safe work places that we all desire.

MINE PLANNING CLOSURE GUIDE UP FOR REVIEW

Industry submissions were called as part of a review of guidelines that aim to ensure Western Australian mines can be closed, decommissioned and rehabilitated in an ecologically sustainable way.

The Department of Mines and Petroleum and the Environmental Protection Authority (EPA) released the current guidelines for preparing mine closure plans in 2011, and industry feedback has been sought regarding possible improvements.

Dr Phil Gorey, Executive Director of the Department's Environment Division, said that the original guidelines had improved the efficiency of the assessment and approvals process by harmonising the requirements of the Department and the EPA.

"Mine closure planning is an integral part of mine development and operations planning," Dr Gorey said.

"In order to enable better environmental outcomes, a collaborative approach is being taken to guide development of mine closure plans. An important part of this approach is to periodically review the guidelines for their effectiveness."

Dr Gorey said that there were a number of issues that continue to challenge effective mine closure.

"This challenge includes issues such as acid and metalliferous drainage, mine pit lakes and the successful re-establishment of recalcitrant species," Dr Gorey said. "The Department and EPA support taking a risk-based approach to manage these issues."

In particular, the Department wanted to hear about the usefulness of the guidelines in producing logical and well-structured mine closure plans that can also be used to implement progressive rehabilitation and closure "on the ground".

For more information, including access to feedback, visit www.dmp.wa.gov.au/mineclosure

FULL HOUSE AT 2013 MINES SAFETY ROADSHOW

What do pie graphs, large falling objects, animal traps, Mars Bars and portable generators have to do with mines safety? They were all featured in the ninth annual Mines Safety Roadshow series presented in October 2013 to coincide with Safe Work Australia Month.

This is one of the Department of Mines and Petroleum's most important proactive strategies targeting mines safety. Considerable effort is expended each year to keep the series topical and interesting, and provide presentation opportunities for inspectorate staff. Survey results and other feedback show that the roadshow series continues to be well received.

Being specifically focussed on the minerals sector, this event allows Resources Safety to inform the mining industry about current occupational safety and health concerns and developments from the mines inspectorate's perspective. It is also an opportunity for industry to meet personally with inspectors and other Resources Safety staff in a positive environment.

Audiences typically comprise safety and health representatives, supervisors, managers and others responsible for safety and health in the minerals industry.

The roadshow program seeks to raise awareness and share solutions, rather than provide professional development training. Through roadshow workshops and interactive sessions, Resources Safety can also consult with a broad cross-section of industry on topics relevant to managing risks on Western Australian mining operations, as well as supporting the development of resilient safety cultures.

At the 2013 roadshow series, the main aims were to:

- support the development of a resilient safety culture by encouraging operators to change their focus from "who" to "how" in site investigations
- update industry on fatality findings and learnings, proposed legislative changes and safety performance
- explore the hazards associated with mobile equipment, stored energy and working hours
- promote the use of higher-order controls in the hierarchy of controls.

About 600 industry representatives attended, with venues covering the Gascoyne (Geraldton), Pilbara (Port Hedland, Karratha, Newman), South West (Bunbury) and Goldfields (Kalgoorlie) regions, as well as Perth. This is the largest total attendance since the Roadshow series began in 2005.

All attendees were asked to provide feedback at the end of each event, and just over half obliged. The survey responses indicate that all sessions were well received by the majority of attendees, and that they came away from the day with an increased knowledge and understanding of the topics discussed.

The final presentation of the day, a demonstration of the hazards of stored energy, complete with props, was particularly well received, as was the presentation reviewing 13 years of fatality reports for the Western Australian mining industry. The toolbox presentation from the fatalities study was downloaded over 1,000 times within a week of being placed on the Resources Safety website!

What is planned for the 2014 series? For a start, there are plans to run another practical demonstration targeting a specific hazard group.

The Geraldton event was very well supported in 2013 and will stay on the itinerary for 2014.

For those who sweated through the Newman event in 2013 (and 2012), you will be pleased to hear that an alternative venue has been secured that will accommodate a larger audience — in more comfort.

Given the large turn-out in Perth, which made it more difficult to run some of the interactive sessions, Mandurah will be trialled as an additional venue. It is hoped that this initiative is supported in 2014 so the southern location can be retained for years to come.

ROADSHOW TOOLBOX PRESENTATIONS NOW AVAILABLE

Most topics covered at the 2013 Mines Safety Roadshow are now available for industry use within the workplace. Some have been updated to include industry feedback collated during interactive sessions.

- Fatigue, shift structures and working hours
- Mobile equipment issues – what needs attention?
- Review of fatal accidents on WA mines 2000-12 – what do the findings tell us?
- The anagram approach to site incident investigations – can you move from "who" to "how"?
- What's happening in mines safety in WA?
- Why is design so important to safety (and production)?

2013 MINES SAFETY ROADSHOW


Geraldton SH


Port Hedland SH


Karratha SH


Newman SH


Newman SH


Bunbury SH


Kalgoorlie SH


Perth TYC

HEEDING THE MESSAGES FROM DMP'S FATALITY STUDY

Is Western Australia's mining industry closing the gap in terms of fatal accidents? If we consider the historical context, then the answer is yes. However, the fatalities in 2013 remind us that we must remain vigilant.

In the 1940s and 50s, there was an average of two fatalities per 1,000 workers each year. In today's terms, with a workforce just under 100,000, this would equate to 200 fatalities each year.

There was a step change in 1960s to 70s, with a decrease to one fatality per 1,000 workers, which would be 100 deaths per year in today's terms.

By the 1980s to 90s, there were some eight to ten fatalities each year for a workforce of around 30,000.

A study undertaken by the Department of Mines and Petroleum (DMP) in 2013 reviewed mining fatality reports for Western Australia from 2000 to 2012. The aim was to identify some key activities and areas where improvements can be made. In the 13 years covered by the review, there were 52 mining-related deaths, with an average of four deaths per annum. Over this period, the industry workforce increased by 60,000.

The formal report will be available in early 2014. In the meantime, a talk developed for the 2013 Mines Safety Roadshow is available as a toolbox presentation on Resources Safety's website.

Before summarising some of the study's results, it should be noted that the sample size is (fortunately) too small for statistical comparison. Therefore the reviewers looked for any trends and clusters to determine what may have contributed to these 52 fatal accidents.

Their analysis identified common hazards and critical activities. A person might conduct 50 to 100 tasks during a shift, of which just one or two could lead to a situation with the potential for serious injury or death. So knowledge of these critical tasks is important when addressing risks.

The reviewers also sought to recommend areas for industry to tackle that may result in improved safety performance by reducing the exposure of workers to hazards.

WHICH ATTRIBUTES WERE MOST CONCERNING?

Resources Safety's Executive Director (and State Mining Engineer), Simon Ridge, wants to spread the word about the key messages generated by this study.

"Forty nine per cent of these deaths involved workers who were in the first year at their respective mine sites or fulfilling new roles," Mr Ridge said, stressing the importance of inductions, training and familiarisation with new environments.

"We believe high staff turnover can also further influence the number of accidents in the first year of a new role," he added.

The DMP study found that in 62 per cent of the cases, onsite procedures were not complied with. In another 27 per cent, it appears that there was no procedure in place.

"This drives the point home that we must always apply known precautions to known hazards, and where new tasks, machines or processes are being introduced, detailed hazard analysis and risk assessment should be carried out," Mr Ridge said.

The research also showed that 44 per cent of the fatal accidents involved supervisors in their first year "on the job". This highlights the need for supervisors to be fully aware of the hazards and risks associated with set tasks, so workers are monitored accordingly.

During the 13-year period reviewed, clusters of accidents occurred at the end of day shift (between 3 pm and 6 pm), five hours into both day and night shift (at 11 am and 11 pm) as well as at 3 am.

"Although the sample size in our study is relatively small, these incident times seem to align with the times when workers may be fatigued and more prone to making errors," Mr Ridge said.

"That is why it is crucial for employers and employees to understand the importance of meal and rest breaks in improving energy and concentration, particularly every four hours during the commonly used 12-hour shift."

The study did not show any evidence that longer rosters resulted in increased fatalities.

Tradesmen and operators comprised 70 per cent of the total fatalities. The most prevalent occupations included fitters (nine fatalities), haul truck drivers (five fatalities), and technicians, service vehicle drivers and jumbo operators (four fatalities each).

Fifty six per cent of incidents occurred at gold and nickel mines and 33 per cent at iron ore mines. There were 35 surface incidents and 17 underground. Although underground workers were over represented by a factor of five when normalised to workforce numbers, this trend started reversing over the review period. The most recent fatal accidents have typically been in the iron ore sector (i.e. surface), rather than underground.

WHAT WERE THE CRITICAL FACTORS?

The ten scenarios involved in repeated fatality incidents were:

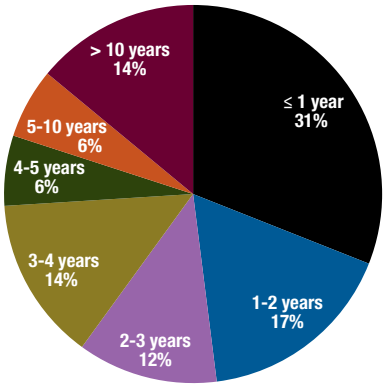
- incorrect use of fall arrest equipment
- departure from original equipment manufacturer (OEM) procedures
- runaway vehicles
- vehicles over edges
- vehicle collisions
- electrical contacts
- rock falls
- pit wall failures
- inrush
- tyre handling.

WHAT CAN INDUSTRY DO WITH THIS INFORMATION TO IMPROVE SAFETY?

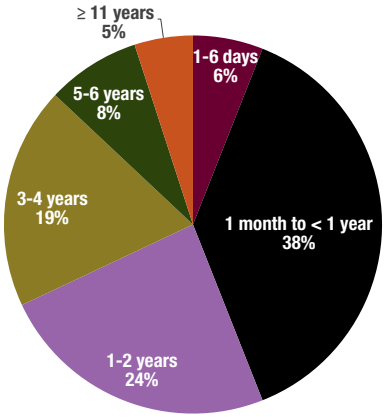
"It is important that the Department carries out such studies so, from a regulator's perspective, we can provide feedback to industry to help stop these incidents and people being killed or seriously injured," Mr Ridge said. "Please take the time to read the recommendations — and review and revise your safety management systems as necessary."

- Identification of hazards and critical tasks (most important) – Everyone needs to understand what hazards they are going to be faced with during the day and what critical tasks everyone does on a day-to-day basis. We need to know what can go wrong and what can kill when doing a particular job.
- Principal hazard management plans (PHMPs) – The repetitive failures that we see in the study match the principal hazards identified by the National Mines Safety Framework. All operators need to have knowledge of the hazards on their site that can cause multiple fatalities and repeat fatalities.
- Written work procedures – These need to be developed for hazards that have been identified, and modified if the situation changes.
- Involvement of workers – Workers need to know the written work procedures and need to be involved with developing those procedures.
- Training processes (workers and supervisors) and supervision to standards – Once the procedures are in place, there needs to be processes in place to ensure all workers and supervisors are well trained in the jobs they have to do and have knowledge of the hazards they might face.
- Site familiarisation – Management needs to be conscious of workers entering the industry who will need time to familiarise themselves with what is going on, the roster cycles and different working environments (this may include a site tour at night, when things look different). People new to an operation, whether experienced or not, need time to get to know their work mates and supervisors, and the hazards and work processes specific to that site.
- Adequate breaks during the shift – The need for breaks during shift is a long standing issue. We need to be conscious that people cannot sustain focused activities for long periods of time and breaks are needed. The likelihood of someone making an error increases with fatigue and lack of concentration. As a minimum, the site's fatigue management plan should be reviewed in regard to the problem times identified around 3 am, 11 am, 4 pm and 11 pm. What sort of breaks and other strategies might be required?

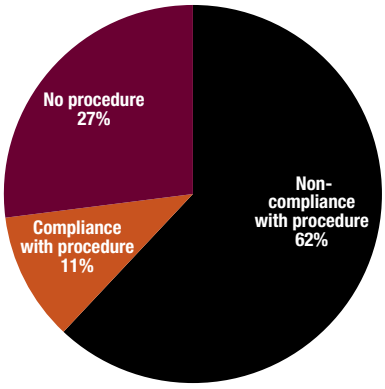
Duration of role – deceased person



Duration of role – supervisor



Compliance with procedures



No fatalities for 1-4 weeks, 4-5 years, 7-8 years and 9-10 years

DIESEL PARTICULATE STUDY OF GOLDFIELDS MINES

INTRODUCTION

In 2013, the Resources Safety Division of the Department of Mines and Petroleum initiated a real-time ambient diesel particulate sampling program of underground mines in the Goldfields. The study will assist industry by establishing baseline data that complements the recently released guideline on the management of diesel emissions in Western Australian mining operations.

Resources Safety acquired instrumentation for measuring real-time diesel particulate exposure in the workplace. This new technology allows for the immediate display of exposure levels at any given location in the work environment. The standard gravimetric process requires laboratory analysis of the samples, which means the results are delayed.

The initial phase of the sampling program included visits to all underground mines in the East Inspectorate, and the results are reported below. Diesel particulates, mine gases, temperature, and ventilation volumes and flow rates were measured in different underground work areas to gauge ambient contaminant levels. Relevant mobile equipment movements were recorded, including the identification of any exhaust treatment devices fitted, fuels used, maintenance processes applied, and general condition of ventilation equipment.

BACKGROUND TO STUDY

In 2012, the International Agency for Research on Cancer (IARC) classified diesel engine exhaust emissions as Group 1, which is carcinogenic to humans, based on sufficient evidence that exposure is associated with an increased risk for lung cancer. A positive association, with limited evidence, of an increased risk of bladder cancer was also found.

The IARC was careful to state that the classification of diesel emissions as a carcinogen was independent of determining the duration, frequency and concentration of exposure required to produce an actual risk. The probability of harm increases with the level of exposure, which was an important aspect of the IARC's findings. The IARC working group pointed out that the main studies that led to this conclusion were for highly exposed workers.

The IARC classification should not be misinterpreted to mean that Western Australian miners are at elevated risk, since the historical diesel particulate concentrations found in the studies were many times greater than the currently accepted limit in this State. However, the inherent risk of developing cancer from exposure to diesel particulate matter is still present.

In line with sound risk management practices, the risks from diesel emissions should be assessed and controlled to an acceptable standard. There is currently no national exposure standard for diesel particulates. However, a number of regulatory agencies in Australia, including the Department, have adopted the Australian Institute of Occupational Hygienists (AIOH) exposure limit recommendation of 0.1 mg/m^3 as elemental carbon measured as a time-weighted average (TWA) over eight hours (adjusted for extended workshifts). The AIOH recommendation was developed because of the irritant health effects from exposure to diesel emissions, with the view that compliance would reduce the risk of health effects.

INDUSTRY SUPPORT

It is pleasing to report the high level of active interest, involvement and participation from industry. The Department acknowledges the assistance afforded to its inspectors during site visits. This support has made it possible to obtain quality data during site inspections as operations continued their normal daily activities, allowing for representative workplace sampling.

DOCUMENTATION PROVIDED

During site visits, certain status information was collected to establish how operations are managing diesel emission exposure. In particular, copies of the following documents were requested from each site:

- diesel emissions management plan
- diesel equipment list, including any exhaust treatment devices
- most recent primary and secondary ventilation survey data
- most recent emissions testing results (NO, NO_2, CO, diesel particulates)
- fuel delivery docket stating type of diesel fuel and supplier.

LIMITATIONS

Diesel particulate monitoring was performed in conjunction with standard site inspections, whereby an escort was provided by the mine site to transport the inspector to requested areas of the mine. Sampling was normally conducted at each mine for durations of two to three hours, with a focus on high traffic areas for machinery.

The data obtained relate to ambient atmospheric sampling of the underground mining environment. The initial phase of sampling did not include direct personal exposure monitoring, although future studies may be expanded to include such monitoring.

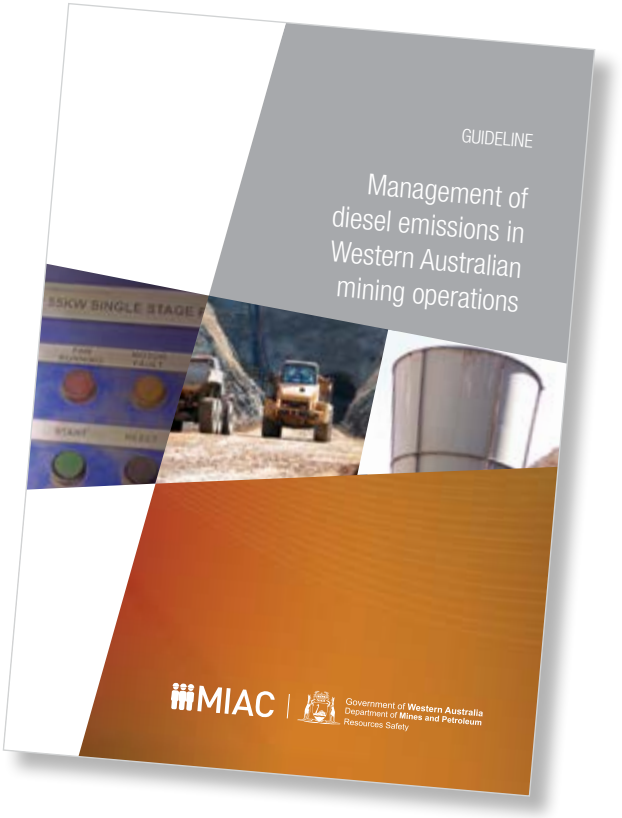
REAL-TIME INSTRUMENTATION

The Department's contaminant exposure database, CONTAM, is used to record results of industry sampling that occurs in Western Australian mining operations. All personal diesel particulate sampling reported to CONTAM has used the NIOSH 5040 analytical method to quantify elemental carbon exposure, which requires the capture of particulates onto a quartz-fibre filter that is then analysed at a NATA-accredited laboratory.

Before 2006, the technology available to effectively measure diesel particulates in the workplace was a high cost process. With the introduction of the NIOSH 5040 sampling method, diesel particulate measurements were integrated into CONTAM reporting requirements and site hygiene monitoring programs.

Elemental carbon is the surrogate component of diesel particulates that can be reliably measured using the NIOSH 5040 analytical method.

Real-time technology replicates the NIOSH 5040 method using laser absorbency and transmittance to determine sample concentrations, with a 0.8 µm size-selective sampler reducing the interference from other mine dusts and aerosols.



FINDINGS

TWA and peak readings

Sampling results represent the ambient environmental conditions that existed in each underground mine at the time of inspection.

This represents potential exposure for individuals where, for example:

- service crew members are conducting activities in associated workings
- open cab equipment is in operation
- itinerant personnel are frequenting underground areas
- ventilating air is recycled to deeper operational mine workings before being exhausted from the mine.

The results should be viewed as an indicator only due to the limited sampling conducted at this stage with regard to:

- duration of sample taken
- mobility of sample
- expanded sample area
- replication and validity of data.

Some sites that returned low diesel particulate results during this program should not consider the results to be a constant — further testing may return higher readings over time and in other mine locations.

Figure 1 graphs the extrapolated assumption of TWA data based on samples taken at each mine relative to exposure duration. These results should be viewed against the currently adopted TWA exposure standard of 0.1 mg/m^3 as elemental carbon.

Based on the TWA exposure recorded on the day of sampling, 10 of 29 sites (34%) would have exceeded the accepted TWA exposure standard had workers been exposed to that environment for eight hours — most underground personnel work a 12 hour shift.

Figure 2 graphs the peak concentrations recorded at each mine. In almost all cases, these peak readings were taken during truck loading and bogger activities. The highest reading (Mine 27) is recorded at 1.1 mg/m^3 as elemental carbon, 11 times the currently adopted TWA exposure standard.

Diesel emissions management plans

Twelve sites had drafted a diesel emissions management plan, but the majority had not commenced this process.

The quality of diesel emissions management plans supplied during site visits ranged from comprehensive and practical, through to a few pages of generic information that did not reflect site-specific requirements.

Several sites had invested time and resources into developing quality plans that had been holistically implemented so they were an integrated part of the business. The lowest diesel particulate TWA and peak measurements were recorded at these sites.

Emissions control using diesel particulate filters

Industry suppliers and manufacturers continue to advance options for mitigating emissions at their source, rather than rely on the need for copious ventilation to purge any contaminants, or other controls aimed at managing exposure to the airborne particles.

Sites were asked for current information on diesel equipment used underground and the status of that equipment with regard to emissions data and the use of emission treatments and control devices. Only 12 of the sites were found to have at least one piece of underground machinery fitted with a diesel particulate filter. That is, the majority of sites sampled have not yet introduced diesel particulate filters into their mobile equipment fleets.

Some sites have committed to fitting diesel particulate filters to all underground machinery through a gradual transition. The few sites that had already invested in diesel particulate filters for all underground machinery had the lowest exposure data for both TWA and peak readings.

What can be achieved?

The photographs in Figure 3 were taken from a return airway and show a bogger loading four 50-tonne trucks in an underground mine. While it is difficult to present a true sense of air quality, these photographs do reflect the clarity of that particular workplace's atmosphere at the time of diesel particulate sampling. The bogger and trucks being loaded were fitted with diesel particulate filters, with other emission controls including an effective maintenance regime, low sulphur fuel, low ash engine oil, and a doubling of the frequency at which air filters were being replaced.

Other findings

The study results support the idea that ventilation turbulence and flow, or fluid, dynamics influence the effectiveness of purging diesel particulates from some work areas.

There is no industry standard for conducting primary and secondary ventilation surveys or reporting the measured data, and there is significant variation in the levels of experience, competence and authority of statutory appointed Ventilation Officers.

WHAT NOW?

The diesel particulate program has established an industry baseline against which underground mines can assess their relative workforce exposure and effectiveness of controls.

Proactive sites continue to lead the industry through trials of new technology in partnership with contractors, suppliers, manufacturers, developers and the safety regulator. The Department acknowledges and encourages this good work and is aiming to further develop our combined understanding of the issues faced by industry.

It is clear from the real-time sampling results that those sites that have invested in preventative controls such as diesel particulate filters, low sulphur fuels, low ash engine oils, more frequent air filter replacement and regular planned maintenance regimes have successfully reduced the generation and emission of diesel particulates at their source.

It is also evident that those sites that have invested time and resources into developing quality diesel emissions management plans, and have integrated those plans into their business, were being rewarded with tangible results and visible improvements in air quality.

The contribution from all sites involved in this study, including those who have some way to go in controlling diesel emissions, demonstrates industry's commitment to managing this issue.

In 2014, Resources Safety will continue this sampling in conjunction with normal site underground inspections, and expand the study to include the remaining underground mines in Western Australia.

