

# minesafe

WESTERN AUSTRALIA

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Government of Western Australia  
Department of Mines and Petroleum  
Resources Safety

## Zeroing in on safety priorities

EXPLORATION ROADSHOW TAKES OFF

TIRED DRIVERS ARE EVERYONE'S PROBLEM

IMPORTANCE OF REFRESHER TRAINING



02



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**W**elcome to the second issue of *MineSafe* for 2012. As part of the Department of Mines and Petroleum's commitment to improving delivery of regulatory services, Resources Safety has increased the opportunities for industry consultation and feedback. Activities include participating in industry conferences, seeking industry input on priority safety targets, attending safety and health representatives meetings, and presenting workshops at the annual safety roadshows. We report on some of these happenings.

You will also read about the Conference of Chief Inspectors of Mines 2012, which I attended in Papua New Guinea in September. When visiting mine sites as part of the pre-conference field trip, the delegates were provided with details of the unique occupational health and safety issues presented by the location, geology and culture of the region.

It was heartening to see that Australian mining companies operating in Papua New Guinea are achieving safety performance standards comparable with many Australian operations. It was also apparent to me that having a culturally appropriate approach is the key to their success. This message should be heard because the foundation to their success was the development of a safety culture that is complemented and reinforced by the underlying native culture.

The tools and programs that we implement at our Western Australian sites must resonate with our workforce if we are to achieve positive cultural change.

Enjoy your reading.

**Simon Ridge**  
*Executive Director, Resources Safety*

Scan this QR code for past issues of *MineSafe*







TYC

## END OF AN ERA FOR RESOURCES SAFETY LEADER

**O**ne of the Department of Mines and Petroleum's leaders announced his retirement earlier this year, following ten years at the helm. Executive Director for Resources Safety, Malcolm Russell, called it a day in July.

Malcolm, who has spent more than half of his career in safety regulation, started at the then-Department of Minerals and Energy in 2002, staying with the Western Australian resources regulator as it moved from the Department of Industry and Resources to the Department of Consumer and Employment Protection and finally the Department of Mines and Petroleum (DMP).

Malcolm said that his biggest challenge came when DMP was formed in 2008, requiring him to oversee the amalgamation of the mining, dangerous goods and petroleum safety inspectorates under the Resources Safety banner.

"I think a lot of people forget that we put in a lot of effort to streamline the delivery of safety regulation services to these three related sectors," he said.

"I mean, we managed to establish a dedicated agency to regulate the entire resources industry — and I couldn't be any more proud of how well we did this."

Once DMP was up and running, Malcolm turned his attention to its Reform and Development at Resources Safety (RADARS) strategy,

which was established in late 2009. Under RADARS, DMP has strengthened its capacity and ability to regulate safety and health in the resources industry. Initiatives include introducing performance-based remuneration packages and a competency-based training and development program.

This has helped DMP recruit more safety inspectors. Since the implementation of RADARS, 50 inspectors have been hired, with nearly half of them in 2011. Resources Safety aims to appoint four petroleum inspectors, along with three mines inspectors, later this year. Recruitment is also underway for five vacant positions for mines inspectors.

In his final words as Executive Director, Malcolm encouraged ongoing stakeholder liaison through the statutory Mining Industry Advisory Committee (MIAC), which he chaired. He noted that he also received invaluable industry feedback on the RADARS strategy from the Minister for Mines and Petroleum's expert Ministerial Advisory Panel.

"This overall approach means Resources Safety is better placed than ever to deliver leading practice regulatory services as well as supporting industry as it makes the cultural changes necessary for improved safety performance". Malcolm, went on to comment by adding that, while the five-year strategy was only at the three-year mark, he was happy to hand over the reins.

"I think it is the perfect time for me to let to someone else complete the job with the same amount of vigour," he said.

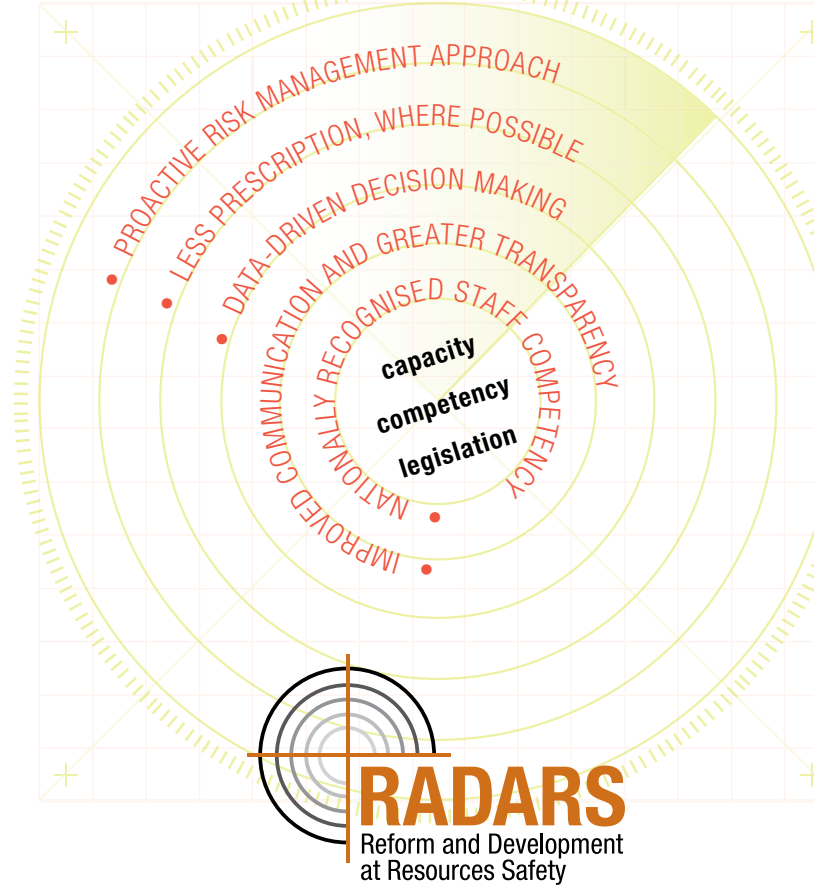


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THIS OVERALL APPROACH MEANS RESOURCES SAFETY IS BETTER PLACED THAN EVER TO DELIVER LEADING PRACTICE REGULATORY SERVICES AS WELL AS SUPPORTING INDUSTRY AS IT MAKES THE CULTURAL CHANGES NECESSARY FOR IMPROVED SAFETY PERFORMANCE.

**MALCOLM RUSSELL**

”



Despite the reform still being in full swing, perhaps Malcolm’s sense of resolution can be best understood when you look at how Resources Safety is operating at present.

“Everything is set in motion, there is nothing standing in the way of the department’s success right now — and I can take comfort in the fact that I helped it get there,” said Malcolm.

“In the end, Resources Safety strives to be recognised as a leading practice safety regulator and it now has the right mix of funding, training, competency and capacity to achieve this. I have every confidence that the commitment of individuals within the team will ensure RADARS is a complete success.”

Despite turning his attention to other matters, Malcolm said that he intends to stay abreast of progress in safety performance across the Western Australian resources industry.

“Actually, I hate the term retirement — I’m simply moving into the next, hopefully exciting and rewarding phase of my life, unburdened from the need to work for someone else,” he said.

“And while I will still keep up with industry, I want to be able to choose what I do and where I want to be each and every day.”

Malcolm will certainly be making the best use of his newfound freedom, with a four-month European holiday.

Regardless of what he gets up to, Malcolm says he will miss working at DMP.

“It is the people you work with and the role you fulfil — they are the things you miss,” he said.

“I have also enjoyed the challenge of trying to make a difference and driving change — it has really given me the most satisfaction, above anything else. So it makes me sad to end this chapter of my life but I do so with a sense of excitement too.”

Department Director General Richard Sellers commended Malcolm on his work at Resources Safety, saying his shoes would be hard to fill.

“I reluctantly accepted Malcolm’s resignation but I did so with great appreciation,” he said. “Malcolm has been instrumental in driving the necessary sweeping changes to safety reform at the department over the past three years and we could not have done it without him. We now have a legacy to build on and will achieve all of the long-term aims set out by Malcolm under his watch.”

State Mining Engineer Simon Ridge, previously Director Mines Safety, has been promoted to the role of Executive Director for Resources Safety. Mr Ridge, who took out the prestigious Australasian Institute of Mining and Metallurgy’s Jim Torlach Health and Safety Award in June this year, said that he was excited to take up the new position.

“My team and I have already achieved a great deal, so I am really looking forward to further strengthening safety regulation across the whole industry in the years to come,” he said.

# HAVE YOUR SAY ON OHS HARMONISATION

Under the strategy to harmonise occupational health and safety legislation across Australia, the Commonwealth, State and Territory Governments, unions and employer organisations have developed a model Work Health and Safety Bill, which would replace the existing occupational health and safety Acts in Western Australia, as well as new national model Work Health and Safety Regulations and model codes of practice. As part of the harmonisation process, new health and safety regulations have been drafted for Western Australia. This legislation will be administered by WorkSafe.

The State Government has undertaken consultation to determine the benefits and costs of the proposed regulations and codes that would apply to general industry in Western Australia. Independent firm Marsden Jacob Associates collected the feedback, which closed on 12 October 2012.

Simon Ridge, Executive Director of Resources Safety, had urged the minerals industry to get involved in the consultation and provide feedback.