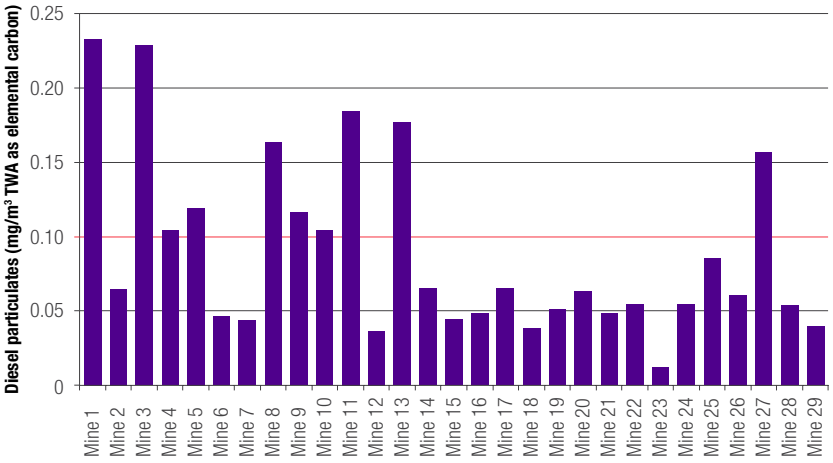


Figure 1 Diesel particulate concentrations reported as mg/m³ TWA (assumes 8-hour consistent exposure). Note: Mine numbers do not relate to the site list.

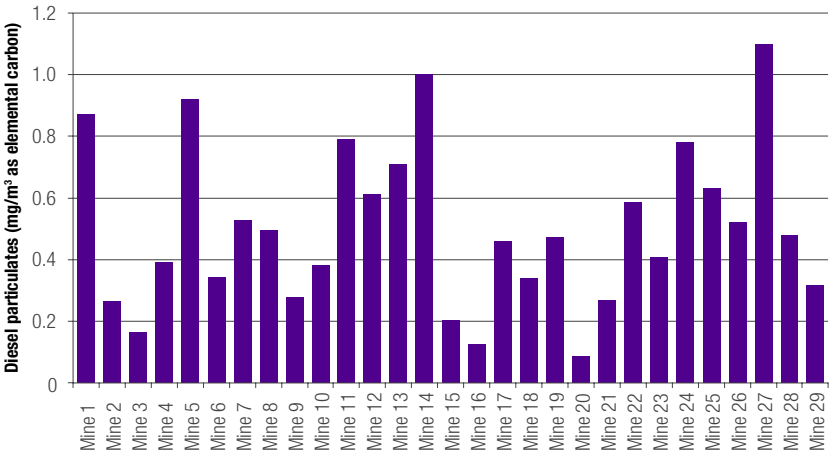


Figure 2 Peak diesel particulate concentration as mg/m³

STUDY PARTICIPANTS

Agnew – Gold Fields
Argo – Gold Fields
Athena – Gold Fields
Chalice – Alacer
Cliffs – BHPB
Daisy Milano – Silver Lake Resources
Darlot – Barrick
Frog's Leg – La Mancha
Granny Smith – Barrick
Gwalia – St Barbara
Homestead – Norton Gold Fields
Jaguar – Jabiru Metals
Jundee – Newmont
Kanowna Belle – Barrick
King of the Hills – St Barbara
Lanfranchi – Panoramic Resources
Lawlers – Barrick
Leinster Nickel – BHPB
Long Operations – Lightning Nickel
Mariners – Mincor
McMahon – Mincor
Miitel – Mincor
Mt Charlotte – KCGM
Otter Juan – Mincor
Raleigh – Barrick
Red October – Saracen
Rubicon-Hornet – Barrick
Sunrise Dam – Anglo Gold Ashanti
Trident – Alacer

Figure 3 Example showing clarity of atmosphere at a site with a fully implemented and integrated diesel emissions management plan

IMPROVING SHOTFIRING PRACTICES IN WA

Since the introduction of the Dangerous Goods Safety (Explosives) Regulations 2007, the Department of Mines and Petroleum has noticed a marked improvement in the level of knowledge and awareness that shotfirers typically have of the legislative requirements. This is to be commended and should lead to continued advances in the level of safety and security when handling explosives.

One key driver for this improvement is the need for explosives management plans (EMPs). Licence holders must prepare an EMP when applying for certain licences. It describes the company's expectations for how explosives will be kept safe and secure while being stored, transported and used. The plans must be effectively implemented, which means shotfirers and those handling explosives must be trained in the requirements of the EMPs.

Another driver is that the Department has spent considerable time working with shotfirer trainers so they have a greater awareness of the legislative requirements. In 2012, Resources Safety ran a forum covering the regulations for the training providers. As a result, trainers have been able to incorporate much of this information into their training programs. The trainers have also been audited by the Training Accreditation Council or Australian Skills Quality Authority in conjunction with Resources Safety.

Anecdotally, it appears that shotfirers are becoming more inquisitive and questioning, and are challenging why things are done in a certain manner. This not only helps them to meet the requirements of the regulations, but is an encouraging sign that augurs well for safe working practices in the future.

As well as the EMP, shotfirers need to adhere to other documents, such as operational and blast plans, and this is also benefiting the profession by raising the standard. This is most encouraging and the Department commends the work done by shotfirers, their employers and trainers in making this possible.

To maintain this positive momentum and drive further improvements, a forum for shotfirers may be held in 2014. Subscribe to Resources Safety's news alerts to be kept informed about this proposed event.

FAQS ABOUT SHOTFIRING ON MINE SITES

1. **Who can fire a shot?**

   Either a shotfirer or a person under the direct supervision of a shotfirer must initiate the shot [see regulation 125 of the Dangerous Goods Safety (Explosives) Regulations 2007, in conjunction with the definition on "use" in regulation 3].

2. **Does a shotfirer need to be present on the bench when loading a shot?**

   No, not necessarily, but a secure nominee who is appropriately trained must be present. At least two people are required for both the safety and security of explosives.

3. **When do misfires need to be reported to Resources Safety (Dangerous Goods Officer and Inspector of Mines)?**

   Although regulation 44 of the Dangerous Goods Safety (Explosives) Regulations 2007 states that misfires do not need to be reported, it does say that dangerous goods incidents do. Hence, where a misfire is treated (i.e. dealt with) before the "all clear" is given, it is not necessary to report it to the regulator. However, where the "all clear" is given and people are exposed to the hazard of the unfired misfire, then it must be reported to the regulator.

4. **Where an article of explosive (e.g. booster, detonator, cartridge) is unaccounted for, does it have to be reported?**

   Yes, it does. A full investigation must be conducted to try and locate and account for the lost item. Where possible, better practices should be implemented to prevent a recurrence.

5. **May radio transmitters or mobile phones be brought inside an explosives magazine?**

   No. They are considered a prohibited article that cannot be brought inside a magazine (see clause 4.3.1 of Australian Standard AS 2187.1 *Explosives – Storage, transport and use – Storage*).

COMMUNIQUÉ FROM 55TH CCIM

The 55th annual Conference of Chief Inspectors of Mines (CCIM) was held in Western Australia from 8-13 September 2013. The conference was hosted by the Western Australian Department of Mines and Petroleum, and chaired by Papua New Guinea's Chief Inspector of Mines, Mohan Singh. There was also representation from the Northern Territory, Queensland, New South Wales, Victoria, South Australia, New Zealand and the Australian Commonwealth Government.

PRE-CONFERENCE ACTIVITIES

Four Western Australian operations were visited before the formal proceedings commenced:

- Rio Tinto's Nammuldi iron ore mine to view the Autonomous Haulage System Project
- Perth Mint Refinery
- the Perth operations centres for Pilbara based iron ore mining, processing, rail transport and ship loading for both Rio Tinto and BHP Billiton.

The Chief Inspectors appreciated the time given by operational staff at all sites to outline operations, safety, current initiatives and programs. Visits of this nature provide the CCIM with a collective opportunity each year to interact with site personnel and to exchange experiences across jurisdictions. These have become a valued and informative part of the Conference process.

CONFERENCE

Fatalities and major incidents (in-camera)

The CCIM reviewed in-camera circumstances involving fatalities and high potential, major or significant incidents over the last twelve months. An analysis of the contributing causes and circumstances was presented to share the lessons learnt between jurisdictions. Discussions of this nature provide the CCIM with a unique opportunity each year for an important exchange on sensitive issues.

National Mine Safety Framework (NMSF)

The NMSF Secretariat provided a paper on the current implementation status of the NMSF strategies. Members noted that the NMSF Steering Group was formally dissolved by the Standing Council on Energy and Resources (SCER) in May 2013. Given the ongoing nature of some activities, particularly in relation to the National Mine Safety Database, Steering Group members have agreed to continue to meet on an informal basis once each year. This will ensure the continuation of a tripartite process to monitor consistency and provide advice to governments.

Governance issues

Discussion topics included:

- diesel particulate studies currently underway towards a national code of practice
- safety training
- implementation in New Zealand of the core regulations of the NMSF
- a risk analysis of 13 years of fatalities in Western Australia
- inspector training to Diploma level
- responses within jurisdictions following the Pike River Royal Commission
- safety concerns in crane design and lifting practices
- Institute of Quarrying Australia equivalent certificate
- revitalising the competency advisory committee.

Members also provided updates on the current issues and situation in each of the jurisdictions represented.

CCIM has now concluded its fourth year as an independent body. CCIM members have successfully continued ongoing dialogue, contact and sharing of solutions. The CCIM, as the peak body for mining regulators, has proven to be an effective forum to exchange information, share experience and lessons learned, and develop consistency in the spirit of harmonisation.

CCIM 2014

The 56th Conference of Chief Inspectors of Mines is scheduled to be held in Queensland from 12 to 17 October 2014.

Left to right: Asa Masterman (DIRD), Wayne Clayton (Qld), Keith Ryan (NTC), Adrian Tusek (CASA), Stephen Lane (DMP), Peter Drygala (DMP), Natalie Higgins (Vic), Ryan Brogden (Qld), Eric Shewchuk (DMP), Ray Clifford (SA), Adrian Simonetta (Vic), Tony Smith (AMSA), Dave Chamings (NSW), Heidi Connell (DIRD), Colin Rannard (NSW)

NATIONAL MEETINGS ON DANGEROUS GOODS TRANSPORT

From 12-15 November 2013, the Department of Mines and Petroleum successfully hosted two national groups looking at the road and rail transport of dangerous goods.

Membership of the Competent Authorities Panel (CAP) and Transport of Dangerous Goods Maintenance Group (TDGMG) are similar, with both comprising representatives from all States and Territories as well as the Federal Department of Infrastructure and Regional Development (DIRD) and National Transport Commission (NTC).

Members with observer status include the Australian Maritime Safety Authority (AMSA), the Civil Aviation Safety Authority (CASA) and the Australasian Fire and Emergency Services Authorities Council. The group is currently debating how best to achieve the necessary input from industry groups by inviting specific industry representatives to participate in the discussions.

COMPETENT AUTHORITIES PANEL

The role of the CAP is to decide on national exemptions, determinations and approvals for dangerous goods transport by focusing on desirable industry outcomes while preserving public safety. Stephen Lane, Senior Dangerous Goods Officer with Resources Safety, is the Panel's new chair. The topics discussed at the 12-14 November 2013 meeting were far ranging.

Performance testing of dangerous goods packaging

Following a workshop on dangerous goods package approvals, CAP agreed that testing laboratories accredited by the National Association of Testing Authorities (NATA) would be appointed as authorised bodies to approve performance-tested dangerous goods packaging. Once implemented, this initiative will reduce red tape and delays for industry when seeking national approvals for packages that are subject to performance testing. In effect, the testing laboratory will assume the role of the competent authority in the approval process.

Transport of plastic aerosol dispensers

A current topic of discussion for CAP is how best to deal with an industry submission to allow the transport of plastic aerosol dispensers. The 7th edition of the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG7) requires aerosol dispensers to comply with the materials, construction, filling and performance standards laid down in Australian Standard AS 2278.1 *Aerosol containers – Metal aerosol dispensers of capacity 50 mL to 1000 mL inclusive*, but these are considered inadequate for the special requirements of plastic aerosol dispensers. Although the Australian aerosol industry recognises the need for a suitable standard for plastic dispensers, it has not yet agreed on what that standard might involve.

CAP recognises the desirability of plastic aerosol dispensers for the consumer and is working with the aerosol industry on the selection of performance standards that will ensure the integrity of the dispenser.

Stability of tanker trailers carrying dangerous goods

Deliberations are continuing over a New South Wales proposal to mandate rollover stability control for dangerous goods tanker trailers. This follows a 2009 petrol tanker incident that caused multiple fatalities. Incorporating stability control systems to complement trailer design is seen as a positive initiative within the heavy vehicle industry, especially for new vehicles. This proposal obtained further support among CAP members in the light of the October 2013 petrol tanker fire at Mona Vale.

UN proposals

Another function of CAP is to help the Australian representative from DIRD at the United Nations (UN) meetings of the Sub-committee of Experts on the Transport of Dangerous Goods come to a position on the numerous current UN proposals

The UN meetings are held biannually in Geneva and determine amendments to the UN Recommendations on the Transport of Dangerous Goods, Model Regulations (commonly called the Orange Book) as well as the associated UN Manual of Tests and Criteria. The latter gives the laboratory and field tests necessary to correctly classify dangerous goods.

Visit www.unece.org/trans for more information on the UN's global role in transport.

TEST SERIES 8 (TS8) FOR "AMMONIUM NITRATE EMULSION OR SUSPENSION OR GEL, INTERMEDIATE FOR BLASTING EXPLOSIVES" (ANE) OF UN 3375 OF DIVISION 5.1

Over recent years, and with the help of the Australian Government representative, the Australian Explosives Industry Safety Group (AEISG), which represents commercial explosive manufacturers, has tried to introduce appropriate changes to TS8 for ANE.

Australian explosives manufacturers are world leaders in ANE technology and research, and are working on replacing one or two of the current classification tests with more meaningful and reproducible tests. This has already led to amendment of existing TS8 tests in Section 18 of the UN Manual of Tests and Criteria. The UN subcommittee of experts has subsequently tasked AEISG with completely rewriting TS8. This work should be presented to the UN in mid-2014.

Note: None of this work has questioned the relevance of Test 8(b), which is the ANE Gap Test to determine the sensitivity of the ANE to intense shock. This is a key test of the series, and is used by Australian explosive manufacturers to demonstrate to regulators that their ANEs are of Division 5.1, rather than of Division 1.5D.

TRANSPORT OF DANGEROUS GOODS MAINTENANCE GROUP

This committee, chaired by Keith Ryan, from the NTC, is responsible for amending the national model regulations on the land transport of dangerous goods and ADG7. It regularly updates ADG7 with the latest changes to the UN's Orange Book.

All proposed amendments with an economic impact are required to undergo a Regulatory Impact Statement (RIS) to inform the TDGMG's decision making. All proposals are then voted on by the Standing Council of Transport and Infrastructure (SCOTI), which is the national Ministerial Council.

On 15 November 2013, when TDGMG met, SCOTI agreed to the NTC's Dangerous Goods Reform Package No. 2, which was previously prepared by the TDGMG. All States and Territories will now implement this reform package by preparing regulatory amendments to take effect on 1 July 2014. There will be a transition period of 12 months to allow sufficient time for industry to implement changes. The reforms will include most of the changes from the 17th edition of the UN's Orange Book.

The group is already working on the next round of regulatory amendments. This includes unresolved issues deferred from the previous discussions such as:

- best regulatory treatment for diesel fuel
- best simplified treatment to control dangerous goods packaged in small or "Limited Quantity" packaging (less than 5 kg/L).

It will also examine the changes included in the 18th edition of the UN's Orange Book with a view to including them in ADG7. The NTC will ask SCOTI to agree to Dangerous Goods Reform Package No. 3 in November 2014.

Visit **www.ntc.gov.au** for more information on the NTC's dangerous goods reform packages.

SHOULD DIESEL FUEL BE TREATED AS A DANGEROUS GOOD DURING TRANSPORT?

Diesel fuel has a flashpoint above 60°C. In accordance with the classification criteria outlined in ADG7 Chapter 2.3 Class 3 – Flammable liquids, there is no requirement to treat diesel as a dangerous good, and this has been a long-standing practice.

In recent years, some oil companies have classified the above "high flashpoint" diesel fuel as Class 9 – Miscellaneous dangerous substance of UN 3082 (Environmentally hazardous substance, Liquid, N.O.S.) in accordance with the classification criteria of ADG7 Section 2.9.3. They have done this on the basis of potential harm to the aquatic environment. Such a classification would normally require the substance to be treated as a dangerous good during transport.

However, the treatment of diesel as a dangerous good is in conflict with Australian Special Provision AU02, which holds that high flash point diesel is not subject to ADG7 if it does not meet the criteria of Chapter 2.3 for assignment to Class 3. When the *Australian Code for the Transport of Dangerous Goods by Road and Rail* was first drafted, no-one foresaw the possibility of diesel being classified into the new UN entry of UN 3082.

TDGMG is currently debating how to amend AU02. While it would be easy to qualify AU02 to confirm that diesel is a dangerous good of UN 3082, most people regard the flammability of diesel as the primary hazard, and the environmental hazards to the aquatic environment as a secondary hazard. The emergency services make a good case for wanting to exclude diesel fuel tankers from entry into tunnels because of the flammability risk. There have been huge fires following crashes involving diesel tankers.

While this debate is being resolved through regulatory amendments to ADG7, Australian regulators are advising industry to maintain their current practices for diesel regarding placarding and transport.

TYC

DANGEROUS GOODS SAFETY

STATUTORY REVIEW OF THE *DANGEROUS GOODS SAFETY ACT 2004*

The Department of Mines and Petroleum has commenced the five-year statutory review of the *Dangerous Goods Safety Act 2004*. The Minister for Mines and Petroleum, the Hon Bill Marmion MLA, must review and prepare a report on the operation and effectiveness of the Act, and table it before each house of the Western Australian Parliament.

The review is being carried out in the context of the regulatory reform program to align safety legislation in Western Australia with the national model workplace health and safety legislation. It also has regard for the structural reform of Resources Safety, which is aimed at improving operational effectiveness and efficiency.

The review involves the preparation of a discussion paper to be released in February 2014, and consultation with key stakeholder representative groups, dangerous goods licence holders and the general public. The discussions focus on three key themes:

- legislation
- application and effectiveness
- organisation.

After analysis of the feedback, a final report will be provided to the Minister in May to present to Parliament. The review process is expected to be completed in July 2014.

Consistent with the aims of the Reform and Development at Resources Safety (RADARS) strategy, this review is an opportunity to identify and implement improved legislative and operational approaches. The Department is interested in hearing from those affected by, or with an interest in, dangerous goods regulation.

The review will be coordinated and drafted by an independent consultant, George McCullagh. This will ensure all points of view are given due consideration and the report provides an unbiased appraisal and recommendations for improvement where appropriate.

As the review progresses, information will be available on the Department's website and an update provided in the next issue of *Resources Safety Matters*. Subscribe to Resources Safety's weekly news alert to be kept informed.

RELOCATION OF BALDIVIS EXPLOSIVES RESERVE

The Baldivis Explosives Reserve is set to move after 30 years in operation. The reserve is being relocated following a State Government decision to allow for residential redevelopment as part of a major LandCorp urban expansion project.

An exhaustive search was conducted for a new site that had the required safety buffers as well as being protected from urban encroachment for decades to come. The chosen site is located about 120 km south of Perth, in a pine forest off Johnston Road at McLarty, 2 km east of the Old Coast Road.

The McLarty site will allow the same activities as the existing reserve — explosives manufacture and storage, and ammonium nitrate storage — activities that have happily coexisted with neighbouring residential areas for decades without incident.

Construction of the new facility will commence in about two years as the site sits on a valuable sand resource, much of which needs to be mined first. The new site will be provided with a gatehouse and maintenance workshop, security fences and electronic surveillance, roads, power and water for emergency services. An area outside the main reserve will be used for transportable offices. The relocation is being used as an opportunity to plan a high quality facility that is flexible and will serve the needs of industry well into the future. There is also ample room for expansion if required.

The Baldivis site, which is currently at capacity, will cease operations in 2017.

The Department of Mines and Petroleum operates three other explosives reserves in Western Australia. There is a large manned site at Kalgoorlie and two unmanned sites at Karratha and Pippingarra, near Port Hedland. These reserves offer a valuable service to the explosives industry as they are cost effective, eliminate planning approval problems, and provide certainty of tenure and protection from encroachment by incompatible land uses.

Philip Hine, Director Dangerous Goods

PETROLEUM SAFETY

TAKING AIM AT ASSET INTEGRITY

The management of safety regulations under the petroleum legislation requires, among other things, an operator to have documented arrangements within their safety management system to ensure the facility, plant, machinery and equipment are always maintained in good condition and are fit for purpose.

The regulations are not prescriptive and allow operators to determine how best this can be achieved, taking into account factors such as the operation's activity, circumstance and location.

One methodology is to consider an asset integrity management system (AIMS) as an integrated approach. An AIMS allows operators, particularly those with large-scale petroleum facilities, to demonstrate that, as far as is reasonably practicable, they have ensured the integrity of their assets.

The benefits of this are obvious from a safety perspective — machinery, plant and equipment failures can have serious consequences to the safety and health of the workforce and to the environment. Failures of high pressure gas transmission pipelines that are located in, or near, populated areas could also have catastrophic consequences in relation to the general public.

From a commercial point of view, poor maintenance, inspection and monitoring regimes can result in unexpected downtime, costly repairs and the consequential loss of production. If supply is interrupted, particularly in relation to gas transmission, the economy and community may be affected. Penalties may also apply as there is a legislative requirement to ensure continuity of supply.

To assist industry, Resources Safety has a guide to evaluating an AIMS. Although published specifically for the energy resources sector, the minerals sector and other industries may find it to be a useful document. It contains an evaluation checklist that can be used to quickly assess whether the systems, processes and procedures adopted for any operation are sufficient to demonstrate that appropriate levels of asset integrity can be assured.

Visit the petroleum safety publications section at **www.dmp.wa.gov.au/ResourcesSafety** to download the guide.

UPDATE ON PETROLEUM SAFETY LEGISLATIVE AMENDMENTS

The State and Commonwealth's petroleum safety regimes exist side by side. The State has jurisdiction over coastal waters up to the three nautical mile limit from the baseline along its coastal boundaries. After this point, the Commonwealth safety regime applies.

It is important for the efficient regulation of the petroleum industry that these two regulatory schemes are as harmonised as possible. This is to ensure there is no confusion within industry regarding similar provisions under each legislation.

A gap analysis carried out recently to determine the extent of deviation between the offshore safety regulations and those covering coastal waters identified a number of inconsistencies. Documentation is now being prepared to seek Ministerial approval to effect the appropriate regulatory amendment.