"As with the existing occupational health and safety legislation that applies in Western Australia, a large portion of these proposed new regulations and codes will also apply to the mining sector," Simon said.

"We all know that there is already robust regulation in the resources industry in our State. However, we are continually looking at ways to improve upon these high standards. The new harmonised laws are part of this approach.

"Therefore, I encouraged those in the exploration, mining construction, mining, mineral processing and other minerals-related sectors to participate in the consultation process.

"This will provide the State Government with a deeper understanding of industry views while the benefits and costs of these planned regulations are being considered."

Western Australia is also participating in the National Mine Safety Framework (NMSF) "non-core" process to develop new mining-specific model regulations to complement the core of model regulations that apply to general industry. These model regulations for mining occupational safety and health will apply to the three major mining states of Western Australia, New South Wales and Queensland.

A similar consultation process will be undertaken in the future for the mining-specific regulations and codes of practice, but it will not include the general regulations that will apply to mining.

"It is important to remember that whatever is agreed for the proposed new general regulations will, in the most part, apply to the minerals sector," Simon reiterated.

## WHERE CAN I FIND OUT MORE?

- To find out more about the public consultation process for harmonisation, visit [www.marsdenjacob.com.au](http://www.marsdenjacob.com.au)
- For information on the proposed new regulations, visit the harmonisation FAQs quick link at [www.commerce.wa.gov.au/WorkSafe](http://www.commerce.wa.gov.au/WorkSafe)

## WHAT'S DIFFERENT IN WA'S WORK HEALTH AND SAFETY BILL?

The proposed Act for Western Australian includes the vast majority of provisions in the model Bill, including those creating duties, imposing responsibilities, providing the regulator with powers and effectively delivering safety at workplaces.

However, the State's proposed Bill excludes four areas of the model legislation that the Government does not believe would directly improve safety and health outcomes in workplaces. These are:

- penalty levels
- union right of entry
- health and safety representative's capacity to direct the cessation of work
- reverse onus of proof in discrimination matters.

There will also need to be specific transitional laws for Western Australia to cover matters such as:

- the continuity of currently elected safety and health representatives to avoid the need for unnecessary elections
- the rules for the continuation of existing investigations.





Photo courtesy Geoscience Australia

CCIM at Lihir gold mine.  
Left to right: Peter Waggitt (NT), Karl Spaleck (Newcrest), Andrew Chaplyn (WA), Mohan Singh (PNG), Simon Ridge (WA), John Mitas (Vic), Dave Bellett (NZ), Robert O'Sullivan (Qld)

## CHIEF INSPECTORS OF MINES GATHER IN PNG

**The 54th annual Conference of Chief Inspectors of Mines (CCIM) was recently held in Papua New Guinea, starting in Port Moresby on 14 September and finishing in Madang on 18 September.**

The 2012 Conference was hosted by the Mineral Resources Authority of Papua New Guinea and chaired by Mr Peter Waggitt (Northern Territory), with representation from Western Australia, Queensland, Victoria, the Commonwealth of Australia and New Zealand.

Before the formal proceedings began, CCIM members visited Newcrest's Lihir gold mine and MCC Ramo NiCo Ltd's Kurumbukari nickel laterite mine and Basamuk nickel-cobalt refinery. Operational staff outlined the safety performance, current challenges, and community and environmental initiatives and programs at each site.

Papua New Guinea's Chief Inspector of Mines, Mohan Singh, said that these visits are valued because they provide an opportunity for members to interact with site personnel and exchange experiences across jurisdictions.

"PNG has benefited from this high level forum in the areas of legislative development, regulatory framework and strategies, as well as sharing resources and expertise, and strengthening relationships," Mr Singh said.

### CONFERENCE PROGRAM

The Conference started with a review of the in-camera circumstances for fatalities and high potential or major or significant incidents over the last twelve months. The contributing causes and circumstances were analysed so the jurisdictions could share lessons learned.

Company representatives then presented talks on some significant local mines and development projects.

The National Mine Safety Framework (NMSF) Secretariat provided a paper on the status of the NMSF strategies. Conference members noted that the primary focus of the NMSF Steering Group continued to be Strategy 1 (Development of Nationally Consistent Legislation), with the "core" model Work Health and Safety Mines Regulations now close to completion, and significant progress made on the "non-core" regulations.

Members also noted that development of the National Mine Safety Database was progressing well, with the NMSF Data Working Group undertaking user acceptance testing of the completed system. The Conference host expressed interest in using the database to store incident information for Papua New Guinea.

Other discussions covered:

- diesel particulates
- underground ventilation standards and the status of ventilation officers
- managing dangerous goods on mine sites
- supervision guidance material
- training for mines inspectors
- management of legacy mine sites
- illegal miners
- fibrous actinolite
- post-blasting plumes of nitrogen oxides
- fires
- emergency preparedness, including the use of remote vehicles in underground mine rescue and recovery procedures.

### GOVERNANCE ISSUES

The CCIM has now concluded its second year as an independent body. As the peak body for mining regulators, the Conference has proven to be an effective forum to exchange information, share experiences and lessons learned, and develop consistency. It is uniquely placed to advise on the implementation and maintenance of the NMSF, as well as harmonisation of mining health and safety legislation.

### WEBSITE

The CCIM website at [www.ga.gov.au/ccim](http://www.ga.gov.au/ccim) will be revised shortly to reflect jurisdictional and membership updates.

### CCIM 2013

The 55th Conference of Chief Inspectors of Mines is scheduled to be held in Western Australia during September 2013.



## ZEROING IN ON SAFETY PRIORITIES

**U**nder the Reform and Development at Resources Safety (RADARS) strategy, the Department of Mines and Petroleum is committed to the target of “zero harm” in the Western Australian minerals industry.

A major initiative under the safety reform strategy has been increased consultation with stakeholders, including seeking industry’s input about what it sees as the safety priorities.

Previous industry consultation in 2011 confirmed nine main priorities for the mines safety regulator, as well as its role implementing the State Government’s decision in relation to the harmonisation of occupational health and safety laws as applied to mining operations.

A concerted effort this year has expanded the consultation phase to ensure more representative feedback and find out more about other industry concerns. A broader approach is important as the inspectorate uses the collated results to guide the setting of its priorities for 2013, review operational plans and identify the types of programs required to support industry efforts to improve safety performance. Where necessary, safety awareness programs are adjusted, and inspection and audit schedules refined to ensure the best use of available resources.

Some 215 people were surveyed at the Chamber of Minerals and Energy’s Safety and Health conference held in March 2012. The survey was subsequently sent to mine, exploration and service company managers, as well as safety and health representatives, and a further 123 surveys were received. The results for the 338 responses mainly represent mines-based activities, with about 4.5 per cent of the surveys from exploration personnel.

In order to better assess the issues considered priorities by the exploration sector, participants at the 2012 Exploration Safety Roadshow were also surveyed, with 99 surveys submitted.

The survey asked respondents to rate each priority from 1 to 3, where 1 is critical (i.e. most important), 2 is essential, and 3 is significant to achieve better occupational health and safety outcomes in Western Australia.

A comparison of the results from the two phases of consultation suggests that while there is broad agreement on the priorities, mineral explorers do have some specific safety concerns.



## GENERAL MINING

About two-thirds of respondents considered that supporting the advancement of a resilient safety and health culture in mining was critical.

About half the respondents agreed that it was also critical to:

- promote the appropriate use of risk management tools
- ensure mines address occupational health and safety (OHS) issues associated with the construction phase of mining operations
- facilitate the introduction of principal hazard management plans (PHMPs).

One-third of the respondents agreed that it was critical to:

- promote a risk management approach for the guarding of machinery
- implement the safety compliance strategy for mineral exploration and drilling
- promote the use of traffic management and confined space audits
- raise awareness of seismicity issues and their potential consequences for underground mines
- empower safety and health representatives

When asked whether there were other major issues that the safety regulator should be targeting, the most common responses covered:

- fatigue and working hours
- alcohol and other drugs
- balance between safety and production in the workplace culture
- new workers in the industry
- managers and supervisors
- standardisation of safety standards and processes across Western Australian sites
- more training for new workers, contractors, supervisors and safety and health representatives
- higher standard of training and management of safety at work
- vehicle and equipment management and maintenance

## EXPLORATION

Compared with the general mining responses, the strength of the response was slightly lower, with fewer “critical” rankings assigned. However, as for general mining, the top priority for exploration respondents was supporting the advancement of a resilient safety and health culture, with half of them agreeing it was critical.

One-third of the respondents said that it was critical to:

- promote a risk management approach for the guarding of machinery
- facilitate the introduction of PHMPs
- Implement the OHS compliance strategy for mineral exploration and drilling
- promote the appropriate use of risk management tools
- ensure mines address OHS issues associated with the construction phase of mining operations.

The remaining targets were considered essential rather than critical by most respondents:

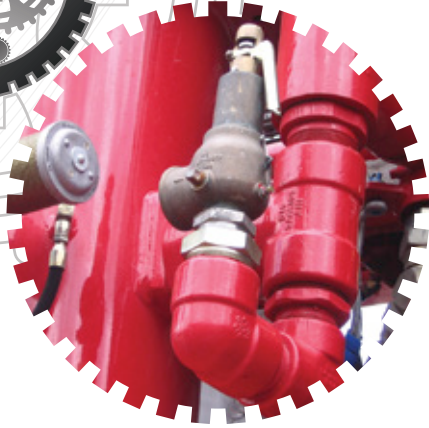
- empower safety and health representatives
- raise awareness of seismicity issues and their potential consequences for underground mines
- promote the use of traffic management and confined space audits

When asked about other major issues, the exploration responses indicated similar concerns to those of general mining:

- fatigue and working hours
- alcohol and other drugs
- new workers in the industry.