Previously identified areas of duplication and inconsistency between the various State Acts that regulate safety in the petroleum industry, the *Dangerous Goods Safety Act 2004* and the *Occupational Safety and Health Act 1984* also need to be rectified.

The amendments to address these anomalies are currently being drafted by Parliamentary Counsel.

Alan Gooch, Director Petroleum Safety

STAY ALERT TO AVOID DÉJÀ VU

Resources Safety issues safety alerts for the minerals and energy resources sectors in Western Australia, but we can all learn from others. Why do we repeat others' mistakes when we know the outcome is likely to be the same?

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) issued Safety Alert 56 in April 2013 covering the hazard of dropped objects. The predominant root causes were identified as:

- poor design of equipment
- work procedures followed incorrectly
- wrong procedures used or no procedures used
- dropped objects not anticipated and factored into the planning for the work
- lack of training, instruction and understanding of the task
- preventive maintenance issues.

Visit **www.nopsema.gov.au/safety/safety-alerts** for more information.

The dropped object hazard was also the subject of the latest Petroleum Safety Significant Incident Report No. 06/2013, issued for Western Australian industry in December 2013. As expected, the causes reflect many of those highlighted in the NOPSEMA safety alert.

Safety alerts can be timely reminders to review a site's procedures and practices. Other sources of safety guidance include:

- Australian Maritime Safety Authority (AMSA) **www.amsa.gov.au**
- Australian Petroleum Production and Exploration Association (APPEA) **www.appea.com.au/safety-environment**
- Australian Transport Safety Bureau (ATSB) **www.atsb.gov.au/publications/recommendations**
- Civil Aviation Safety Authority (CASA) **www.casa.gov.au**

Left to right: Eric Magee, Waeel Ilahi, Graham James, Doug Barclay, Andrew Chaplyn and Neil Woodward

MINES SAFETY

INSPECTORS GATHER TO SUPPORT LEADING PRACTICE PRINCIPLES

Regulatory excellence was at the forefront of the Department of Mines and Petroleum's Mines Inspectors Forum held in late October 2013.

This biannual in-house event gives Western Australia's mines inspectors an opportunity to meet colleagues from across the State; discuss their concerns and challenges; and listen to other inspectors, Departmental staff and external experts talk about latest developments in safety-related fields.

The forum helps the mines inspectorate to consolidate and communicate policy decisions, revisit the inspectorate's top ten priority targets as well as determining what needs attention in the next six months or so.

Presentations at the forum included a report on the 55th annual Conference of Chief Inspectors of Mines (CCIM), the lessons learnt from recent investigations and prosecutions, what is happening in Western Australia's regions, and the latest on the diesel emissions study of underground mines. There were discussions about specific hazards and work practices of concern to the inspectors, as well as feedback on training courses.

The program was enhanced by industry presentations on supporting positive cultural change and improving work practices, as well as learning in a complex world.

The Mines Inspectors Forum has an important role in supporting the five principles of leading practice safety regulation:

- Transparent – we have clear rules and processes
- Accountable – we explain our performance
- Consistent – the same outcome is sought, although our approach may differ depending on the circumstances
- Proportionate – our actions are guided by the safety and health risk
- Targeted – we focus on the most important safety and health outcomes.

MINES SAFETY WELCOMES NEW STAFF

Late 2013 saw the recruitment of key personnel for the leadership team in mines safety, with three new Regional Inspectors and three Team Leaders now confirmed in their roles. They are ready to work towards delivering the inspectorate's operational plan and meeting the challenges of promoting a resilient safety culture across the industry.

I would also like to thank the staff who previously worked in some of these roles, and recognise their contribution to implementation of the Reform and Development at Resources Safety (RADARS) strategy over the last three years.

The new Regional Inspectors are:

Neil Woodward – North
Graham James – West
Doug Barclay – East

The new Team Leaders include:

Eric Magee – Mid West
Waeel Ilahi – Kimberley
Tony Robertson – South West

Andrew Chaplyn, Director Mines Safety

2014 ROADSHOW DATES

27 February — Exploration Safety Roadshow Newman

05 March — Exploration Safety Roadshow Kalgoorlie

07 March — Exploration Safety Roadshow Perth

10 October — Mines Safety Roadshow Geraldton

14 October — Mines Safety Roadshow Bunbury

16 October — Mines Safety Roadshow Kalgoorlie

21 October — Mines Safety Roadshow Newman

22 October — Mines Safety Roadshow Karratha

23 October — Mines Safety Roadshow Port Hedland

28 October — Mines Safety Roadshow Mandurah

29 October — Mines Safety Roadshow Perth

Which hazard will be demonstrated at this year's Mines Safety Roadshow? Will it involve mouse traps and Mars Bars?

Avoid the traffic jam on the Kwinana Freeway – Mandurah is now on the Mines Safety Roadshow itinerary

PHASE 3 DANGEROUS GOODS REGULATORY REFORMS

Since the *Dangerous Goods Safety Act 2004* commenced operation in March 2008, it has undergone a series of adjustments aimed at improving the operation of the regulations and, wherever possible, reducing the administrative burden they impose. The third phase of the reforms took effect on 1 January 2014.

Some of the more significant elements are outlined below. Visit the dangerous goods publications section at www.dmp.wa.gov.au/ResourcesSafety for more detailed information.

EXPLOSIVES AND SRS

There have been significant changes for explosives and security risk substances (SRS) licensees.

- Once consultants have been trained and authorised, licence applications can be endorsed by an accredited consultant instead of being submitted to the Department of Mines and Petroleum for assessment. Applications from consultants are typically processed within two weeks.
- While companies must have a responsible person at all times, they no longer have to:
  - supply the name of that person with a licence application
  - provide updated information when that person changes.

  Also, failure to have a responsible person is no longer an automatic trigger of licence cancellation. Companies need to keep a record of the personal details of their responsible persons, who are now called "qualified officers".
- The term "secure employee" has been replaced with "secure nominee". Instead of requiring their own licence, non-employee subcontractors may now be authorised by licence holders to have unsupervised access to the licence holder's explosives or SRS in accordance with a licensee's security plan. To support this, the authorisation must now be in writing and contain prescribed information. All licence holders need to renew the existing authorisation of their secure employees as secure nominees and the nominees must formally acknowledge that they understand that authorisation. To allow time for implementation of this new approach, a three-month transition period runs until the end of March 2014. A template to assist with the authorisation process is available in the dangerous goods publications section of the Resources Safety website.
- Licences may now be transferred to another licensee, subject to review and update of the explosives or security management plan.
- Holders of an explosives transport licence may now store Division 1.4 explosives in their transport yards without the need for an additional explosives storage licence as long as basic security and storage requirements are observed in accordance with the regulations.

DANGEROUS GOODS IN PORTS

The regulation of dangerous goods in ports has been changed to improve the standard of safety management at these facilities.

- The Dangerous Goods Safety (Goods in Ports) Regulations 2007 have been repealed and the special berth requirements for explosives and explosion risk goods such as ammonium nitrate have been relocated to the explosives and storage and handling regulations.
- The threshold for requiring a special berth declaration for ammonium nitrate has been reduced from 400 tonnes in freight containers (or 150 tonnes in intermediate bulk containers or IBCs, not further packaged into freight containers) to 30 tonnes to ensure adequate safety measures are applied to all shipments of these goods.
- The regulations have been simplified by consolidating all mandatory requirements. These were previously spread across the goods in ports regulations, the Australian Standard AS 3846 and a Resources Safety guidance note. This has significantly reduced prescription in favour of a risk-based approach.
- Port operations involving greater than manifest quantities of dangerous goods now require licensing. This brings ports into line with comparable activities elsewhere.

A six-month transition period is in effect for the new special berth threshold quantities and licensing arrangements.

DRIVING HOME THE DANGEROUS GOODS SAFETY MESSAGE

PROSECUTION

On 8 November 2013, the Department of Mines and Petroleum successfully prosecuted a transport company for transporting fireworks without a licence. The company pleaded guilty to offences under sections 12 (unlicensed possession of dangerous goods) and 15(1) (unlicensed driver transporting dangerous goods) of the *Dangerous Goods Safety Act 2004*. A penalty of $5,000 plus costs of $100 were imposed.

The non-compliant transport activity was identified during a road block conducted by the WA Police.

The company has subsequently taken actions to increase its awareness of, and compliance with, dangerous goods transport requirements.

NORTHBRIDGE TUNNEL ENFORCEMENT

Northbridge Tunnel operators, who have been trained by Dangerous Goods Officers from the Department, have spotted five dangerous goods vehicles entering the Northbridge Tunnel in the last year. Infringements were issued to drivers and companies.

For a tanker carting LPG (flammable gas) and two vehicles carting placard loads of LPG cylinders, each incident attracted two remediation notices, a company infringement for $1,500 and a driver infringement for $300.

A company infringement for $1,500 and driver infringement for $300 were applied to each of the remaining two incidents, which involved a truck and other vehicle carting placard loads of flammable liquids.

DANGEROUS GOODS ARE NOT PERMITTED IN POLLY'S PIPE!

For more information, see the Main Roads brochure on Navigating the Northbridge Tunnel, available in the road and traffic information section at www.mainroads.wa.gov.au/UsingRoads

SYSTEMS FAILURE LEADS TO PROSECUTION

In August 2008, Paul Sparkes died at BHP Billiton Iron Ore's Yandi mine near Newman, then operated by HWE Newman Services. The mobile maintenance supervisor was fatally struck by the arm of a tyre handler device. The arm was propelled from the device when a heavy earth-moving equipment tyre was overinflated.

Following a thorough investigation and prosecution led by the Department of Mines and Petroleum, both companies were found guilty in April 2013 of failing to provide a safe working environment.

The court heard that BHP Billiton and HWE both failed to provide the necessary equipment for safe tyre assembly, and Mr Sparkes did not receive sufficient training for the task.

In October 2013, BHP Billiton and HWE were collectively handed a total of $238,000 in fines at Perth Magistrate's Court. The companies also had to pay a total of $125,000 in court costs.

In sentencing remarks, Magistrate Steven Malley said that, while there was not a blatant disregard in relation to safety, "there was a systems failure with dire consequences."

"Although this tragic event happened over five years ago, and the majority of mining companies are now operating to high safety standards, we need to maintain our vigilance and ensure safe systems of work are maintained," said Resources Safety's Executive Director, Simon Ridge.

"It is crucial for the safety regulator to continue to hold to account those who aren't doing the right thing."

Mr Ridge said that, through the introduction of safety reforms in 2010 and a commitment from operators to developing resilient safety cultures, he hoped future tragedies like the death of Mr Sparkes could be avoided.

"It is up to all of us – companies, government and workers – to close the gap between the incidence of serious injuries and fatalities and our aspirational goal of 'zero harm'."

LEGAL PROFESSIONAL PRIVILEGE AND THE INVESTIGATION PROCESS

Mines inspectors undertake an investigation to determine if there have been breaches of the legislation. However, just as importantly, they also gather information for safety alerts so the lessons learnt can be shared with industry to help prevent recurrences.

For sites, there are both reactive and proactive reasons for undertaking effective investigations to meet the aims of the *Mines Safety and Inspection Act 1994*.

Reactive – What went wrong?

Proactive – How can we stop it happening again?

We should strive to get value from our investigations so we can correctly identify and address the root causes of events. We need as much information about the incident as possible — and people need to feel that they can provide it freely. This is a feature of a resilient safety culture.

It is important that investigators are able to gather information while it is still fresh in people's minds and reflects what actually happened.

Safety information can then be shared across industry, without delay, with the aim of raising awareness of the issues identified during the investigation and more effectively controlling the hazards.

During investigations by Resources Safety, some companies claim legal professional privilege for information or documents gathered during the company's own investigation. Registered Managers and companies are required by law to make an assessment of the hazard and whether there is any ongoing risk to safety, and to determine what measures to take to resolve any issues. Accordingly, the company's investigation reports and other material are likely not privileged, having not been prepared for the dominant purpose of legal advice or use in contemplated legal proceedings.

In an ideal resilient safety culture, the company is committed to working with the regulator to find out what went wrong and how, and sharing the lessons learnt to improve safety in their workplaces — and across the resources sector.

By working together, we can close the gap between actual safety performance and the aspirational goal of "zero harm".

WHAT IS LEGAL PROFESSIONAL PRIVILEGE?

Legal professional privilege is a privilege claimed by a client to withhold information or documents that would reveal **confidential communications** between lawyer and client made for the **dominant purpose** of:

- giving or obtaining legal advice or
- providing legal services, including representation in legal proceedings that have actually commenced or are anticipated by the person claiming legal professional privilege.

The privilege applies to communications as well as documents. It will prevent access to oral communications and records of communications in any form.

Legal professional privilege serves the public interest, and underpins the rule of law, by facilitating free communication between the client and the legal adviser. Legal professional privilege protects communications, not documents *per se* and even less so the information given by or obtained in those documents.[1]

There is no application of legal professional privilege to information itself that witnesses can provide under compulsory interview, about what they have observed or what conclusions they can draw from those observations. The witness must answer the questions.

The communication must be confidential, made in a confidential manner and confidentiality must be preserved. If the communication or the record has been disseminated or made public, it would not be confidential.

Privilege extends to communications with a third party for the benefit of the lawyer's client, provided the dominant purpose is legal advice. For example, a confidential opinion from an engineering consultant or a witness statement obtained for the dominant purpose of actual or anticipated legal proceedings would be privileged.

Privilege also prevents the disclosure of documents that record legal work carried out by the lawyer for the benefit of a client, such as notes or research memoranda.

Documents such as contracts, accounting records, internal reports and memoranda that were not created for the dominant purpose of legal advice or litigation will not be covered by legal privilege, even if they have been lodged with the lawyer for the purpose of obtaining legal advice.

WHAT IS THE TEST FOR LEGAL PROFESSIONAL PRIVILEGE?

The test for whether a confidential communication is privileged focuses on the purpose for which the communication was made, not the information in the communication. Where there is more than one purpose, the communication will not be privileged unless the claimant (client) demonstrates that the dominant purpose was legal advice or litigation. If there is an equally valid reason for the creation of the communication then it is not privileged.

A document or other form of confidential communication will be protected by legal professional privilege if it has been created for the dominant purpose of obtaining legal advice or preparing for, or conducting, court proceedings. This is called the "dominant purpose test".

If the communication was created for more than one purpose, then the person claiming legal privilege must establish that the dominant purpose was to seek or give legal advice or to conduct litigation. For example, a report produced for the purpose of obtaining legal advice may also provide an evaluation of a particular procedure. The report would still be privileged. If, however, it was created primarily to evaluate particular operating procedures of the organisation, it would not be privileged.

APPLICATION OF LEGAL PROFESSIONAL PRIVILEGE TO AN INVESTIGATION

Interviewing witnesses

An inspector will generally attend a site to investigate an incident or occurrence shortly after the incident or occurrence takes place.

If the employer has obtained a statement from any person, this will not affect the inspector's investigation. The inspector has the power to interview any person who he or she believes can provide information about the incident or occurrence.

Privileged documents

Only confidential communications between a lawyer and client, brought into existence for the dominant purpose of obtaining legal advice, or for use in actual or contemplated legal proceedings, are privileged.

Documents such as contracts, employee records, maintenance records and work systems will not be privileged, even if they have been given to the company lawyer for the purpose of providing legal advice or for litigation.

Communications with the company lawyer seeking advice about the legal position of the company may have been made immediately after the accident or occurrence. These communications will be privileged, but are unlikely to be relevant to the conduct of the investigation.

Documents produced by the company following its own investigation will only be privileged if they are confidential communications between the company and its lawyer for the purpose of obtaining legal advice, or for litigation. For example, an investigation carried out by a safety and health representative would not be privileged.

All other corporate documents should be available to be produced upon request.

Claim of legal privilege in a document

Adequate opportunity to make a claim

The inspector is required to give adequate opportunity for the company representative to claim legal professional privilege for particular documents, unless there is no possibility of privilege being applicable.[1]

The claim

A claim of privilege to resist the production of documents should be made clearly and precisely. An assertion that a document is protected by privilege will not, on its own, be enough.

The claim must be made and justified for individual documents. A blanket claim for a group or bundle of documents is not valid.

The person claiming legal professional privilege has the onus of proving that the claim is valid. They must provide sufficient information to enable the inspector to determine whether the particular document will be privileged.[2]

The following information is required to make an informed decision:

- a clear description of the communication including the date on which it was made (e.g. fax from...to... regarding...dated...)
- justification of the claim for privilege. Each document must satisfy all the elements of privilege to justify the claim for non-disclosure:
  - there must be a lawyer–client relationship
  - the privilege must be claimed for a confidential communication between a client and lawyer, or with a third party for the benefit of the client
  - the communication must have been made for the dominant purpose of obtaining or giving legal advice, or for providing legal services in respect of actual or anticipated legal proceedings.

Where a communication has been brought into existence for more than one purpose, the person claiming the privilege must establish that the dominant purpose is for legal advice or litigation.

The person claiming privilege does not have to give information that would reveal the content of the document, but should provide sufficient evidence to demonstrate objectively that the claim is valid.

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1 Federal Commissioner of Taxation v Citibank Ltd (1989) 89 ATC 4268 at 4293

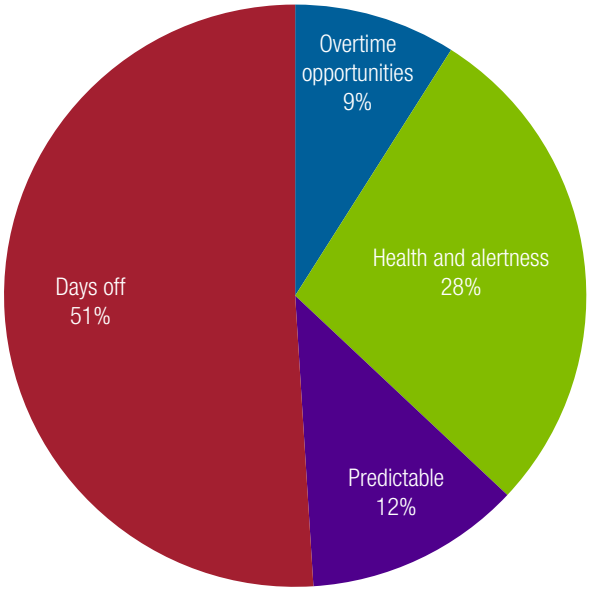
2 Re: National Crime Authority v S (1991) 29 FCR 203; (1991) 54 A CRIM R 307

ERRATUM – DO YOUR ROSTERS MINIMISE FATIGUE?

Fatigue and working hours are one of Resources Safety's top ten priorities for the mines inspectorate, and are typically at the top of the list when roadshow participants are asked what they would like to hear more about. In volume 1, number 3 of Resources Safety Matters, published in September 2013, Jim Huemmer of Shiftwork Solutions discussed how rosters and actual hours of work can be tailored to an organisation's needs and its workforce while minimising fatigue. Unfortunately, the graphs in Figure 3 on page 24 were switched in the print version. They are reproduced below in the correct order.

WHERE ARE WE HEADING?

Perspective in 1994



Perspective today

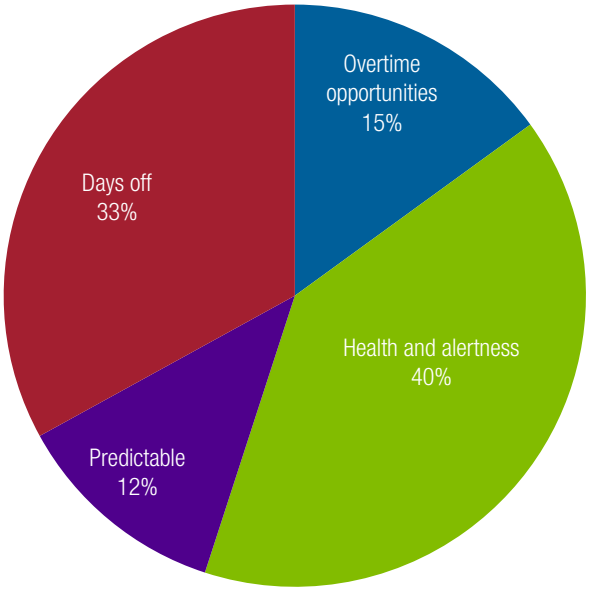


Figure 3 Pie charts showing change in worker sentiment regarding most desired improvement to their working lives

GETTING ON TOP OF BULLYING

A peak in 2013 in bullying reports for mine sites in the South West prompted the Department of Mines and Petroleum to launch an awareness program aimed at the region's 60 medium- and large-scale mines.

From January 2011 to August 2013, Resources Safety received triple the number of reports related to bullying at South West mines compared to the previous three years, although the total number of reports over the last three-year period was still in the single-digit range. To help industry address this trend, Resources Safety has adopted a proactive approach whereby inspectors scrutinise a mine's preventative systems, policies and procedures.

South West Team Leader Tony Robertson, who heads the region's Collie-based team of six, said that the program provides information to companies to ensure they fulfil their duty of care.

To promote this process, Resources Safety has developed a new anti-bullying checklist for inspectors and industry to use alongside the code of practice on the prevention and management of violence, aggression and bullying, and accompanying guideline on dealing with bullying at work.

"South West mines have been sent a copy of this checklist so they have a fair understanding of what our inspectors are looking for when inspecting a site," Mr Robertson said, adding that the safety and health of resources industry workers in Western Australia remains the number one priority for the Department.

"We know there is a potential for workers to suffer serious and long-term health effects from bullying — something that is completely unacceptable," Mr Robertson said.

"We firmly believe that raising awareness with proactive programs like this is the best way to reduce work-related injuries and illnesses."

Minister for Mines and Petroleum, Bill Marmion, who recently visited Resources Safety's Collie office, echoed Mr Robertson's sentiments and said that Resources Safety's South West Mines Safety Team had his full support during its campaign.

"Bullying is just not acceptable in this day and age," Mr Marmion said. "However, we know it can still occur, so that's why the work of my Department's Collie-based inspectors is so crucial."