However, there were some areas of particular concern for exploration, including:

- fitness for work and physical fitness
- contractors
- issues associated with dust, air quality and the use of compressed air
- audits
- vehicle and equipment management and maintenance
- off-site travel.



**EXPLORATION SAFETY  
ROADSHOW  
2012**

## EXPLORATION ROADSHOW TAKES OFF

**In July 2012, Resources Safety presented the fifth annual Exploration Safety Roadshow series, with some 140 attendees in Kalgoorlie and Perth. Almost half were from exploration companies and about one-fifth worked for drilling companies.**

The audience heard about safety reform progress, some industry performance figures, and the management of exploration sites. Much of the program was interactive and covered the draft drilling code of practice, how to address the hazard of rotating and moving parts on drill rigs, and emergency preparedness and response in remote locations.

There was in-depth discussion on the best way to present exploration and drilling audits for inspectorate as well as industry use. It was agreed that the draft documents would be made available for industry testing in early November 2012, with feedback sessions to run in Perth and Kalgoorlie later in the month.

The move towards more discussion and consultation on topical issues was well received. A bigger venue will be used for the 2013 forum in Kalgoorlie to accommodate the projected increase in the number of participants.

## EXPLORATION AND DRILLING AUDITS – FEEDBACK SESSIONS

### Perth

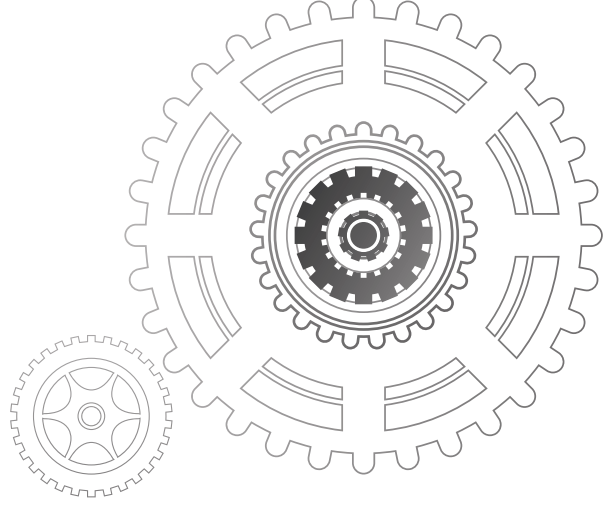
Date: Monday 19 November 2012  
Time: 8.00 am to 11.30 am  
Venue: Burswood on Swan  
Camfield Drive, Burswood

### Kalgoorlie

Date: Wednesday 21 November 2012  
Time: 8.00 am to 11.30 am  
Venue: Department of Mines and Petroleum  
Corner Hunter and Broadwood Streets

Visit [www.dmp.wa.gov.au/events](http://www.dmp.wa.gov.au/events) to register and receive the draft audits.





### 2012 EXPLORATION SAFETY ROADSHOW – KALGOORLIE



### 2012 EXPLORATION SAFETY ROADSHOW – PERTH



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## WA'S SAFETY LANDSCAPE IS CHANGING

**W**estern Australia is in the throes of a step change in the laws that regulate safety in the workplace. The efforts of many stakeholders throughout Australia to deliver a harmonised occupational health and safety legislative framework have yet to be fully realised, but it is likely that a high degree of consistency across the various jurisdictions and regulated industries will result, which is a positive outcome.

In relation to general industry and mining, the new legislation will probably contain a number of new concepts for those involved in occupational health and safety. Two of these new concepts are:

- person conducting a business or undertaking or PCBU
- worker.

These new concepts will dramatically change the regulatory landscape as the new laws will place specific duties onto a wider range of businesses and individuals than in the past, although such duties may have been implied previously.

The PCBU concept will place specific duty-of-care provisions on any business conducting work at a location — no matter what other relationships are in place at that work place. This PCBU concept will capture sole traders, contractors and joint venturers, as well as principals.

Similarly, the new concept of “worker” will capture any person who does work at a location. There will no longer need to be an employment contract between an employee and an employer, as exists currently with the concept of an “employee”. Sole traders, consultants, contractor employees and even volunteers will be considered as workers, in addition to the usual employees.

This will obviously create an overlap in some cases where individuals or companies are working on the same site. In such cases, it will not be an acceptable excuse that “I thought they were responsible for that provision”. Each individual or PCBU will have to ensure that the relevant provisions are effectively addressed. This may involve the

second PCBU or individual conducting the act or process but the first entity must still ensure that this has happened.