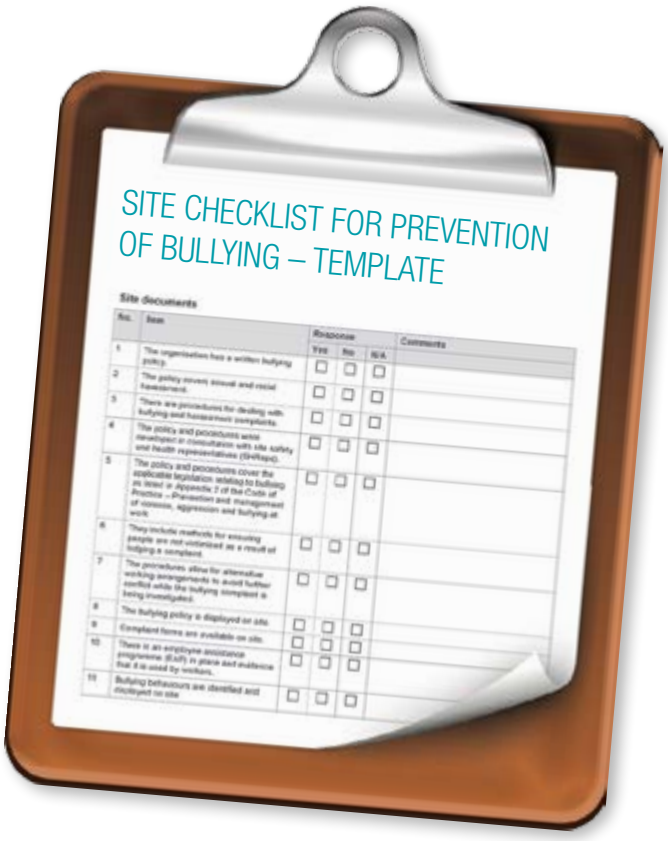
"While most companies and workers are doing the right thing, we must stamp out any instances of this behaviour."

Mr Robertson added that, while Resources Safety provides guidance material to assist, ultimately, it is industry's responsibility to ensure bullying issues are resolved onsite.

"In saying that, though, if companies are not doing the right thing, our inspectors have the power to take enforcement action to help prevent bullying," he said.

"This includes issuing sites with improvement notices that require companies to demonstrate how they will remedy ineffective anti-bullying or preventative measures onsite."

Visit **www.dmp.wa.gov.au/16878.aspx** for further information on the prevention of bullying, aggression and violence.



SEASONAL HAZARD ALERT

Operations in Western Australia need to be prepared for summer, which brings its own suite of natural hazards, particularly in the north of the State. Here is Resources Safety's annual reminder to remain vigilant.

Some useful links and articles are listed on pages 36 and 37 of the January 2013 issue of *Resources Safety Matters* (vol. 1, no.1).

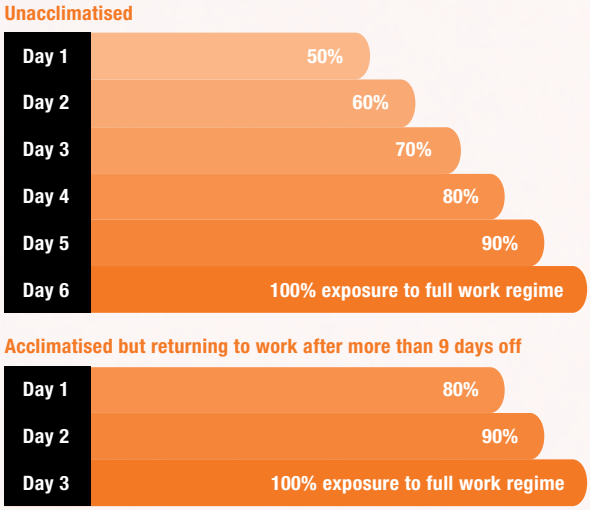
HEAT

Management and workers should be aware of the risks associated with high temperatures, especially in summer. Heat stress may be experienced in varying degrees, and exacerbated by underlying medical conditions.

Dehydration can be associated with heat stress.

Does your operation have an acclimatisation schedule for hot working conditions?

Recommended acclimitisation schedule



THUNDERSTORMS

Severe thunderstorms are localised events. They usually affect smaller areas than cyclones and so their effect may be underestimated.

Flash flooding may occur when thunderstorms pass over an area.

Lightning is associated with thunderstorms and workers should be aware of the risk of lightning strikes.

What is your operation's procedure for working during thunderstorms?

BUSHFIRES

When temperatures rise, so too does the risk of bushfires.

What is your operation's policy on hot work as the fire danger rating increases?

CYCLONES

The cyclone season in Western Australia starts in November and typically extends to April. While this weather phenomenon is forecast and warnings are broadcast, cyclones can be unpredictable.

The high winds may be destructive and extensive rainfall can be expected with possible flooding.

Is your operation prepared for high winds?

MOSQUITO-BORNE VIRUSES

Mosquito-borne diseases can be debilitating or even fatal. The diseases of concern in Western Australia are:

- Ross River virus disease
- Barmah Forest virus disease
- Kunjin virus disease
- Murray Valley encephalitis (MVE).

Mosquitoes thrive in warm water that may remain after rain or flooding. There are no specific cures or vaccines for any of these mosquito-borne diseases.

Do you take care to prevent being bitten by mosquitoes and avoid mosquito habitats where possible?

SHINING A GUIDING LIGHT ON UNDERGROUND SAFETY

Fire is a serious hazard for all mining operations, outbreaks of fire can be particularly dangerous in the underground environment.

This is due to the:

- confined nature of excavations
- potential quantity of smoke and noxious fumes
- restricted ability to evacuate quickly from the mine.

With the release of two complementary publications in late 2013, a planned trio of guidelines for underground mines is well on its way to completion.

The following guidelines were endorsed by the tripartite Mining Industry Advisory Committee (MIAC) following extensive industry collaboration and consultation:

- Prevention of fires in underground mines
- Refuge chambers in underground mines.

PREVENTION OF FIRES

Employers have a duty of care to provide and maintain a safe working environment. The prevention of fires is a priority underground as they can lead to entrapment, smoke inhalation, serious or fatal burns, asphyxiation and other serious consequences such as explosions.

All underground mines should have a documented underground fire risk assessment that is current and specific to its operations, with appropriate controls in place to manage the risks. The fire prevention guideline will assist employers and mine operators to:

- prevent the outbreak of fires in underground mines
- minimise the effects should a fire occur.

Chapter 2 describes the hazard of fire, while Chapter 3 describes the risk management process and type of information collected and considered when assessing and addressing fire risk in underground mines.

Chapters 4 to 6 detail controls to help prevent underground mine fires and minimise the impact of fire outbreak, while Chapter 7 summarises the content of a suitable underground fire control plan.

REFUGE CHAMBERS

An atmosphere is considered to be irrespirable under conditions where there is an immediate threat to life or the potential for irreversible adverse health effects. The potential for an underground mine atmosphere to become irrespirable due to airborne contaminants derived from fire or other sources, or the loss of a fresh air supply, is well recognised. A refuge chamber can provide a safe haven while waiting for the fresh air supply to be reinstated or a rescue to be mounted.

The size, location and complexity of underground mines in Western Australia vary widely. A comprehensive risk assessment should be undertaken to determine the potential for generating an irrespirable atmosphere and the resulting requirements for refuge chambers. Regardless of the operation's risk profile, fire is the most obvious scenario to be addressed, but others to consider include:

- explosion – blasting or sulphide dust
- inadequate or loss of ventilation
- flooding
- inrush of mud or tailings
- gas outbursts or intercepts
- extensive collapse of workings
- dust
- contaminated atmosphere (old workings).

The guideline considers a range of matters relevant to refuge chambers, including their design and construction, internal features, location selection and access, and management and maintenance.

WORKING AT HEIGHT IN UNDERGROUND MINES GUIDELINE – PUBLIC COMMENT TO BE SOUGHT

This third guideline focuses on the hazard of working at height in the underground environment.

Interested in providing feedback?

Find out when the draft is available for comment by signing up for Resources Safety's weekly news alerts at **www.dmp.wa.gov.au/ResourcesSafety** or use the QR link.

STAY ALERT

The safety alerts described below are reproduced in full at the back of this magazine, and can be downloaded from the publications section at www.dmp.wa.gov.au/ResourcesSafety

UNWANTED INTERACTION

A number of interactions over the past three years between dozers and loading equipment led to the release of *Mines Safety Bulletin No. 107*. The alert discusses the issue of clean-up vehicles working within the swing radius of loading equipment, which can result in significant damage and equipment downtime, and serious injuries in worst-case scenarios.

The bulletin recommends implementing a safe system of work, including a prohibition on workers and some equipment entering the swing radius, and the use of anti-collision devices and appropriate radio communications.

CRANE LOAD TESTING

Mines Safety Bulletin No. 108 was issued as a result of uncertainty over the Standards Australia Ruling SA RUL CR.1-2013 *Rulings to cranes, hoists and winches*, and its application under the *Mines Safety and Inspection Act 1994* and Mines Safety and Inspection Regulations 1995.

Recommendations on performing and keeping records of crane load testing include guidance for crane designers and suppliers, site representatives and persons conducting the load tests.

BLASTING FLYROCK MANAGEMENT

Two blasting incidents at mine sites resulted in the combined *Mines Safety Bulletin No. 109* and *Dangerous Goods Safety Bulletin No. 0113*. Workers were exposed to flyrock while equipment was significantly damaged.

The alert emphasises the importance of effective management systems when undertaking blasting operations. This includes who should be involved in the blasting operation, and who takes responsibility for implementing controls that minimise the risks to workers and can contend with human error.

The *Code of good practice – Blast guarding in an open cut mining environment* will assist those tasked with determining safe blast exclusion zones.

FALLING BALL-MILL LINER

Mines Safety Significant Incident Report No. 187 discusses a serious crush injury sustained when an unsecured ball-mill liner plate fell on a worker preparing to remove liner plates.

The report highlights the need for safe systems of work to reduce the risk to workers involved in mill relining operations. It also recommends competency-based training for workers involved in relining work.

COLLISION ON DECLINE

Mines Safety Significant Incident Report No. 188 highlights the consequences of failing to correctly judge travelling distances and safe parking locations in an underground mine. The report emphasises the need for site traffic management plans that establish clear communication systems and provide adequate and clearly marked parking locations.

UNDERGROUND DRILL RIG TOPPLES

An underground drill rig being set up was not secured as recommended. It toppled onto the driller. This incident led to the issuing of *Mines Safety Significant Incident Report No. 189*, which recommends establishing a safe system of work for underground drilling operations. Implementing competency-based training for drillers is also advocated.

HIGH VOLTAGE ARC FLASH

The incidents reported in *Mines Safety Significant Incident Report No. 190* and *191* involved high voltage (HV) equipment. In the first, the operator received a hand injury and superficial burns, whereas equipment was seriously damaged in the second. In both incidents, serious HV arc flashes resulted when the isolating switches were operated while reactive currents were still flowing.

Both reports recommend that relevant safety measures must be known, understood and applied when dealing with HV equipment. Operational instructions must be developed by designers, site engineers and operators, and should incorporate design drawings and maintenance manuals. Sites should implement competency-based training so workers are aware of the critical tasks associated with electrical installations.

SHORT CIRCUIT ELECTRICAL FAULT

Mines Safety Significant Incident Report No. 192 was issued following a short circuit fault in a variable speed drive for a conveyor. A fire, arcing and equipment damage were the result. The report highlights the legislation that must be complied with, and recommends actions to achieve this compliance.

TAILINGS PIPE MOVEMENT – FATAL INJURY

Mines Safety Significant Incident Report No. 193 was issued following a fatal accident at a tailings dam. A large section of poly pipe slid down the embankment, pinning the worker in a shallow trench. The report stresses the importance of detailed safe work instructions that identify the hazards and controls for the jobs to be undertaken.

WRONG TOOL USED

The use of a wrong tool to perform a routine job led to the incident reported in *Petroleum Safety Significant Incident Report No. 05/2013*. Unfortunately, the worker received severe lacerations and needed to be hospitalised.

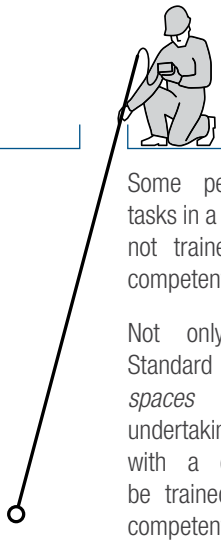
COLLAPSING MOBILE LIGHTING TOWER DAMAGES EQUIPMENT

In the incident reported in *Petroleum Safety Significant Incident Report No. 06/2013*, a mobile lighting tower collapsed onto equipment. The report recommends controlling this falling object hazard by providing sufficient information to ensure installations can be performed correctly, and routinely checking plant.

WHAT SHOULD WE WATCH OUT FOR IN CONFINED SPACES?

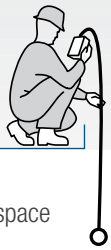
Over the past 18 months, Resources Safety has conducted a program of confined space audits of mining operations, mainly targeting alumina and nickel refineries, where confined spaces are common.

The information collected for non-compliances will not only assist Resources Safety in planning future regulatory activity, but can be used proactively by industry. Key points are summarised below — are these issues addressed at your site?



Some people carrying out tasks in a confined space were not trained or assessed as competent.

Not only does Australian Standard AS 2865 *Confined spaces* require anyone undertaking tasks associated with a confined space to be trained and assessed as competent, they are also required to be reassessed at appropriate intervals to maintain their competency.



Personnel did not notify the emergency response representative about the confined space activity they were about to undertake.

AS 2865 requires emergency response personnel to be made aware of the conditions and the number of persons in the confined space prior to any entry. The standard also requires appropriate emergency response and first aid procedures and provisions to be identified, planned, established and rehearsed.

There was no record of personnel entering confined spaces, or the records were not maintained.

The intention of keeping a record of the presence of those entering a confined space is to count and monitor their safety. This is particularly important when a large group is working inside a confined space. The record should also be used to control a worker's exposure to certain hazards such as noise, vibration and heat. Maintaining good records also allows appropriate rotation of personnel exposed to these hazards.

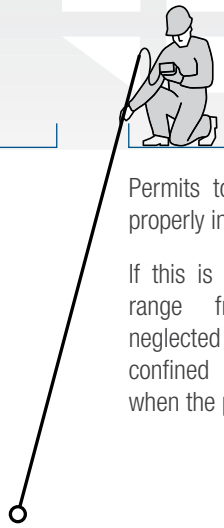
Personnel often entered a confined space without reviewing the completed risk assessment.

Reviewing the risk assessment before you enter a confined space is critical as it tells you the hazards associated with the space you are about to enter and what you are about to do.

The risk assessment must be conducted by a competent person or persons to identify:

- all hazards of the confined space
- all hazards of the tasks to be conducted
- all the required control measures
- the emergency response procedure.

Graphics from Safe Work Australia confined spaces CoP



Permits to work were not closed out properly in some cases.

If this is not done, the consequences range from housekeeping being neglected to, in the worst case, the confined space still being occupied when the process plant starts up.

CONTROLS FOR CONFINED SPACE ENTRY

The controls required for confined space entry include:

- adequate training and competency of personnel working in or around the confined space
- isolation of all energy sources and hazardous or process services (e.g. introduction of any materials, contaminants or agents) normally connected to the space.
- safe purging requirements
- atmospheric testing and monitoring
- adequate ventilation
- erection of signs and protective barriers to prevent unauthorised entry
- safety monitoring of all persons inside the space, such as:
  - provision of sentry or equivalent system of work
  - recording presence of personnel inside the space
- emergency response plan.

Resources Safety has a poster outlining what a confined space is and what should be included in a risk assessment, as well as a checklist to help with the entry process.

Contact **RSDComms@dmp.wa.gov.au** to order copies.

SWA'S CODE OF PRACTICE

Safe Work Australia's publication on confined spaces has practical guidance for safely undertaking work in a confined space.

Download your copy from the Model WHS laws section at **www.safeworkaustralia.gov.au**

FATIGUE FAQS

2012 Mines Safety Roadshow attendees participated in a workshop to review fatigue guidance documents from Safe Work Australia and the New South Wales government. It became clear during the workshop discussions that people were seeking guidance that was straightforward, easy to read, and addressed the issues faced by Western Australian mining. The workshop outcomes were reported in Resources Safety Matters magazine (January 2013).

In response to the workshop feedback, Resources Safety drafted an information sheet of frequently asked questions (FAQs) to complement the risk management approach of the existing Western Australian code of practice on working hours. The questions were expanded to cover factors related to mining practices in Western Australia with its large travelling distances, remote workplaces and extreme environmental conditions (i.e. heat).

The answers were mainly extracted from Resources Safety's *Fatigue management for the WA mining industry – guideline*, published in 2000, which has a lot of useful content but is not well known by industry. It was agreed that the new information sheet would replace this guideline.

The draft information sheet was distributed at the 2013 Mines Safety Roadshow and industry comment was invited. That feedback has been very useful in generating some additional questions and expanding some answers. Thank you to everyone who contributed.

The fatigue FAQs information sheet is now available in the publications section of the Resources Safety website, or contact **RSDComms@dmp.wa.gov.au** to order printed copies.

FAQS ON PREVENTING AND MANAGING FATIGUE ON WA MINING OPERATIONS

1. What is fatigue?
2. Why is fatigue a problem in the workplace?
3. What does the legislation say about fatigue?
4. Who is responsible for managing fatigue?
5. What does a fatigue management plan involve?
6. How is fatigue measured?
7. What can management do to prevent or reduce fatigue in the workplace?
8. What can supervisors do to help prevent fatigue in the workplace?
9. What can workers do to help prevent fatigue?
10. What roster is best for reducing the risks associated with fatigue?
11. What should be considered for extended work schedules?
12. What about night shift? Are there any special considerations?
13. What types of work contribute to fatigue?
14. How does commuting affect fatigue?
15. Can working in a hot or cold environment contribute to fatigue?
16. How can I improve my quality of sleep?
17. How can I repay my sleep debt?
18. Where can I find out more about fatigue?

WANT SOME ANSWERS?

Resources Safety's online one-stop shop has some useful links to fatigue resources, including the FAQs information sheet!

Visit the mining safety guidance and FAQs section at **www.dmp.wa.gov.au/ResourcesSafety** or use the QR code below.

QUICK HITCHES

Quick hitch devices present particular compliance and duty of care issues for duty holders and regulators. These devices are commonly found on excavators, integrated tool carriers, telescopic handlers and other multipurpose machines. This article reminds duty holders of their legislative obligations and outlines the Department of Mines and Petroleum's policy and approach to quick hitches.

WHAT ARE QUICK HITCHES?

A quick hitch or quick coupler is an engagement and latching device that allows attachments to be quickly connected to the boom of an excavator, front-end loader, integrated tool carrier (ITC), telescopic handler (telehandler) or other multipurpose mobile plant. Quick hitches are in common use throughout the construction and mining industries.

The commonly used pin-system quick hitches connect to standard pivot pins (e.g. on bucket attachments), allowing for a wide range of attachments to be used. They may be categorised into three broad types:

- manual hitches – require the operator to leave the cab to manually latch and lock (with a pin or bar)
- semi-automatic hitches – have hydraulic latching with manual insertion of a safety locking pin by the operator
- fully automatic hitches – fully automatic or hydraulically operated latching and locking from the operator's cab.

WHAT CAN GO WRONG?

When adequately designed, maintained and operated, quick hitches can be fit for purpose and safe to use. However, there is a history of incidents in Australia and overseas involving numerous types of quick hitch. The use of quick hitches on mobile plant, in particular, can be an issue when they are configured with:

- jibs for lifting suspended loads (i.e. functions as a crane)
- work platforms for lifting personnel above a support surface (i.e. functions as a mobile elevating work platform).

A missing or failed retaining pin or bar is a common theme of the incident reports. Operator competency and a lack of adequate inspection and maintenance are commonly identified as causal factors.

DEFINITIONS AND SPECIFIC REQUIREMENTS

In order to fully comply with the duty of care obligations in section 9 of the *Mines Safety and Inspection Act 1994*, employers need to manage and control the use of quick hitches to ensure any associated risks are as low as reasonably practicable. This includes the application of best practice to the processes of equipment selection (i.e. safety in design), operator training and competency assessment, testing, inspection and maintenance. Ignoring any of these aspects may compromise the safe working environment and expose employees to hazards.

In addition to the general duty of care obligations in section 9 of the Act (and in common law), the Mines Safety and Inspection Regulations 1995 contains specific regulatory requirements. In particular, all cranes and hoists are defined as classified plant in regulation 6.1, and must comply with Australian Standard AS 1418 *Cranes, hoists and winches* under regulation 6.33.

Under regulation 6.34, certain types and capacities of cranes and hoists must be registered. Mobile elevating work platforms (EWPs), whether telescoping boom, articulated boom or scissor lift type, are defined in regulation 6.1 as hoists for the purposes of the regulations.

Lifting suspended loads using earth moving machinery

AS 1418.8 *Cranes, hoists and winches – Special purpose appliances* allows earth moving machinery (e.g. ITCs, front-end loaders, excavators) to be used to lift suspended loads under certain conditions. Clause 5.8 of AS 1418.8 requires quick hitches fitted to earthmoving equipment that is used to lift freely suspended loads to comply with AS 4772 *Earth-moving machinery – Quickhitches for excavators and backhoe loaders*.

Duty holders are also reminded of the following.

- Clause 5.1 of AS 1418.8 requires that when earthmoving equipment is used to lift freely suspended loads – as a "secondary function associated with the normal application of the equipment" – the design requirements of section 5 of that standard are intended to apply.
- When it is intended to use earthmoving equipment for cranage operations, or where variable rated capacities are specified, all the requirements of AS 1418.5 and section 5 of AS 1418.8 apply.
- Appendix C of AS 1418.8 contains some informative guidance about the rated capacities of earthmoving equipment fitted with quick hitches and jibs for lifting suspended loads.

Work platform attachments

AS 1418.8 provides no guidance for using ITCs or other earthmoving equipment with a work platform attachment. Therefore, any equipment combination that is functionally consistent with the definition of a mobile EWP is expected to comply with AS 1418.10 *Cranes, hoists and winches – Mobile elevating work platforms*.

Telescopic handlers

AS 1418.19 *Cranes, hoists and winches – Telescopic handlers* uses the term “quick couplers” rather than quick hitches, and clause 2.7.7 contains some requirements for quick couplers used on telescopic handlers.

Duty holders are also reminded that clause 1.1 of AS 1418.19 states that all telescopic handlers intended to support work platforms have to comply with AS 1418.10. Although AS 1418.10 does not preclude the attachment of a work platform to a boom by means of a quick hitch, nor does it provide any guidance on the matter.

DEPARTMENT’S POSITION

When investigating issues or occurrences involving multipurpose machines fitted with quick hitches, particularly those configured for lifting freely suspended loads or with work platforms, duty holders may expect that Resources Safety’s mines inspectors will typically ask the following questions.

For ITCs used as mobile cranes

- Is cranage the primary purpose of the machine? If the answer is no, then AS 1418.8 applies. If yes, then AS 1418.5 applies (i.e. should use a purpose-designed mobile crane).
- Does the quick hitch comply with AS 4772? Is it being operated, inspected and maintained in accordance with this standard?
- How was the rated capacity determined?
- What has the original equipment manufacturer (OEM) instructed for operating the ITC in crane mode?
- What are the OEM instructions for operating, inspecting and maintaining the quick hitch?
- How is operator competency assessed?
- What risk assessment processes are applied?
- What company-developed safe work procedures (SWPs) are applied?

For ITCs used with work platforms

- Does the combination of a particular ITC model and work platform fully comply with AS 1418.10?
- What are the OEM instructions for operating in this mode?
- What are the OEM instructions for operating, inspecting and maintaining the quick hitch?
- How is operator competency assessed?
- What risk assessment processes are applied?
- What company-developed SWPs are applied?

For telescopic handlers used as mobile cranes

- Do they fully comply with AS 1418.19? If they are predominantly used for cranage, do they comply with AS 1418.5? If they do not, then a purpose-designed mobile crane should be used.
- What are the OEM instructions for operating in this mode?
- What are the OEM instructions for operating, inspecting and maintaining the quick hitch?
- How is operator competency assessed?
- What risk assessment processes are applied?
- What company-developed SWPs are applied?

For telescopic handlers used with work platforms

- Do they fully comply with AS 1418.10? If they do not, then a purpose-designed mobile EWP should be used.
- What are the OEM instructions for operating in this mode?
- What are the OEM instructions for operating, inspecting and maintaining the quick hitch?
- How is operator competency assessed?
- What risk assessment processes are applied?
- What company-developed SWPs are applied?

For quick hitches in particular

Are adequate processes and procedures in place to ensure the following:

- Comprehensive risk assessment(s) have been completed to identify all foreseeable hazards and ensure adequate controls are in place?
- Operators are competent and provided with necessary information?
- The quick hitch is of the correct size, type and capacity for the machine and the attachment, and is otherwise fit for purpose and in serviceable condition?
- The retaining or locking pin is always available on the machine?

  Note: Loose pins or clips that may be easily misplaced should be attached to the quick hitch or otherwise retained in a suitable fashion.

- Only the correct retaining or locking pin is used?

  Note: Avoid the ad hoc replacement of pins with substitutes (e.g. long bolts) and do not modify hitches and pins without the OEM's approval.

- There is a system for ensuring that the attachment is correctly latched and locked before commencing work?
- Risk-based periodic inspections are undertaken by competent persons?

  Note: Quick hitches should be labelled with serial numbers so that a register may be kept for the purpose of periodic inspection.

WHERE CAN I FIND FURTHER GUIDANCE ON MULTIPURPOSE MACHINES?

See pages 30 to 31 of the September 2013 issue of *Resources Safety Matters* (vol. 1, no. 3) for an article on the use of multipurpose machines as cranes and EWPs.

MANAGING THE RISKS OF PNEUMATIC TRANSFER OF DANGEROUS GOODS

In late 2013, a high-density polyethylene (HDPE) storage tank burst, spraying an acid mist into the atmosphere and potentially exposing more than 30 people near the facility to serious harm.

The acid was being transferred, using a pneumatic process, from a transportable IMO type 1 tank (iso-tank) to the site's HDPE storage tank. The receiving tank failed during filling when its internal air pressure exceeded the tank's design parameters.

When the facility was designed and commissioned, there had been insufficient consideration given to the use of high-pressure air as the transfer method. It was designed to use a mechanical pumping system that met all the requirements for the safe transfer of dangerous goods. Once operating, however, it was decided to use a pneumatic or pressure differential method instead. This introduced additional risks associated with the potentially high pressure of gas (i.e. air) in the system. These new risks were not considered in the design, which meant there were insufficient controls in place to prevent over-pressurisation of the storage tank receiving the goods.

Operators of dangerous goods storage sites need to check that the transfer method used by a transport company delivering goods is compatible with the site's storage tanks.

Transport operators need to ensure sufficient information is provided by the storage company to allow the safe transfer of dangerous goods.

POINTS TO CONSIDER

The accident is a reminder of the increased risks from dangerous goods during transfers where significant pressure is involved, and the need to identify additional hazards when there is any change in the transfer process. The following points require special consideration.

- Having a vent that is open to atmosphere does not mean that the system is immune to over-pressurisation. This includes the delivery tank, transfer hoses, pipework and receiving tank.
- A system designed for mechanical pumping accommodates low flow rates. When the delivery tank is empty, the flow stops and there is normal atmospheric pressure. The system cannot be over-pressurised.
- A system designed for transferring goods pneumatically needs to cater for the potential situation where the flow only comprises gas under pressure or at very high flow rates, or a combination of both.

  Why is this? A full delivery tank is under pressure. As the tank is being emptied, the liquid level nears the mouth of the siphon, and the discharge changes to two-phase flow (gas and liquid). An obvious indicator of this progression is violent shaking of the transfer hose. When gas is incorporated, the pressure in the transfer system and receiving tank can increase rapidly.

- Atmospheric storage tanks are not designed to contain the significant pressures that can be generated during pneumatic transfers.

The table shows the difference in design pressures (at the gauge) of an IMO chemical tanker and three common design standards for storage tanks.

Storage vessel	Incident involvement	Design standard	Design pressue
IMO Type 1 chemical tanker	Delivery tank	ASME VIII	400 kPag (58 psig)
Low pressure storage tank (steel)		API 620	103 kPag (15 psig)
Atmospheric storage tank (steel)		API 650	17 kPag (2.5 psig)
Atmospheric storage tank (HDPE)	Receiving tank	ASTM 1998	2.5 kPag (0.36 psig)

SOME GUIDANCE

A North American company producing polyethylene chemical storage tanks has had to deal with the issue of over-pressurisation after its tanks were being damaged during pneumatic filling. They commissioned an engineering firm to study the effect of pressure on tanks using different applications and a variety of settings.

The study results, including guidance on tank pressurisation and proper venting, are available in an article about proper venting for polyethylene tanks in the *News & blog* section at **www.polyprocessing.com**

Paulsens SH

PERTH COMPETITION WEATHERS WIND AND RAIN … AND MUD

The 2013 Mining Emergency Response Competition (MERC) was held at Langley Park on the wet and blustery weekend of Saturday 21 and Sunday 22 September.

While the weather was not ideal for spectating, when it comes to real-life rescue situations, mining emergency response teams do not get to choose the climatic conditions in which rescues need to be performed. Fortunately, one of MERC's aims is to provide a realistic training experience for rescue teams so, despite the strong winds, the competition pushed on while safe to do so.

MERC committee member Jen Pearce said that the storm added a touch of realism to the competition.

"The weather affects all emergency situations, so for our competitors to be tested in tough conditions – be it extreme heat, rain or wind – the storm makes it all the more realistic," Jen said.

"We did notice a reduction in the number of spectators on the Sunday due to the weather; however, we had a great turn out on the Saturday with family, friends and industry representatives turning up to support their teams."

2013 was the first year the MERC had been held at Langley Park. Scheduled maintenance at the previous venue, Burswood Park, coupled with the committee's desire to raise the profile and awareness of the event led to the change of venue.

This year, nine emergency response teams competed in seven scenarios. The disciplines assessed were First Aid, HazChem, Vehicle Extrication, Confined Space, Rope Rescue, Fire Fighting and Emergency Response Team Readiness. There were also two compulsory skill stations that tested defibrillation and vehicle extrication skills.

The wind definitely added an extra element of difficulty to the Rope Rescue event, in which teams had to work from two scaffold structures, each about 10 metres high.

In the 40-minute scenario, two casualties were trapped between the two structures. One had fallen from a height and was unconscious with cuts and bleeding. The emergency response teams had to reach the top of the first structure and then lower their team medic down to attend to the casualties. The unconscious casualty then had to be raised to the top of the second structure and lowered down the far side to safety.

It was a race against time and any indecision proved costly — none of the nine competing teams managed to get the unconscious casualty lowered to safety in the 40 minutes allowed for the scenario. In a real-life situation, such a time constraint is unlikely, and the emphasis would still be on team and patient safety.

The high level of camaraderie within teams was obvious, and it was surprising to learn that some teams had only trained together for four days. Teams go about the rescues calmly and methodically, despite some of the scenarios looking extremely realistic to those watching from the fence line. The large crowd gathered at the vehicle extrication event broke into spontaneous applause at one point when an unconscious casualty was finally freed from a vehicle and stretchered to the fence line for first aid treatment.

In the Emergency Response Team Readiness event, team members constantly shout encouragement to each other as they work through a series of short scenarios that test their mental and physical capacities. In one scenario, heavy rescue equipment is carried and passed through confined spaces in simulated darkness. Team members have to rely on one another and their sense of touch as they navigated obstacles.

Inspectors of Mines from the Department of Mines and Petroleum, Chris Gamble and David Harvey, were adjudicators for the HazChem event. They said that teams approached the scenario with extremely positive and proactive attitudes.

The mines inspectors had adjudicated at the previous two MERCs and noticed huge gains in the implementation of HazChem response.

"It was pretty special to be a part of this event, given the harsh weather conditions experienced on the weekend," Chris Gamble said.

"The improvements made by the iron ore operations were particularly impressive. These operations don't involve complex chemical processes so this scenario has previously not been a strength for these teams."

He praised the attitude of the teams and their supporters saying, "Dave and I were honoured to support such a fantastic event and represent the Resources Safety Division."

He added that the rivalries created at the 2013 event should produce some intense but friendly competition over the next few years, given the closeness of the results across the scenarios.

Family-friendly activities on the day included free fire engine rides, a rock climbing wall and bungee, face painting and a children's colouring-in competition.

The MERC proudly supports the Miners' Promise, a charity that provides support and pastoral care to family members who have experienced the loss of a loved one working in the resources sector. The 2013 MERC raised over $50,000 for Miners' Promise, bringing the total donation from the last three years to over $145,000.

Further information on the competition and its aims is available on the MERC website at **www.themerc.com.au**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SPRING STORMS

Data from **www.bom.gov.au**

Saturday 21 September 2013

Min temp 9.5°C Max temp 21.6°C Rainfall 2.0 mm
Max wind gust 43 km/h NW (1.02 pm)

Sunday 22 September 2013

Min temp 13.5°C Max temp 18.9°C Rainfall 14.0 mm
Max wind gust 83 km/h NW (3.01 am)

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DEMONSTRATION IN THE CBD

Date: Friday 13 September 2013
Time: 12 noon
Where: Forrest Place
Event: MERC VX

It wasn't what city workers were used to seeing in the Murray Street Mall on their lunch breaks. A car had crashed into a Forrest Place light pole, an ambulance was waiting nearby, and two people with extremely realistic-looking head wounds were being carefully extricated from the vehicle by a team of rescuers.

Some people came in for a closer look, while others took only furtive glances as they walked by, unsure whether the accident scene was real or not.

What was actually taking place was a promotional demonstration by the people behind the 2013 Mining Emergency Response Competition (MERC). The team was showcasing the vehicle extrication event, complete with two very bloody casualties, one of whom was Nova 93.7 breakfast presenter Nathan Morris.

In a vehicle extrication scenario, emergency response teams undertake the controlled release of one or more casualties trapped in a vehicle following an accident. Teams must extricate the casualty being mindful not only of the safety of the trapped person, but also the safety of their fellow team members and attending emergency service personnel.

In the demonstration scenario, a car had collided with a light pole and the two passengers had suffered potential head and spinal injuries. They needed to be safely removed from the damaged vehicle and given first-aid treatment.

The emergency response team attending the incident comprised six volunteer rescuers tasked with showcasing the skills needed to perform this type of rescue. A six-person team is typical in mine rescue.

For the benefit of onlookers, one of the MERC's chief adjudicators, Stuart Wilson, was the master of ceremonies for the event and explained what was happening and why.

In this demonstration, hydraulic rescue equipment, more commonly known as the "jaws of life", was used to cut the roof away from the vehicle and enable the casualties to be safely

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removed. The vehicle was cut at six points and a reciprocal saw was used to cut through the windscreen so the roof could be removed.

"Hydraulic rescue equipment is favoured for these types of rescues because the hydraulic power can be located away from the incident," explained Stuart.

The MERC provides an opportunity for people in Perth to see what their loved ones who work in the mining industry, especially fly-in fly-out, may be faced with. It also highlights the site safety systems that ensure they come home safely at the completion of each swing.

"Today is a demonstration day to showcase the safety systems and response capabilities that are in place to ensure the safety of workers," Stuart said.

"A lot of care is taken with the extrication. The rescuers try to expedite the process but not at the expense of further injuring the casualties or exposing themselves to harm," he told the gathered crowd.

Once safely removed from the vehicle and transported to the awaiting ambulance, Nathan Morris told the audience that the rescuers had been extremely gentle.

"I wasn't sure what was going on around me but Sue kept me calm and I felt really secure," he said, referring to the rescue team's medic, Sue Steele.

Explaining why he was so keen to help promote this year's MERC, Nathan said, "I'm from Kalgoorlie so I know people who have had relatives involved in mining accidents."

With both casualties safely extricated from the vehicle, the crowd began to disperse. As they headed back to their office blocks, they no doubt had a much greater understanding of what those who volunteer in emergency response teams might have to face in the event of an accident on their mine site or in the nearby community.

COMPETING TEAMS

BHP Billiton Iron Ore
Birla Nifty Copper Operation, Aditya Birla
FMG Vest, Fortescue Metals Group
Muja Power Station, Verve Energy
Paulsens Gold Mine, Northern Star Resources
Premier Coal
Rio Tinto 1, Rio Tinto Iron Ore
Rio Tinto 2, Rio Tinto Iron Ore
Saracen ERT, Saracen Gold Mines

HONOUR BOARD

Overall winner	Birla Nifty Copper Operations
Hazardous chemicals and breathing apparatus scenario	BHP Billiton Iron Ore
Vehicle extrication scenario	BHP Billiton Iron Ore
Fire fighting scenario	Rio Tinto 2
Confined space scenario	Birla Nifty Copper Operations
Rope rescue scenario	Paulsens Gold Mine
First aid scenario	Paulsens Gold Mine
Emergency response readiness scenario	Paulsens Gold Mine
Best captain	Birla Nifty Copper Operations
Overall team safety	Saracen ERT
Overall first aid	Paulsens Gold Mine
Overall breathing apparatus	Rio Tinto 2

Rio Tinto One TYC

CONFINED SPACE SCENARIO

EMERGENCY RESPONSE READINESS SCENARIO

FIRE FIGHTING SCENARIO

FIRST AID SCENARIO

HAZARDOUS CHEMICALS AND BREATHING APPARATUS SCENARIO

ROPE RESCUE SCENARIO

VEHICLE EXTRICATION SCENARIO

SEEN AROUND

Barrick Kanowna TYC

AND THE WINNERS ARE …

The Barminco Presentation Night for the 2013 Underground Mine Emergency Response Competition, presented by the Chamber of Minerals and Energy of Western Australia (CME), was held in Kalgoorlie on 3 November. The presentation night not only acknowledged event winners and place getters, but the 50th anniversary of KCGM's Mt Charlotte Gold Mine, the competition venue.

KCGM General Manager, Russell Cole, gave the tribute, outlining the history of underground gold mining at Mt Charlotte. Attendees also saw a video tribute that included interviews with past and present employees and provided further details of the mine's history.

Tim Campbell, Chairman of the Mine Rescue Committee for the CME Eastern Regional Council, also paid tribute to Mt Charlotte, which has hosted the underground competition for the past four years, and thanked KCGM for the support they continue to provide to the competition.

"Mt Charlotte is a great location," said Mr Campbell, "KCGM have supported us sensationally over the years."

Despite being expected to close on three different occasions, Mt Charlotte has been in continuous operation since 1963 and today is now 1.2 km deep and the only active underground mine on the Golden Mile.

KCGM took over operations of the mine in 1989 and currently employs 60 people at Mt Charlotte, with 40 working underground. Mt Charlotte still produces almost five per cent of KCGM's gold.

Another special event of the evening was the presentation of the prestigious Harry Steinhauser Award, which was given to Sue Steele of Red Earth Health Solutions.

It was anyone's guess as to who was going to take out the best team award this year, with Barrick Kanowna and KCGM each winning several events and placing in many others. In the end, the Best Team award came down to just one point. According to CME Chief Executive, Reg Howard Smith, this was one of the tightest contests in the event's history.

Barrick Kanowna took out the overall honour this year. As team captain Donny Rice said in his acceptance speech, the tight contest bodes well for mines safety in Kalgoorlie, with teams pushing themselves and each other to continually improve.

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SUE RECEIVES STEINHAUSER AWARD

The Steinhauser Award recognises excellence and commitment to mines rescue and emergency response. Recipients are decided by the Mine Rescue Committee and previous Steinhauser Award recipients.

Three Steinhauser awardees were in attendance on the night — Peter O'Loughlin (2003), Kevin Broadbent (2006) and Mick Nollas (2011).

The award was presented to Sue Steele by Russell Cole, KCGM General Manager, who said "Sue's scenarios are realistic, achievable, and test the whole team's emergency response preparedness."

Sue received the 2013 Steinhauser Award for her tireless work to improve emergency response preparedness across the industry. She has been involved in mining emergency response competitions since 2006, and run many first aid scenarios for the CME competitions.

Humble in acceptance, Sue Steele was a popular recipient of the 2013 Steinhauser Award.

HONOUR BOARD

1st best team	Barrick Kanowna
2nd best team	KCGM
3rd best team	Norton Gold Fields
Breathing apparatus (BA) skills	Agnew Gold
Fire fighting	La Mancha Mine Rescue
First aid	KCGM
Incident management scenario	Christian Price, (Gold Fields – St Ives)
Rope rescue	KCGM
Search and rescue	KCGM
Team skills	Barrick Kanowna
Theory	Barrick Kanowna
Theory individual	Andrew Scharf (La Mancha Resources)
Team safety	KCGM
Overall BA skills	Barrick Kanowna
Overall first aid	KCGM
Best scenario	First aid
Best captain	Drew Miller (KCGM)
Best new captain	Damian Hudson, (Silver Lake Resources)
Best new team	Agnew Gold

COMPETING TEAMS

Agnew Gold, Agnew Gold Fields Mining Company
Barrick Kanowna, Barrick Gold of Australia
Gold Fields Lions (Granny Smith and Darlot), Gold Fields Australia
Gold Fields – St Ives, Gold Fields Australia
Jaguar Emergency Services, Independence Group
Kambalda Mutual Aid, Lightning Nickel, Mincor and Silver Lake Resources
KCGM, Kalgoorlie Consolidated Gold Mine
La Mancha Mine Rescue, La Mancha Resources Australia
Newmont Jundee, Newmont Asia Pacific
Norton Gold Fields
Silver Lake, Silver Lake Resources
St Barbara Leonora, St Barbara Ltd

Gold Fields Lions SH

TV CREW GATECRASHES INCIDENT MANAGEMENT SCENARIO

The incident management scenario does not normally attract the same level of attention as the other events. However, thanks to some humorous role-playing from the event team, the Incident Management scenario was definitely entertaining for spectators at the 2013 underground competition.

Geared to the senior operational management level, incident management is usually undertaken by the Registered or General Manager. The team manager or emergency response coordinator usually takes this part in competitions, although it is pleasing to see more mine managers becoming involved.

Participants take on the role of the overall coordinator or manager in a crisis situation. They must coordinate the emergency response team as well as manage the incident site and communications with head office and others.

In this scenario, the overall incident controller (OIC) is required to account for all personnel in an underground mine following an incident. The task includes utilising on-site services and mutual aid to locate and recover the site's emergency response team members, who have been trapped during the course of the rescue.

The adjudicators are available to take on roles in the incident management team, but only as directed by the OIC. Roles assumed by the event team include the shift boss, captain of the site's emergency response team, captain of the mutual aid team, a mines inspector and the company's CEO.

The status report to the OIC is that an underground loader has ignited in one of the drives at "Culverwell Consolidated" underground mine. The site's emergency response team is fighting the fire while underground personnel move to refuge chambers and fresh air bases.

The fire is brought under control within a few minutes but the emergency response team is out of water. The captain reports to incident management that the tyre is still hot and smouldering, and water is required from an external source. The team is going further down the drive to try and locate the loader operator when an explosion is heard and the tyre reignites.

One member of the emergency response team is critically injured, and the team is trapped with no water protection and limited oxygen supply. The OIC needs to ensure a mutual aid team from a neighbouring mine is en route to assist the original team.

Event manager Kevin Broadbent said, "In this scenario, the OICs are instructed to make use of the equipment on their sites. So the scenario tests their knowledge of the equipment available to their emergency response teams."

About 15 minutes into the scenario, it is reported that the team member injured when the loader tyre explodes is showing "no signs of life".

"At this stage, all emergency services and the Department of Mines and Petroleum should have been notified by the OIC. This is the level where you've got to get your control right," explained Kevin.

As if life wasn't difficult enough for the OIC, a call comes through from the gatehouse about half an hour into the incident to say that a news helicopter is circling, and then another to say it has landed close to the building where the incident management team is controlling the scenario. A minute later, a journalist and cameraman burst into the room and thrust a microphone and camera into the OIC's face.

"Can you tell us what has occurred underground? How many workers are involved? They say there is smoke bellowing from the underground vent extraction fans – can you confirm if there is a fire?"

Event manager Kevin Broadbent and adjudicator Greg McCauley play the roles of the news journalist and cameraman — before being escorted from the room. Although distracting for the OIC, this proves extremely entertaining.

Some of this year's participants were extremely experienced incident controllers, whereas for others their only experience had been on the gate.

"It doesn't matter how many times you do this, there's always something more to learn," said Brad Kunjasich from Kambalda Mutual Aid at the completion of his scenario.

With the event team's 125 years of combined experience in emergency response competitions and passion for incident management, this is certainly what Kevin Broadbent hoped participants would feel at the completion of the event.

KCGM TYC

BA SCENARIO DRAWS FROM KAMBALDA INCIDENT

"Something credible – the real deal – based on a real-life incident that happened in Kambalda," was how event manager Craig Neeson described the scenario the team had constructed for the Breathing Apparatus (BA) Skills scenario.

What happens in this scenario? A bogger has caught fire but the blaze has since been extinguished. The driver has been evacuated to the surface but four workers are stuck on the other side of the bogger. Visibility is very low as the drive area has been smoked out.

The team captain is told by the fresh air base (FAB) coordinator that four ambulances are on their way and a back-up emergency response team is about 15 minutes away. After being shown on a map where the missing are likely to be, the captain is instructed to "search, locate, stabilize and extricate" and informed that there are no refuge chambers in the area.

Once full checks have been performed on all BA equipment, the emergency response team departs the fresh air base to search for the missing workers.

"We learnt about an incident where a rescue team had moved past a bogger to search for casualties when it reignited. They too became trapped," Craig explained. "The original team then had to be rescued by a back-up team."

In this scenario, as well as adjudicating, Craig plays the role of the FAB coordinator. At various stages, he radios the team captain with additional information. As in the real-life incident on which this is modelled, once all team members have passed the bogger, they are informed that the fire has reignited. They are trapped on the other side and must stay out of the line-of-sight of the fire in case a tyre explodes.