Within Western Australia, WorkSafe WA will still administer the Act and regulations covering general industry. The mining industry will continue to be regulated by a separate Act and regulations, administered by the Resources Safety Division of the Department of Mines and Petroleum. The two new Acts will be essentially the same, with most of the regulations for general industry reflected in Chapters 1 to 9 of the mining regulations. The mining-specific regulations will be in Chapter 10.

Currently, WorkSafe WA is preparing a regulatory impact statement (RIS) to estimate the implementation costs of the proposed new harmonised regulations on Western Australian industry in general. The public consultation was undertaken by Marsden Jacob Associates.

A further RIS will be conducted for the mining-specific regulations that will complement the general regulations for the minerals sector. This process has been delayed while the National Mine Safety Framework tri-state non-core process is completed. New South Wales, Queensland and Western Australia have been considering improvements to the national model mining-specific regulations, particularly in the area of underground coal mining and statutory positions such as Underground and Quarry Managers.

Codes of practice form the third component of the proposed harmonised regulatory framework. Under the Safe Work Australia banner, a number of new codes of practice have been finalised and others are being developed. It is intended that these will be adopted by all jurisdictions within Australia. The codes may be viewed at [www.safeworkaustralia.gov.au/sites/swa/legislation/model-cop/pages/model-cop.aspx](http://www.safeworkaustralia.gov.au/sites/swa/legislation/model-cop/pages/model-cop.aspx)

The final outcome for Western Australia will be a further transition to a wholly Robens-style legislative framework that is less reliant upon prescription and, it is hoped, will provide the flexibility for industry stakeholders to implement the best solutions to workplace safety and health issues.

**Andrew Chaplyn**  
*Acting Director Mines Safety*



## COMMONWEALTH ENFORCEABLE UNDERTAKING AIMS TO IMPROVE WORKPLACE SAFETY

**O**n 20 December 2010, Comcare initiated civil proceedings in the Federal Court of Australia (Perth Registry) against both John Holland Pty Ltd and John Holland Group Pty Ltd in relation to three separate incidents involving unsecured grid mesh falling from structures.

No one was injured in the first two incidents on 12 and 18 March 2009 but, on 19 March 2009, a John Holland Pty Ltd employee was standing on a section of grid mesh that fell. The employee fell 10 metres to the ground, sustaining fatal injuries.

On 19 April 2012, the Federal Court declared that John Holland Pty Ltd contravened the *Occupational Health and Safety Act 1991* (Commonwealth) and ordered it to pay the maximum penalty of \$242,000. John Holland Pty Ltd had admitted its contravention and agreed the maximum penalty should be imposed. The proceedings as they relate to John Holland Group Pty Ltd have been adjourned for a period of 18 months to enable both John Holland Group Pty Ltd and John Holland Pty Ltd to complete an enforceable undertaking that has been accepted by Comcare in regard to this matter. Comcare's notice of acceptance of the enforceable undertaking is reproduced on the right.

### WHAT IS COMCARE?

Comcare administers the Commonwealth's *Work Health and Safety Act 2011* and Work Health and Safety Regulations 2011 for Australian Government employees and the employees of organisations that have been approved to self-insure under the Comcare scheme.

The new work health and safety legislation took effect on 1 January 2012, replacing the *Occupational Health and Safety Act 1991*, Occupational Health and Safety (Safety Standards) Regulations 1994 and Occupational Health and Safety (Safety Arrangements) Regulations 1991.

Comcare has accepted an enforceable undertaking from John Holland Pty Ltd and John Holland Group Pty Ltd to improve workplace safety. Comcare has agreed to suspend proceedings WAD 406 of 2010 against John Holland Group Pty Ltd in the Federal Court of Australia on the basis that it complies with the enforceable undertaking.

Comcare commenced the proceedings to enforce alleged breaches of the *Occupational Health and Safety Act 1991* (the OHS Act) after an investigation by Comcare into an incident at the Mt Whaleback Mine in Western Australia where the John Holland companies had been contracted to provide various services. On 19 March 2009, a John Holland Pty Ltd employee was at work at the site when the unsecured grid mesh flooring he was standing on gave way and he fell approximately 10 metres. The employee sustained fatal injuries from the fall.

The Comcare investigation identified alleged breaches of the OHS Act in regard to installing the grid mesh, barricading hazards, providing supervision/training, reporting incidents and internal communications between work teams. The incident was severely aggravated by two other instances of unsecured grid mesh falling at the site in the week prior to the fatal incident. No one was hurt in the two earlier incidents. The proceedings as they related to John Holland Pty Ltd were recently finalised. John Holland Pty Ltd admitted the allegation against them and were fined the maximum penalty of \$242,000.