The missing workers are located. Three of the four have used their self-rescuers and are okay. One, however, is unresponsive and requires first-aid treatment. Their self-rescuers have already been in use for around 40 minutes, and it is not known

Silver Lake Resources TYC

how long it will take to extinguish the reignited fire. So, while the medics treat the casualties, the other team members work to create a temporary refuge chamber using a nearby air vent bag.

The captain is instructed by the FAB coordinator that once the casualties are safely in the temporary refuge chamber, he should put his team in entrapment mode to conserve energy.

"One of the experiences we wanted to give the captain was to work with the FAB coordinator, something they might not have had much experience with," Craig said. "We wanted to test the captain's skills at adapting to constantly changing conditions."

Just as the teams are finishing construction of their temporary refuge chamber, they are informed that the fire has been extinguished and they are to prepare for extrication. The casualty suffering smoke inhalation needs to be stretchered back to base while the other workers are able to walk out.

What impressed Craig most about this year's competing teams?

"They showed a high standard of knowledge of their BA equipment. Teams have really taken on the learnings from last year!"

The Department of Mines and Petroleum sponsored the BA Skills scenario, which was won by the Agnew Gold team. Resources Safety's Director Mines Safety, Andrew Chaplyn, presented the trophy. The scenario was very close to home for Andrew. He had been involved in the Kambalda incident when working for Western Mining Corporation's Kambalda Nickel Operations as a graduate mining engineer.

"I was a member of the mine rescue team and we trained regularly, including participating in competitions just like this one. It certainly paid off when the real situation occurred. We were able to respond professionally, save our work mates and re-establish the mine to normal operations," Andrew recollected.

LEAVE YOUR (HARD) HAT ON

The Norton Goldfields Limited Welcome Evening, held at the WASM Graduates' Hall on 1 November 2013, featured a special performance by 60 students from St Joseph's Primary School in Boulder. St Joseph's were the State winners of the 2013 Wakakirri Primary School Story Dance Challenge.

Their piece, called "You Should Leave Your Hat On", told the story of a rescue at the fictitious Mt Wear-a-Hat treatment plant. The students acted out the story of four miners trapped following a rock fall, and the emergency response team that comes to their rescue.

The theme was chosen by the school because many of its students have parents employed in the mining industry, so mines safety is an important issue for them.

The dance routines were supported by a clever soundtrack that included Joe Cocker's "You Can Leave Your Hat On", the Beatles' "Help", One Direction's version of Blondie's "One Way or Another", and an adaptation of the LMFAO song, rewritten as "We're Miners and We Know It".

Following the performance, Tim Campbell, Chairman of the Mine Rescue Committee for the CME Eastern Regional Council, presented the principal, Miranda Swann, with $500 for the school.

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BREATHING APPARATUS SKILLS

FIRE FIGHTING

FIRST AID

INCIDENT MANAGEMENT SCENARIO

THEORY

ROPE RESCUE

SEARCH AND RESCUE

TEAM SKILLS

CLOSING THE GAP FOR MINING

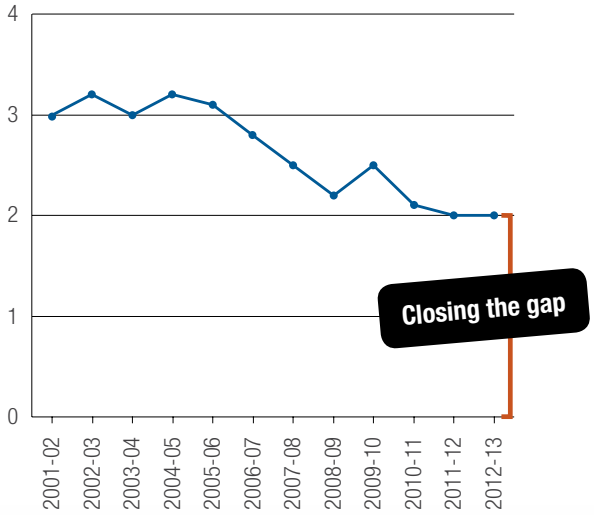
Safety performance data for the Western Australian mining industry over the past decade or so shows that, for most indicators, there have not been as many improvements as in the previous three decades. After decreasing significantly, some graphs show a plateau has been reached. This is shown by the annual frequency rates for serious injuries and disabling injuries.

There have been technological and system improvements over the years that have had a long-term positive effect on safety performance. How might we get the next step-change so we can close the gap to the aspirational goal of zero harm? Industry is now focusing on one of the biggest variables in the safety equation – us!

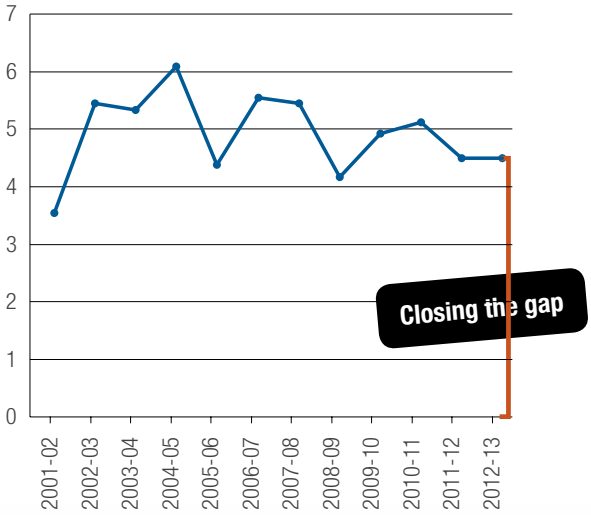
We can all play a role in improving the application of risk management strategies. Here are some ideas:

- a designer can decrease the risks by considering hazards as early as possible in the planning and design process
- company boards can not only commit to positive cultural change in their operations, but provide tangible evidence that they support key strategies including communication and consultation
- a manager or supervisor can involve workers in the risk assessment process for jobs, particularly the identification of critical tasks, and provide appropriate supervision, information, training and competency verification
- manufacturers and suppliers can provide maintenance and service manuals that are easy to read and clearly identify critical tasks and the risk factors
- workers can ensure that they are fit for work, competent to undertake their jobs and understand the critical tasks – and if not, tell their supervisor or manager, who will deal with the underlying issues (e.g. arrange training, on-the-job mentoring)
- safety and health representatives can be the vital link in the communication chain by making it easier to exchange ideas and concerns about safety between employers and workers.

SERIOUS INJURY FREQUENCY RATE 2001-02 AND 2012-13



DISABLING INJURY FREQUENCY RATE 2001-02 AND 2012-13



WHY IS RISK MANAGEMENT TRAINING IMPORTANT?

Risk management skills are essential when working in industries like mining, which involve such intrinsic hazards as high energies, remote workplaces and a harsh environment.

Risk management can be compromised if people on site:

- fail to recognise the hazard and its potential consequences
- are driven by paperwork and form filling, rather than focusing on the outcomes
- engage in the numbers game and rely on a five-by-five risk matrix as a tool for establishing acceptable risk, rather than using it as a tool to set priorities
- do not monitor the implementation of controls and their ongoing effectiveness, including changed conditions
- are uncertain about who owns the risk management process, if anyone.

Within the National Mine Safety Framework (NMSF), there have been discussions over several years on what the minimum standard should be for risk management training, particularly for statutory position holders and other key personnel.

Some Australian regulators have developed specific provisions for competencies in risk management that are mapped to the National Competency Framework. The NMSF process has recommended that these become a legislative requirement for jurisdictions that are party to the proposed Tri-State Competency Advisory Council (TCAC), comprising Western Australia, Queensland and New South Wales.

For Western Australia, the final discussion about whether to implement this recommendation will be managed through the Ministerial Advisory Panel, which was recently established to facilitate the regulatory reform process for safety in the resources sector. It is highly likely there will be a prescribed requirement for key mining personnel — those involved in the management and supervision of mining operations — to undergo risk management training to a national standard of competency.

Irrespective of the outcome of this consultation process, the Department of Mines and Petroleum recommends that companies seriously consider taking up opportunities to train statutory position holders, operational managers and supervisors, to recognised competencies in risk management.

Training is an opportunity to challenge traditional thinking about risk and safety. It can provide fresh eyes to recognise the importance of making a personal commitment and determining accountability, with both leading to better decision-making about risk.

IMPROVING RISK MANAGEMENT

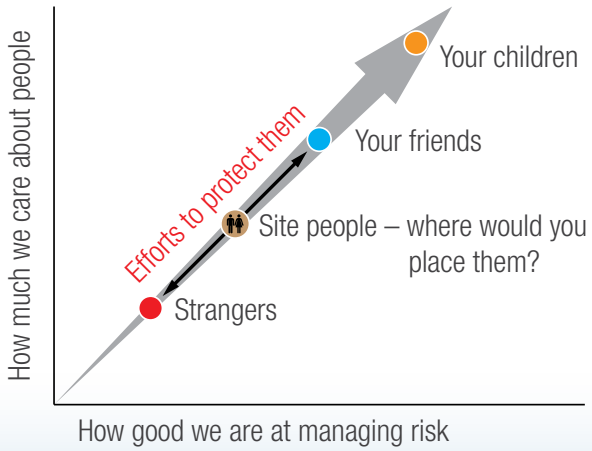
REMAIN VIGILANT….

Bruce Landsberg, Aircraft Owners and Pilots Association, 1 November 1998, discussing the safety equation when flying:

"Being safe does not eliminate risk — it reduces it."

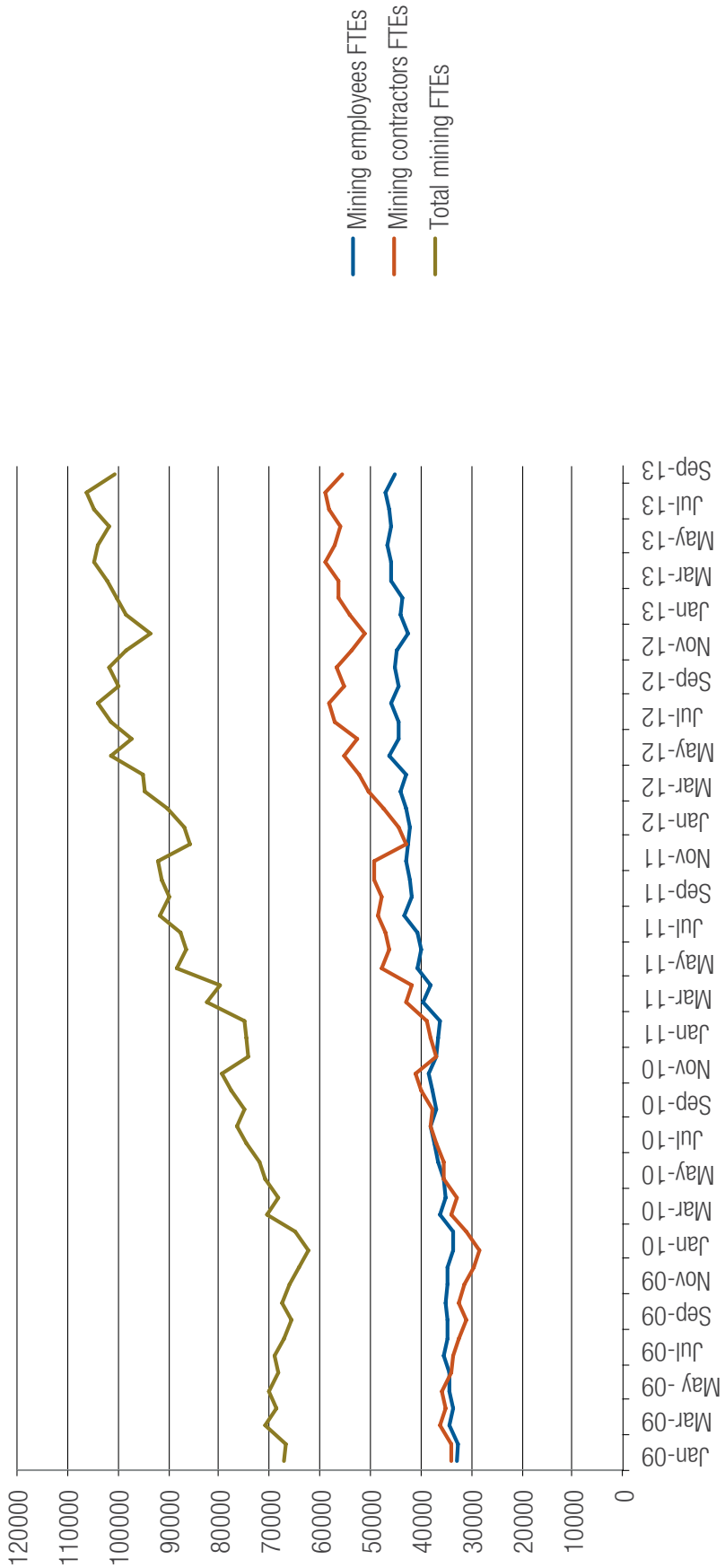
Source: www.aopa.org

…. AND CARE



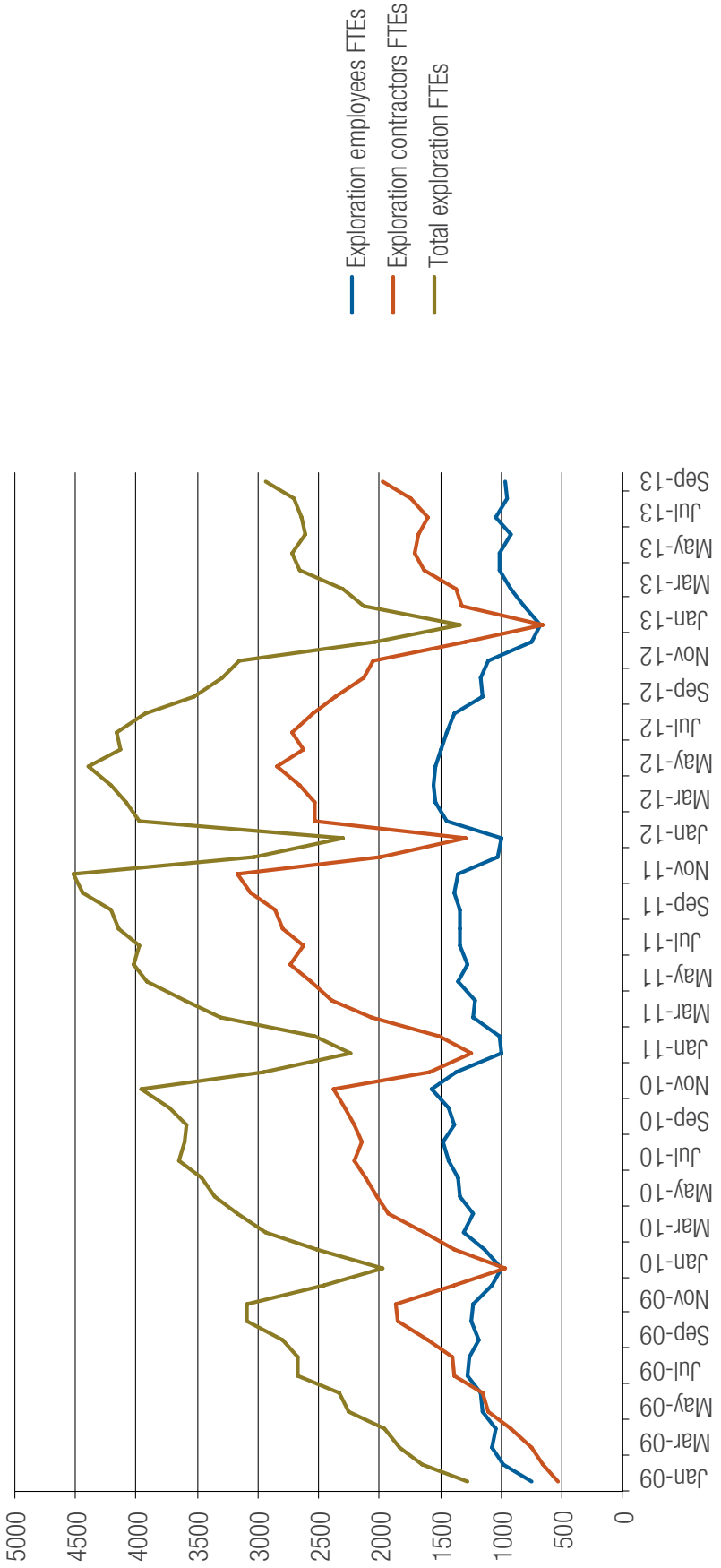
WA'S MONTHLY MINING WORKFORCE

NOTE: From 1 July 2009, monthly mining workforce figures are plotted as full-time equivalent (FTE), where 1 FTE = 2,000 hours worked per year

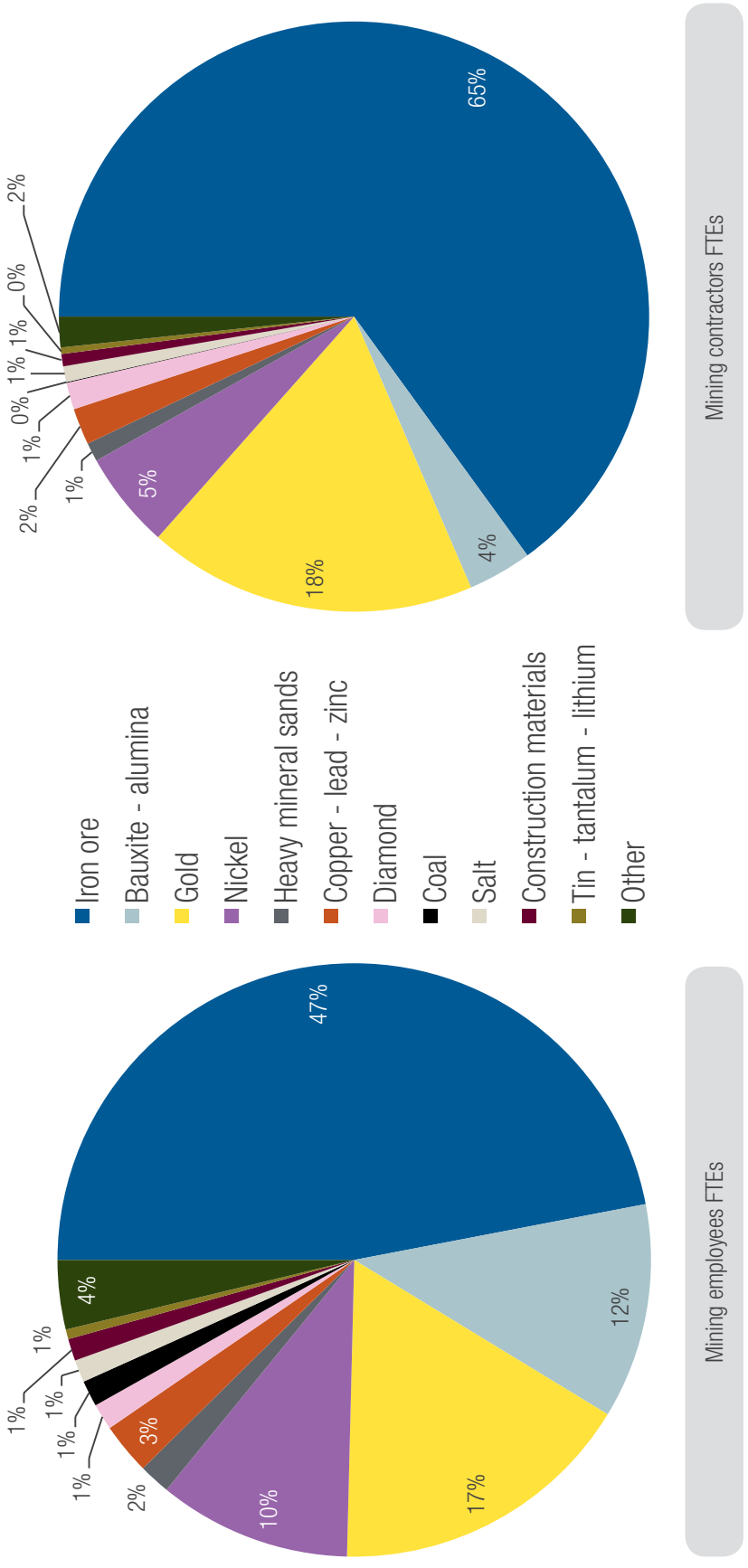


WA'S MONTHLY MINERAL EXPLORATION WORKFORCE

NOTE: From 1 July 2009, monthly mining workforce figures are plotted as full-time equivalent (FTE), where 1 FTE = 2,000 hours worked per year

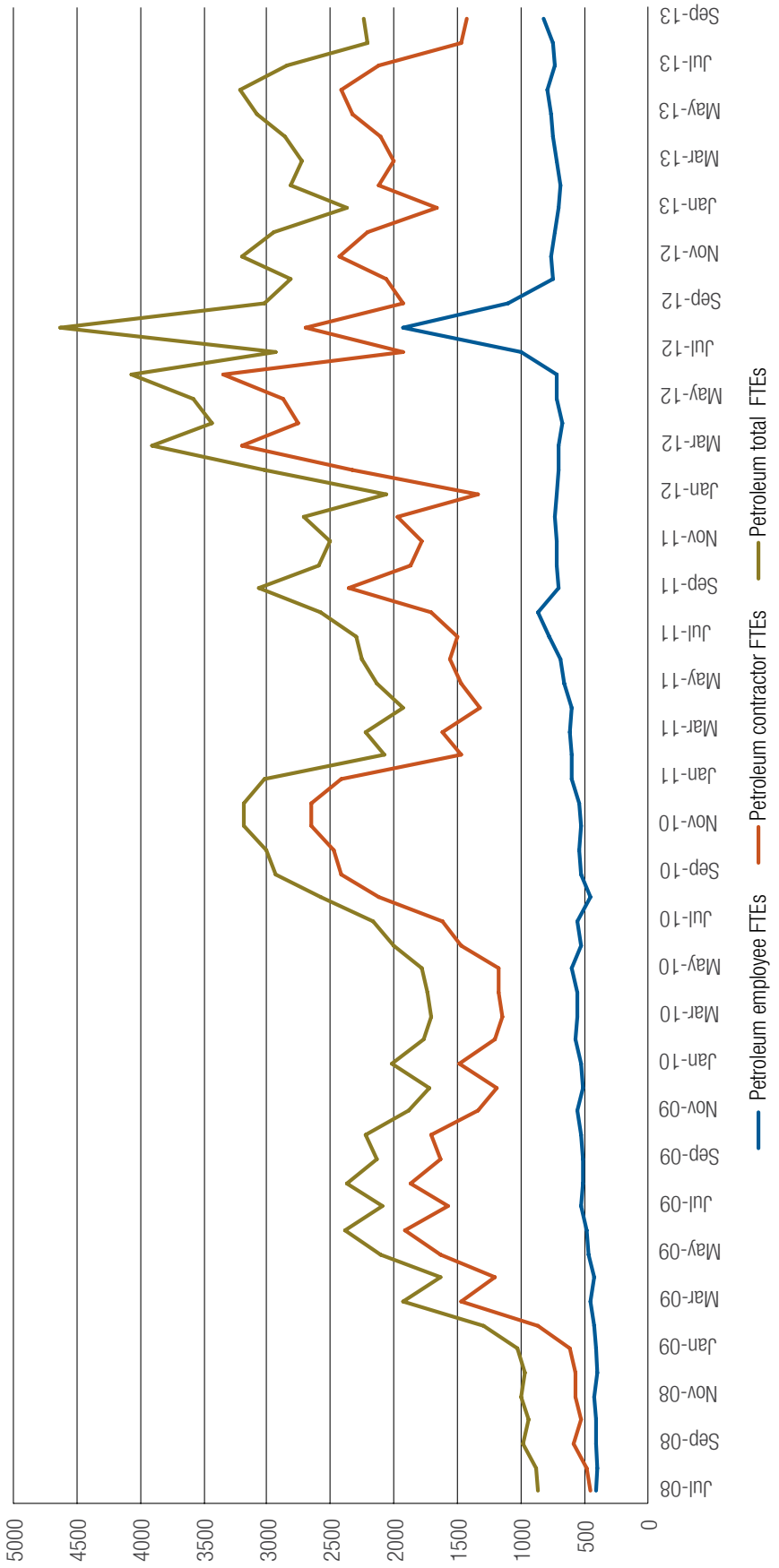


WA'S MINING WORKFORCE – PERCENTAGE BY COMMODITY (SEPTEMBER 2013)