Under the enforceable undertaking, John Holland Group Pty Ltd and John Holland Pty Ltd have agreed to review and improve internal systems and procedures in regard to installation of grid mesh, barricading and shift handover communications. The expert reviews will consider industry leading practice and will look beyond mere procedures and into broader issues such as training and supervision.

Safety improvements identified by the John Holland companies through the enforceable undertaking will be made available to industry through its website and will also be provided to the Federal Safety Commissioner's office for dissemination to the construction industry.

The enforceable undertaking can be viewed at Comcare's website at [www.comcare.gov.au](http://www.comcare.gov.au)





## ONLINE RESOURCES FOR POSITIVE CULTURAL CHANGE

**W**hile engineering and system controls have led to major improvements in safety outcomes, the next step change in safety performance will be driven by addressing human factors and establishing resilient safety and health cultures.

There has been so much written about these topics and, with the plethora of online material, it can be difficult to decide where to start! To help locate key resources referenced in *MineSafe* and discussed at roadshows, Resources Safety has added safety culture and human factors to its directory of online one-stop shops.

There is now a single entry point covering:

- understanding human factors – links to the extensive resources of the UK-based Health and Safety Executive (HSE) and Energy Institute
- developing a resilient safety culture – safety culture spectrum that features in many Resources Safety presentations

- addressing toughness in mining (gender and safety) – links to report on findings and recommendations from the 2010 roadshow workshops as well as the resultant workshop planner series for senior management
- managing fatigue – guidance material currently applicable in Western Australia
- improving communication and consultation – guidance material currently applicable in Western Australia
- toolbox presentations – PowerPoint presentations from past roadshows.

Access the safety culture and human factors one-stop shop at [www.dmp.wa.gov.au/16259.aspx](http://www.dmp.wa.gov.au/16259.aspx)





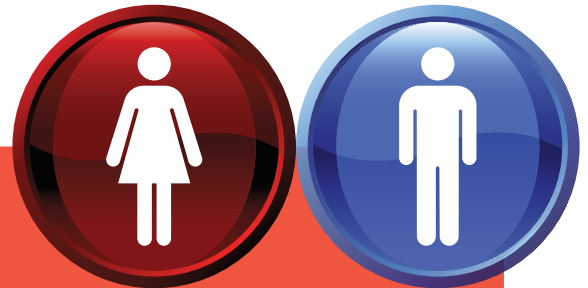
**The minerals sector is very good at addressing the engineering and system components of the safety equation, but safety performance appears to be plateauing. The next step change in safety performance will be driven by human factors and safety culture.**

Resources Safety has released a workshop planner series on gender and safety in mining, developed in response to feedback at industry workshops exploring the notion of “toughness in mining”, held as part of the 2010 Mines and Exploration Safety Roadshows. The planner works through some gender-related issues that can affect safety and health at workplaces.

## TACKLING THE TOUGH

Cultural change should be driven from the top and must engage the workforce to ensure its effectiveness. Hence, the planner series is specifically designed for use by senior managers, including the board of directors. It provides a good starting point to initiate discussions about gender and its potential impact on the safety culture of an organisation. This information can then be drawn upon to develop a strategy to address gender-related issues identified in the workplace, whether in the boardroom or individual work areas.

The planner series and roadshow report that it draws upon are available online from Resources Safety's safety culture and human factors one-stop shop.



## GENDER AUDITING AND SAFETY

*Dr Dean Laplonge of Factive ran the 2010 roadshow workshops and has written about gender and safety in past MineSafe issues. Here he discusses gender auditing within the mining industry.*

Gender auditing is commonly used in Europe and Africa to assess gender culture and ensure that seemingly gender-neutral systems and processes are considered in terms of how they impact on women in the workplace. The mining industry poses a number of challenges for gender auditors.

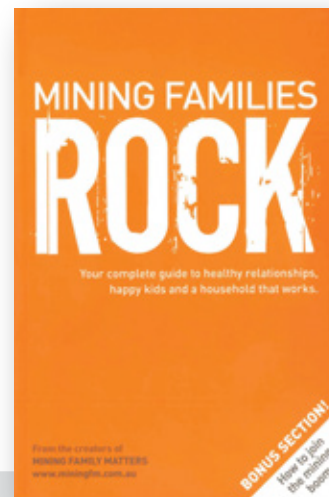
“Gender” can be a confronting concept for many employees in the mining industry. Attempts to transform the gender culture on a mine site can be strongly resisted. Many people like things the way they are right now. Where “gender” is no more than a euphemism for “women”, this can result in particularly negative responses. Senior managers may also view their company's policies and practices as gender neutral although this may not be the case, with the interests of “tough” men being supported in the interests of production and “getting the job done”.