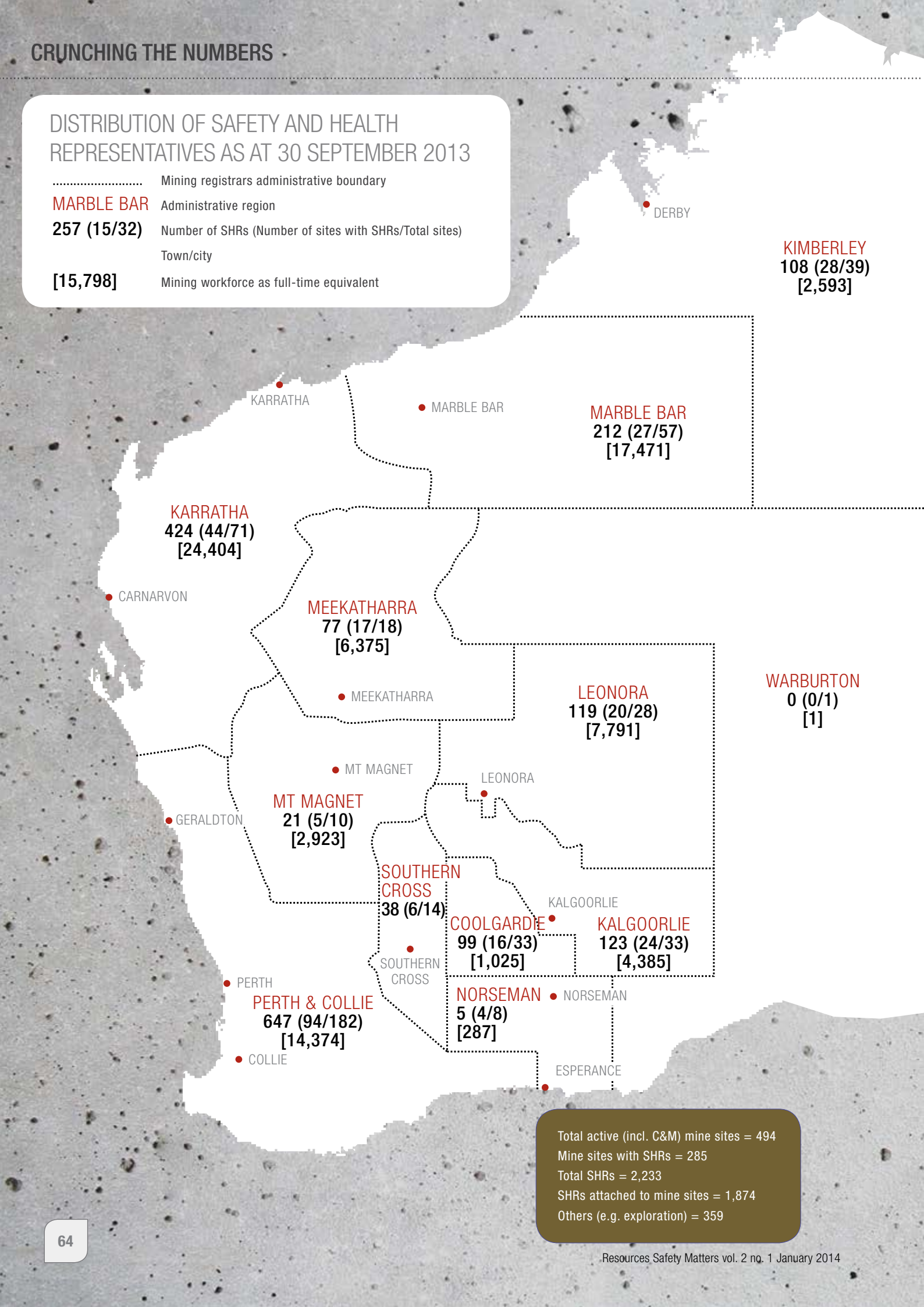
WA'S MONTHLY PETROLEUM WORKFORCE

NOTE: Monthly petroleum workforce figures reported as hours but plotted as full-time equivalent (FTE), where 1 FTE = 2,000 hours worked per year



DISTRIBUTION OF SAFETY AND HEALTH REPRESENTATIVES AS AT 30 SEPTEMBER 2013

.....	Mining registrars administrative boundary
MARBLE BAR	Administrative region
257 (15/32)	Number of SHRs (Number of sites with SHRs/Total sites)
	Town/city
[15,798]	Mining workforce as full-time equivalent



Total active (incl. C&M) mine sites = 494
Mine sites with SHRs = 285
Total SHRs = 2,233
SHRs attached to mine sites = 1,874
Others (e.g. exploration) = 359

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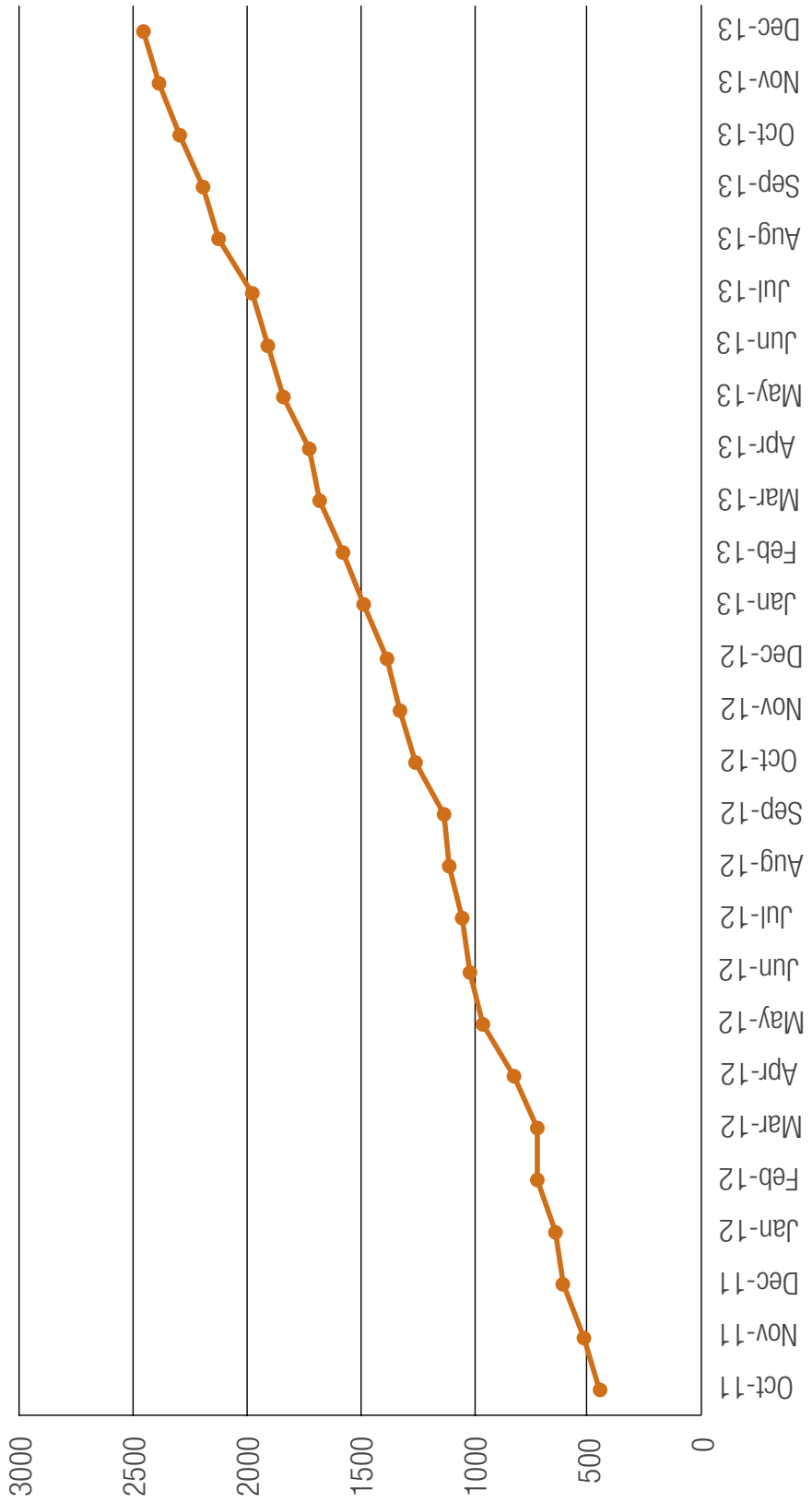

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PETROLEUM SAFETY SIGNIFICANT INCIDENT REPORT NO. **05/2013**

USE OF WRONG TOOL RESULTS IN SERIOUS ARM INJURY

ISSUED: 14 NOVEMBER 2013

Incident

After a cleaning pig run of an oil pipeline, the pig (pipeline inspection gauge) was cleaned, dismantled, checked and reassembled. A cotter pin was required to complete the job. A worker involved in the pig reassembly found the lid of the plastic container of cotter pins secured with a cable tie. He decided to use a paint scraper from a nearby bench to remove the tie.

The worker pushed the scraper under the tie and twisted it until the tie broke. The edge of the scraper then struck and severely lacerated the arm holding the container, damaging tendons and an artery.

First aid was administered on site. The injured worker was transferred to the regional hospital, where he stayed overnight for medical treatment before travelling to Perth for an operation at a major hospital. The worker returned to work a week and a half later.

Contributory factors

- A written job hazard analysis (JHA) was not available for the complete pigging operation.
- Box cutters, which were suitable for this task, were supplied but not used.
- Concerns had previously been raised regarding the use of cable ties on containers as they were awkward to open. However, management had decided to continue their use.

Preventative actions

- When preparing the JHA before commencing a job, assess the individual tasks that are involved and ensure fit-for-purpose tools are available to complete those tasks.
- When safety issues are raised, include representatives of those involved in the task to ensure all risk factors are identified and addressed.
- Provide regular reminders to the workforce of the need to:
  - follow the standard operating procedures (SOPs), even where tasks are familiar and repetitive
  - select appropriate tools for the task and have them readily accessible.

PETROLEUM SAFETY SIGNIFICANT INCIDENT REPORT NO. **06/2013**

COLLAPSE OF MOBILE LIGHTING TOWER RESULTS IN EQUIPMENT DAMAGE

ISSUED: 10 DECEMBER 2013

Incident

At the beginning of a work-over operation on an oil well, a mobile lighting tower was erected to provide light during night activities. A few days later, the tower fell onto the lighting plant generator, damaging the equipment. Fortunately, no-one was in the vicinity of the tower when it fell or the outcome could have been more serious.

Contributory factors

- The mast was not perfectly aligned during installation, and therefore the spring-loaded locking pin only partially engaged.
- No instruction manual or written procedure for deployment was available..

Preventative actions

Mobile lighting towers are used throughout the resources sector, but are probably not included as a potential hazard when risk assessing a job requiring illumination. However, towers typically range from 7 to 12 metres in height when fully extended, and can weigh hundreds of kilograms. Therefore they can represent a significant falling object hazard if the tower is not properly secured.

To help control this hazard:

- provide workers with adequate information, such as manuals and procedures, to ensure installations are performed correctly
- implement routine double-checks (preferably independent) for plant installations (e.g. another worker to confirm that all locking mechanisms are fully engaged in lighting towers).

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **187**

SERIOUS CRUSH INJURIES CAUSED BY FALLING BALL-MILL LINER PLATE

ISSUED: 23 OCTOBER 2013

Summary of incident

A worker was seriously injured during a ball-mill relining operation when he was struck by a large liner plate weighing about 1.5 tonnes. The worker had been preparing to remove two unsecured liner plates still in place inside the ball mill when the top liner plate was dislodged and fell, pinning him to the ground.

A mechanical lifting device was required to lift the liner plate from the worker. He sustained extensive injuries, including compound leg fractures, fractured vertebra, and crush injuries to his chest.

Probable causes

Direct

- The ball-mill liner plate was unsecured.

Contributory

- The unsecured liner plates were identified as a hazard but there were no controls in place to prevent their uncontrolled movement or prevent worker exposure to falling object hazards.
- The resting position of the unsecured liner plate was above the horizontal centre-line of the ball mill (Fig. 1).
- The workers undertaking the mill relining were not adequately trained and had not been assessed as competent for the task.

Actions required

When developing safe systems of work for mill relining operations, mine sites should apply the same rigour and standards as used for other workplace activities.

New mill designs and installations should include, where practicable, appropriate engineering controls to assist mill relining operations, such as fit-for-purpose equipment for handling mill liner plates.

Mill relining tasks should include a pre-task risk assessment. Identify the potential for objects such as liner plates to fall during mill relining operations — during both removal and installation of lining — and implement controls to prevent:

- their uncontrolled movement
- workers entering the fall zone.

Ensure competency-based training has been undertaken by those involved in the mill relining operation (including contractors). This should include awareness of the increased potential for unsecured liner plates to fall if they are located above the mill centre-line (red area in Fig. 1), and the need to prevent the mill moving as the centre of gravity adjusts when liner plates are removed or added.

Ensure critical tasks are supervised by competent persons.

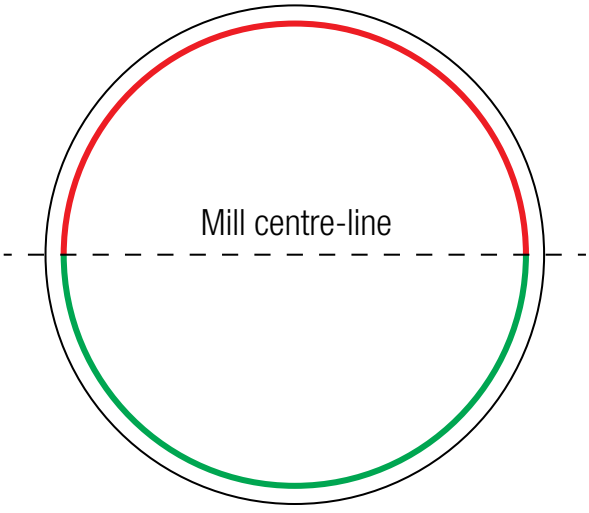


Figure 1 *Cross-section schematic of mill showing potentially hazardous section above the centre-line (red) from which unsecured objects may fall, and less dangerous section below the centre-line (green)*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **188**

LIGHT VEHICLE STRUCK BY UNDERGROUND TRUCK IN DECLINE

ISSUED: 15 NOVEMBER 2013

Summary of incident

An underground light vehicle driver travelling up a decline misjudged a radio call and thought he could safely make it to the next safe parking location. As he approached a blind bend, he saw the headlights of a truck coming down the decline. He anticipated that the truck driver would not see him and attempted to pull into a pump cuddy. His vehicle did not have enough momentum to negotiate the step up into the pump cuddy and fully exit the decline.

As the truck travelled past the pump cuddy, its right hand side collided with the rear right hand side of the light vehicle. The light vehicle was pulled out of the cuddy and its front wedged under the truck's rear tyre.

A moving pump line was the only indication the truck driver had that he had hit something. He stopped and exited the truck to investigate possible damage to the pump line and discovered the light vehicle wedged under the truck. Fortunately, the light vehicle driver sustained only minor injuries.

Figure 1 *Incident scene after the light vehicle driver had been extracted and the truck reversed back*

Figure 2 *A mines inspector viewing the recovered damaged light vehicle*

Probable causes

Direct

- The light vehicle driver attempted to travel further along the decline than was practicable before interacting with the truck.

Contributory

- Absence of designated and standard signs at call-up locations for trucks using decline.
- The light vehicle driver attempted to enter and park in an unsuitable location.
- A blind bend on the decline and the location of the beacon on the light vehicle did not provide sufficient illumination to make the light vehicle visible to the truck driver.

Actions required

Review the site's traffic management plan with respect to the potential for collisions and contacts between underground mobile equipment. The plan should:

- identify adequate call-up points
- establish appropriate signage along the decline to indicate each call-up point
- establish clear radio usage protocols
- provide an adequate number of passing and parking locations suitable for light vehicles along the decline
- restrict access to decline locations that are not suitable for parking vehicles.

Review the appropriateness of the location and type of beacon used on underground mobile equipment.

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **189**

TOPPLED UNDERGROUND DRILL RIG SERIOUSLY INJURES WORKER

ISSUED: 22 NOVEMBER 2013

Summary of incident

A crew was setting up a portable diamond drill rig for an underground drill operation. The drill site was in a decline that sloped about 10 degrees, requiring the rig to be levelled. As the integrated tool carrier used for repositioning and alignment was unavailable, the crew was using a portable jack and wooden blocks to level the 1.5 tonne rig.

The rig toppled over, pinning the driller, who sustained serious crush injuries to both legs.

Note: In the past year, two toppling incidents involving similar diamond drill rigs have been reported in America and Africa. Neither rig was anchored to the ground before set up commenced.

Probable causes

Direct

- The rig was being moved by hand by the drill crew.

Contributory

- The crew proceeded to set up the rig without following the mine's safe system of work.
- The rig was not anchored as recommended by the original equipment manufacturer (OEM).
- The use of wooden blocks increased the rig's instability.
- Fit-for-purpose equipment was not used to reposition and align the rig.
- There was no-one to supervise or assume the role of spotter while the rig was being set up.

Actions required

Establish safe systems of work for setting up diamond drill rigs for operation in underground mines.

Provide OEMs with design requirements based on site risk assessments and task observations rather than purchase machinery based on perceived or advertised performance alone.

Implement competency-based training for work done underground using diamond drill rigs, covering the mine's safe system and the hazards that may be encountered for specific types of plant.

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **190**

SERIOUS HIGH VOLTAGE (HV) ARC FLASH INCIDENT RESULTS IN INJURIES

ISSUED: 22 NOVEMBER 2013

Summary of incident

A worker was performing a process (not electrical) isolation associated with the scheduled change-out of a high voltage (HV) 550 kW, 6.6 kV pump motor. As part of verification testing, a "bump" test was performed to confirm the motor was rotating in the correct direction. This test required the motor to be decoupled from the pump, which meant that after successful completion of the test, the motor needed to be isolated before being recoupled to the pump.

The first stage of this isolation procedure involved opening the main 6.6 kV isolating switch for the motor. When this isolator was operated, there was a large arc flash and blast, forcing the switchgear cabinet door partially open and damaging the switchgear (Fig. 1). The worker operating the isolator received a hand injury and superficial burns.

Figure 1 Photograph of the switchgear cabinet showing damage from the arc blast

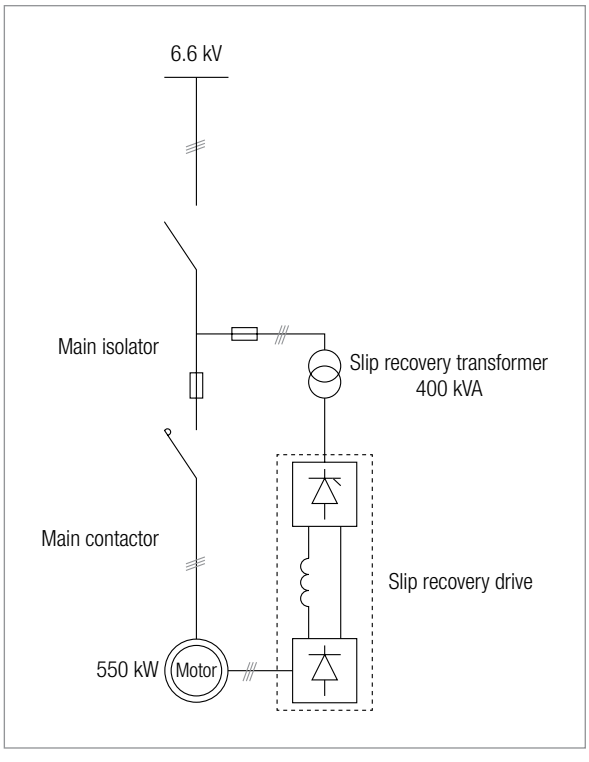


Figure 2 Simplified circuit diagram showing pump motor

Mines Safety Significant Incident Report No. 190 continued

Probable causes

Direct

- The main isolating switch was operated while the motor was still rotating. This resulted in reactive current flow through the associated slip recovery drive system and main isolating switch (Fig. 2), even after the main contactor had been de-energised.
- The main isolating switch could not break the highly reactive current flow as it had not been designed to do so.

Contributory

- The switchgear cabinet did not contain the arc blast.
- The indication on the switchboard was misleading — the motor's run indication was off, even though the motor was still coasting down.
- The switching program did not take into account the design and operation requirements for this type of drive.

Actions required

Electrical safety awareness is particularly important for tasks involving HV equipment. Relevant safety measures must be known, understood and applied appropriately by all. To achieve this:

- incorporate design, operation and maintenance information developed at the time of installation into operational instructions
- develop the operational instructions by consultation between design, site engineering and operations personnel
- record installation design drawings and operation and maintenance manuals
- develop, implement and maintain competency-based training systems so that workers are aware of the critical tasks involved with HV equipment.

Note: Under regulations 5.10 and 5.11 of the Mines Safety and Inspection Regulations 1995, the statutory electrical supervisor is responsible for ensuring that electrical equipment and installations are maintained in a safe working condition. For very large sites, this may require the appointment of a senior electrical supervisor, commonly known as an electrical engineering superintendent.

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **191**

SERIOUS HIGH VOLTAGE (HV) ARC FLASH INCIDENT RESULTS IN EQUIPMENT DAMAGE

ISSUED: 22 NOVEMBER 2013

Summary of incident

A worker was performing a process (not electrical) isolation associated with routine maintenance for a pump. On switching the high voltage (HV) 3.3 kV isolator, a large arc flash and blast occurred, forcing the switchgear control cabinet door partially open. The switchgear equipment was damaged and there was the potential for serious injury to the worker. Fortunately, the worker was wearing category 4 arc blast-rated personnel protective equipment, including hearing protection, and was physically unharmed.

The main isolating switch was upstream of a fused contactor for an associated variable speed drive, which had an active front end for ongoing correction of harmonic distortion. This meant that although the pump was not running, the variable speed drive still delivered reactive power back into the site power system. The active front end had recently been added to the installation but operational instructions were not updated to reflect this retrofit.

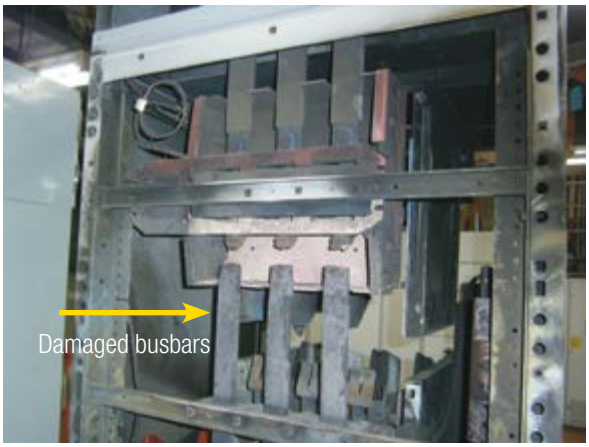


Figure 1 *Photograph of the switchgear cabinet (front and rear panels removed) showing damage from the arc blast. Note the condition of the busbars (i.e. gap)*

Mines Safety Significant Incident Report No. 191 continued

Probable causes

Direct

- The main isolating switch was designed to be operated once the contactor for the variable speed drive had opened but the isolation was performed with the contactor still closed, while reactive current was still flowing.
- The main isolating switch could not break the highly reactive current flow as it had not been designed to do so.

Indirect

- A mechanical interlock between the contactor and isolator failed, allowing the isolator to be operated while the contactor was still engaged.
- The switchgear cabinet did not contain the arc blast.
- The switching procedure did not take into account the design and operation requirements for this type of drive.

Actions required

Electrical safety awareness is particularly important for tasks involving HV equipment. Relevant safety measures must be known, understood and applied appropriately by all. To achieve this:

- incorporate design, operation and maintenance information developed at the time of installation into operational instructions
- develop the operational instructions by consultation between design, site engineering and operations personnel
- record installation design drawings and operation and maintenance manuals
- develop, implement and maintain competency-based training systems so that workers are aware of the critical tasks involved with HV equipment.

Any change to an existing installation, such as the addition of power factor correction in this incident, must be:

- reflected in the design drawings and operation and maintenance manuals
- communicated to relevant personnel.

Note: Under regulations 5.10 and 5.11 of the Mines Safety and Inspection Regulations 1995, the statutory electrical supervisor is responsible for ensuring that electrical equipment and installations are maintained in a safe working condition. For very large sites, this may require the appointment of a senior electrical supervisor, commonly known as an electrical engineering superintendent.

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **192**

SHORT CIRCUIT FAULT IN A VARIABLE SPEED DRIVE RESULTS IN FIRE, ARCING AND EQUIPMENT DAMAGE

ISSUED: 11 DECEMBER 2013

Summary of incident

Four 1000 kW drive motors were being used to drive an overland conveyer. A 5.5 MVA transformer powered a 690 V motor control centre (MCC), which fed three variable speed drives (VSDs), each controlling a drive motor. A fourth motor was controlled separately.

A short circuit fault in one variable speed drive developed into a line-to-ground fault. The resulting thermal stress caused a fire and arc flash within the variable speed drive.

The electrical installation, including cables, the 690 V motor control centre and three variable speed drives, was severely damaged. Electro-mechanical forces generated by the short circuit fault ripped the cables from the cable ladders. Fortunately, no-one was in the vicinity.

Photographs showing (A) location of initial short circuit fault in the VSD and (B) resultant arc damage to internal components

Mines Safety Significant Incident Report No. 192 continued

Probable causes

Direct

- The variable speed drives were designed for a distribution system with a direct earth connection, at the neutral point of the supply transformer. The earth connection was separated from the neutral point and, therefore, the protection failed to operate.
- The designer failed to identify hazards associated with site earthing and protection on the engineering drawings and documentation.

Indirect

- Testing of electrical equipment was only carried out at factory level. Site earthing and protection verification was not carried out.
- Site procedures and competencies were not adequate to ensure safe electrical installation.
- The cables were not secured to the cable ladder using clamps rated for potential short circuit current.

Actions required

Electrical installations at a mine site must comply with Part 5 of the Mines Safety and Inspection Regulations 1995. In particular, regulation 5.3 requires electrical installations and equipment at a mine to be designed, installed and tested in accordance with Australian Standard AS/NZS 3000 *Electrical installations* (known as the Australian/New Zealand Wiring Rules).

To achieve this:

- design electrical installations to meet fundamental electrical safety principles, including protection against overcurrent (Wiring Rules clause 1.5.9) and earth fault current (clause 1.5.10)
- provide engineering drawings and documentation with sufficient information to allow electrical equipment to be installed and maintained in a safe manner
- verify the installation, as far as practicable, prior to it being placed in service or use (clause 1.8)
- develop, implement and maintain competency-based training systems so workers are aware of the critical tasks involved with verification of the electrical installation.

Note: Regulations 6.3, 6.4 and 6.5 of the Mines Safety and Inspection Regulations 1995 require a designer to:

- *identify hazards associated with plant and assess the risks*
- *consider whether the risk of exposure can be reduced*
- *provide sufficient information for the plant to be manufactured in accordance with the design specifications*
- *provide sufficient information relating to installation, operation and maintenance of the plant.*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. **193**

CRUSH INJURIES SUSTAINED FROM MOVEMENT OF TAILINGS PIPE – FATAL ACCIDENT

ISSUED: 23 DECEMBER 2013

Summary of incident

A worker was fatally injured in an accident at a tailings dam. Workers were installing a new section of poly pipe on to the end of the existing tailings header. The pipe has an outside diameter of 800 mm, and individual sections are 60 metres long. The accident occurred near the edge of the tailings dam embankment. A worker was positioned in a shallow trench that had been excavated to provide access to the bottom of the flange of the connected end of the pipe. He was tightening bolts on the flange. Preliminary enquiries indicate the worker was pinned between the pipe being installed and the walls of the shallow trench when the loose end of the pipe slid down the embankment.

Probable causes

Direct

- The pipe was located near the edge of a slope.

Contributory

- The hazard of the pipe moving was not identified or controlled in the operating procedure being followed.
- The 60 metre long pipe section was not secured.
- Workers were completing the connection of the pipe to a flange while independent actions were being taken 60 metres away at the unsecured end of the pipe.

Actions required

Managers and supervisors are reminded of the importance of detailed safe work instructions that identify hazards and controls for each job step. For an operating procedure or work instruction to be safe, it should identify hazards and controls for each job step. The description for each job step should provide sufficient detail to carry out the task.

While long sections of flanged poly pipe provide operational convenience, they create significant handling hazards when compared to shorter rigid pipes. In particular, the inherent flexibility of poly pipe limits the length that can be simply lifted, and dynamic movement of unsecured ends can lead to load instability. In addition, if a section of the pipe snags on an obstacle during handling, there is the potential for elastic energy to be stored in the flex of the pipe, which can lead to sudden uncontrolled movement (“pipe whip”).

MINES SAFETY BULLETIN NO. **107**

UNWANTED INTERACTIONS BETWEEN LOADING AND CLEAN-UP EQUIPMENT

ISSUED: 11 OCTOBER 2013

Summary of hazard

Over the past 36 months at South West mining operations, at least four incidents have been reported for rubber-tyred dozers performing clean-up tasks. They were working inside the swing radius of loading equipment when the counterweight or bucket of the loading unit has struck the dozer, usually the cabin, causing significant damage and equipment downtime. Fortunately, any injuries have been minor but there is the potential for more serious outcomes.

Contributory factors

- Contrary to site procedures, and possibly demonstrating poor judgement of separation distances, dozer operators have been working inside the swing radius of loading equipment.
- Inadequate communication between operators has resulted in incorrect assumptions being made about another operator's actions.
- Inadequate supervision has meant that issues relating to violations of site procedures and poor communication practices have not been identified and addressed.

Recommendations

The potential for equipment conflict can be reduced by implementing a safe system of work for pit floor clean-up.

- A critical practice to be considered in any procedure is a prohibition on any worker or equipment, other than a haul truck being loaded, being inside the swing radius of any excavator or face shovel until the bucket is grounded and the swing brake (where fitted) is applied. If the excavator or hydraulic shovel has a cut-off switch that is activated when the operator stands, another layer of protection can be provided by requiring the excavator or shovel operator to stand during clean-up operations to prevent accidental activation of slew functions.
- Anti-collision technologies such as personal locator badges or radius sensitive alarm systems may be a useful aid for avoiding equipment conflicts.
- Verbal responses through radio communications should include a formal hand-over of a loading unit's work area to the operator responsible for clean-up activities. Upon completion of the clean-up, there should be a formal hand-back of the work area to the operator of the loading unit.
- Errors of judgement relating to the swing arcs of loading equipment can be minimised by identifying and demarcating the extent of the hazardous area surrounding loading operations, including the turning radius of dump trucks. This creates an exclusion zone for all mobile equipment, other than haul trucks, until authorised to enter.
- Inexperienced operators or those new to a site should work under the close personal supervision of a competent person until they are assessed as competent in the work being carried out.
- Where operators have been trained and assessed as competent, they may carry out the work without close personal supervision. However, the supervisor should oversee compliance with the procedure through task observation or other regular contact throughout the shift as required.

MINES SAFETY BULLETIN NO. **108**

TESTING OF CRANES TO ADDRESS THE POTENTIAL FOR UNCONTROLLED DESCENT OF LOAD DURING POWER FAILURE

ISSUED: 22 NOVEMBER 2013

Summary of hazard

Investigations have revealed cranes operating at mine sites with inadequate records of commissioning and load testing. This is partly the result of uncertainty over the Standards Australia Ruling SA RUL CR.1-2013 *Rulings to cranes, hoists and winches*, and its application under the *Mines Safety and Inspection Act 1994* and Mines Safety and Inspection Regulations 1995.

Clarity is required regarding performing and recording commissioning tests on cranes in accordance with the Act and regulations.

Testing of crane brakes under power failure conditions is required by Australian Standard AS 1418.3 *Cranes, hoists and winches - Bridge, gantry, portal (including container cranes)* and jib cranes. Clause 12.2.4 of AS 1418.3 requires checking of the hoist brake application when lowering on power failure.

Enquiry C of SA RUL CR.1-2013 indicates that using the emergency stop satisfies power failure load testing requirements if "it simulates sufficiently conditions under a power failure (when the braking is done purely by mechanical means)".

Other relevant legislation includes:

- Section 14 of the Act, which requires testing of plant to ensure that it is compliant with design
- Regulation 6.33, which requires all cranes to be compliant with AS 1418
- Clause 8.7.2 of AS 1418.1, which requires a crane's control system and equipment to provide fail-safe operation at all times including when there is a power supply failure
- Clause 8.7.4 of AS 1418.1, which requires an electrical control malfunction to not result in an unsafe condition of the crane
- Clause 8.10.4.2 of AS 1418.1, which requires a crane isolator to be readily accessible at a location that provides a clear view of all crane operations
- Regulation 6.20, which requires the installation and commissioning of plant to be performed by a competent person who is provided with adequate information to carry out the task
- Regulation 6.25, which requires records of testing to be kept for registered classified plant.

Note: The intent of the legislation is that employers must be able to prove that they have complied with minimum requirements of testing. Plant must comply with AS 1418, which requires a load to stop in the shortest possible time without causing shock to the structure. Visible acceleration is not stopping in the shortest possible time and therefore it is not an acceptable condition. AS 1418 also requires that the test performed simulates the conditions under power failure. The employer must prove this compliance with relevant records.

Mines Safety Bulletin No. 108 continued

Summary of hazard

A power supply failure to a crane at a mine site is a conceivable event that can lead to the uncontrolled descent of a load. Using the emergency stop for load testing may not replicate all the conditions of a power outage.

Recommendations

When performing and keeping records of crane load testing, more rigorous processes and attention to detail will improve the identification and control of hazards associated with crane operation.

Crane designers and suppliers

- When the crane isolator is not used to simulate power failure during commissioning testing, the record of testing must include:
  - justification as to why it is not practicable to use the crane isolator for this testing
  - verification that the testing performed simulates the conditions under a power failure.
- Verify the competence of the person performing the testing, and include details with the record of crane load testing.
- Provide all test acceptance criteria to the person performing the load test.

Site representatives

- Ensure operating hazards addressed by the load testing of the crane are identified, risk assessed and have quantified criteria to establish a successful load test.
- Ensure load test procedures and acceptance criteria are in place before allowing a load test to commence.

Persons conducting a load test

- Set targets for all load test criteria prior to testing.
- For a load test to be successful, there must be no visible acceleration of a load after a power failure occurs or is simulated.

MINES SAFETY BULLETIN NO. **109** AND DANGEROUS GOODS SAFETY BULLETIN NO. **0113**

MANAGEMENT OF BLASTING FLYROCK

ISSUED: 20 DECEMBER 2013

Summary of hazard

In two recent blasting incidents at separate mines, mine vehicles were significantly damaged when struck by flyrock. Workers were also exposed to flyrock in both events. In one incident, ten employees, including supervisory and blasting personnel, were standing beside a light vehicle when it was struck by flyrock. These events could have had more serious consequences.

Contributory factors

The following contributory factors were evident for both incidents.

- The shotfirer determined the safe distance for the blast exclusion zone without consulting and receiving approval from each responsible person.
- The shotfirer underestimated the extent of the danger associated with blast flyrock.

Actions required

These incidents highlight the importance of effective management when undertaking blasting operations. The shotfirer does not have the authority to unilaterally make and approve blasting controls at a Western Australian mine.

The primary responsibility for blasting procedures, standards, practices and blast exclusion zone distances lies with each responsible person involved in blasting operations. For a mining operation, this is defined to be the principal employer, any other employer and the manager.

Each responsible person at a mine must jointly ensure that controls are implemented to minimise the risks of injury or harm to people. To be effective, controls should be able to contend with human error.

The following measures are recommended.

- The blast design, procedures, standards, practices, and safe exclusion zone distances for all blasting operations are determined and approved jointly by the relevant responsible person, in consultation with the explosive manufacturer and under the advice of the shotfirer or other competent person on the mine.
- Any changes to blasting procedures, practices, standards or exclusion zone distances are referred to each responsible person for approval.
- Use the *Code of good practice – Blast guarding in an open cut mining environment*, published by Australian Explosives Industry and Safety Group Inc. (AEISG), as a guideline when preparing safe blast exclusion zone distances for the different blast parameters.

  Note: The code may be downloaded free from the AEISG website at ***www.aeisg.org***

- Where there is a danger to any person, public road or property not under the control or ownership of the principal employer:
  - change the blast design (i.e. reduce blast size and explosive energy)
  - use blast mats or
  - apply a combination of these strategies

to contain and prevent flyrock from being ejected outside the blast exclusion zone or boundaries of the mine.

HEAD OFFICE

RESOURCES SAFETY DIVISION, DEPARTMENT OF MINES AND PETROLEUM

Street address: Level 1, 303 Sevenoaks St, Cannington WA 6107
Postal address: Mineral House, 100 Plain St, East Perth WA 6004
Telephone: +61 8 9358 8002 (Monday-Friday, 8.30 am to 4.30 pm)
Facsimile: +61 8 9358 8000
Email: ResourcesSafety@dmp.wa.gov.au
NRS: 13 36 77 (the National Relay Service is an Australia-wide telephone access service available at no additional charge to people who are deaf or have a hearing or speech impairment)

In May 2014, Resources Safety is moving from its Cannington office to 1 Adelaide Terrace, East Perth (across the road from Mineral House). Our postal address will remain the same.

Sign up for Resources Safety's weekly news alerts at **www.dmp.wa.gov.au/ResourcesSafety** to receive the latest information about the move.

DANGEROUS GOODS SAFETY AND LICENSING

including explosives, fireworks and major hazard facilities

Telephone: +61 8 9358 8002
Facsimile: +61 8 9358 8000
Email: ResourcesSafety@dmp.wa.gov.au (licensing enquiries)
dgsb@dmp.wa.gov.au (dangerous goods safety enquiries)
rsdspatial@dmp.wa.gov.au (dangerous goods pipelines enquiries)
Dial 000 for dangerous goods emergencies or accidents requiring attendance of emergency services.

PETROLEUM SAFETY

including petroleum pipelines and operations, and geothermal energy

Telephone: +61 8 9358 8184
Facsimile: +61 8 9222 3383
Email: psb@dmp.wa.gov.au

SAFETY COMMUNICATIONS

including publications, events and *Resources Safety Matters* subscriptions

Telephone: +61 8 9358 8154
Facsimile: +61 8 9358 8000
Email: RSDComms@dmp.wa.gov.au

UPDATE YOUR CONTACT INFORMATION

If you have moved or changed jobs and are not receiving *Resources Safety Matters*, or wish to be added to the mailing list, please contact:

Safety Communications
Resources Safety Division
Department of Mines and Petroleum
100 Plain St, East Perth WA 6004
Telephone: +61 8 9358 8154
Facsimile: +61 8 9358 8000
Email: RSDComms@dmp.wa.gov.au

MINES SAFETY

including exploration, mining and mineral processing

Telephone: +61 8 9358 8079 (general enquiries and safety and health representatives)
+61 8 9358 8102 (mines safety reporting)
+61 8 9358 8461 (health surveillance, biological monitoring and contaminant monitoring [CONTAM])
Facsimile: +61 8 9325 2280
Email: MinesSafety@dmp.wa.gov.au (general enquiries)
SRSNotificationsManager@dmp.wa.gov.au (mines safety reporting forms and guidelines)
mineshreps@dmp.wa.gov.au (safety and health representatives)
contammanager@dmp.wa.gov.au (contaminant monitoring and reporting)
occhealth@dmp.wa.gov.au (health surveillance and biological monitoring)
For a serious mining accident or incident, the mine or exploration manager must advise their District Inspector as soon as practicable.

NORTH INSPECTORATE

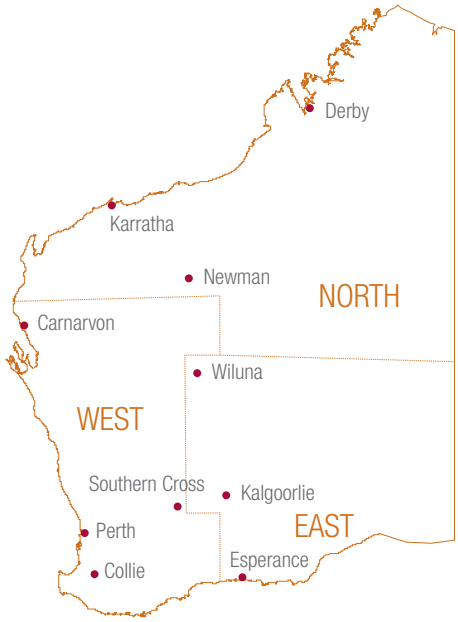
Street address: Level 1, 303 Sevenoaks Street, Cannington WA 6107
Postal address: Mineral House, 100 Plain St, East Perth WA 6004
Telephone: +61 8 9358 8079
Email: north.inspectorate@dmp.wa.gov.au

EAST INSPECTORATE

Street address: Cnr Broadwood and Hunter Sts, Kalgoorlie WA 6430
Postal address: Locked Bag 405, Kalgoorlie WA 6433
Telephone: +61 8 9021 9411
Email: east.inspectorate@dmp.wa.gov.au

WEST INSPECTORATE

Street address: Level 1, 303 Sevenoaks Street, Cannington WA 6107
Postal address: Mineral House, 100 Plain St, East Perth WA 6004
Telephone: +61 8 9358 8079
Email: west.inspectorate@dmp.wa.gov.au
OR
Street address: 66 Wittenoom Street, Collie WA 6225
Postal address: PO Box 500, Collie WA 6225
Telephone: +61 8 9734 1222
Email: west.inspectorate@dmp.wa.gov.au



MINE PLANS

Telephone: +61 8 9358 8115
Facsimile: +61 8 9358 8000
Email: rsdmineplans@dmp.wa.gov.au

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Resources Safety Matters is published by the Resources Safety Division of the Department of Mines and Petroleum (DMP). It is distributed free of charge to industry and interested members of the public.

Comments and contributions from readers are welcome, but the editor reserves the right to publish only those items that are considered to be constructive towards safety and health. Reader contributions and correspondence should be addressed to:

Resources Safety Matters Editor
Resources Safety, DMP
Mineral House, 100 Plain Street
East Perth WA 6004

Editor: Dr Susan Ho
Enquiries: 08 9358 8149
Email: RSDComms@dmp.wa.gov.au

This publication is available on request in other formats for people with special needs.

LIST OF CONTRIBUTORS (FROM DMP UNLESS OTHERWISE INDICATED):

Arthur Baker
Colin Boothroyd
Jeb Bromley
Samantha Cairns
Peter Capon
Andrew Chaplyn
Peter Chessa
Dean Cunningham
Conor Doherty
Peter Drygala
Jennifer Goh
Alan Gooch
Aaron Graham
Philip Hine
Su Ho
Alan Holmes
Jeremy Johnston
Adrian Jurg
Craig Little
Andrew Martin
Greg McCauley
Russell Miners
Bec Moore
Junior Oding
Peter Payne
Beau Pearson
Keith Porritt, Geoscience Australia
Marcus Rader
Simon Ridge
Tony Robertson
José Sanchez
Ankit Shah
Chris Stubley
Bob Temple
Amanda Thomson
Marshall Tigere
Daisy Tristanto
Tiffany Wertheimer
Henry Zuidersma

PHOTO ATTRIBUTION:

LD = Leanne Downes
SH = Su Ho
TYC = Tse Yin Chang
MA = Manish Ankleshwaria

COVER PHOTO:

DMP Safety and Risk Analyst Keiran Galvin inspecting a petroleum facility [MA]

RSD Jan14_860