For mining companies today, gender is often deemed a concern only to personnel in human resources, where it is linked to organisational values around diversity and to the number of women in the workforce. The goal of gender auditing, however, is “gender mainstreaming”, where the impacts on women are included in all aspects of the business — planning, budgets, recruitment, and so on.

One of the biggest cultural challenges for this industry is the continuing preference for a tough masculinity, regardless of whether this is displayed by men or women. Creating gender change in mining, therefore, requires an approach that focuses not so much on “man” and “woman”, but on the multiple ways men and women understand and do gender. By expanding “gender” to include the behaviours of men and women, the aim is to encourage changes in the gender culture where employees see the benefits of such changes without the changes impacting on (or rather negating) existing senses of masculinity or femininity.

Any strategic plan aimed at changing the gender culture also needs to be matched with gender expertise, staff resources, commitment on the part of management, an awareness of the differing forms of resistance, and a willingness to judge the outcomes not purely in terms of changes in the ratio of men to women.

Traditionally, a gender audit also does not consider the issue of safety. Yet the link between gender and safety is widely recognised in research into workplace culture. Seemingly gender-neutral safety procedures or initiatives may, in fact, be encouraging behaviours that place people at risk. A gender audit that includes a focus on safety allows mining companies and their employees to explore a range of issues that affect not only the status of women, but also the physical and mental wellbeing of everyone.



## STRATEGIES TO EASE LIFE'S PRESSURES FOR MINING FAMILIES

**B**uilding on the success of its 32-page *Survival Guide for Mining Families*, the online support network Mining Family Matters has scaled up its publishing efforts to help people through any challenges they face as a result of their work choices.

*Mining Families Rock* is 176 pages of professional advice and practical strategies for the growing number of mining workers coping with fly-in fly-out (FIFO) or drive-in drive-out (DIDO) arrangements, or living in isolated mining communities.

The self-help book features professional advice from a psychologist, personal anecdotes from mining family members, and a suite of simple tips for keeping relationships healthy and children happy.

Mining Family Matters co-founder Alicia Ranford said that *Mining Families Rock* had been carefully compiled to not only help people face work challenges, but help them feel good about their choices.

“The mining boom offers great opportunities for families but, after six moves in a decade and eight years of FIFO, I know it can also put intense pressure on couples trying to maintain a strong relationship and raise happy, healthy kids,” Alicia said. “Great communication is the absolute key and, hopefully, this book will start a lot of conversations on many personal levels.”

Angie Willcocks, Mining Family Matters’ resident psychologist, pointed out that there is a lot of attention in Australia on the negative impacts of FIFO rosters on families, and it is time to focus on how to make these couples more resilient.

“Working away from home is a fact of life for a growing number of Australian families. It can be a positive experience as long as couples are very clear about goals and potential problems up front,” Angie said. “They need to tackle any issues as a united team and regularly assess how the whole family is coping.”

Despite the increased number of pages, the book is easy to read and contains many simple strategies to ease life’s pressures and help the mining families focus on their health and happiness. Visit [www.miningfm.com.au](http://www.miningfm.com.au) for further information.





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## OCCUPATIONAL HEALTH

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THE HEALTHY WORKERS INITIATIVE PROVIDES WA EMPLOYEES WITH AN OPPORTUNITY TO MAKE POSITIVE LIFESTYLE CHOICES THAT WILL HELP IMPROVE THEIR HEALTH AND WELLBEING.

DENISE SULLIVAN,  
WA HEALTH

”

## NEW SERVICES TO SUPPORT HEALTHY WORKPLACES

**In early 2013, Western Australian workplaces will have access to a range of free services to help them implement healthy lifestyle practices in the workplace.**

The services are part of the Healthy Workers Initiative, which is a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventive Health. Under the agreement, WA Health will receive \$15.55 million between July 2011 and June 2015 from the Australian Government to develop and implement a Healthy Workers Initiative.

WA Health Director Chronic Disease Prevention, Denise Sullivan, said that the initiative comprised two components — a Healthy Workplace Support Service (HWSS), and a suite of specialist programs available to workplaces and their employees.

"The Healthy Workplace Support Service will be delivered by the National Heart Foundation of Australia (Western Australian Division) following an open and competitive tender process," Ms Sullivan said.

"The Foundation will deliver free services to help workplaces develop and implement programs that will lead to improved health for their employees."

Through the HWSS, a range of tools and resources will be available to assist management groups to introduce healthy lifestyle policies and practices in their workplace. A "one-stop shop" website will enable provide access to these resources and information on other HWSS initiatives.

To help management groups deliver their own healthy lifestyle interventions, a workplace grants scheme will be delivered through the HWSS. An awards program will also recognise companies

that encourage healthy lifestyle practices and behaviours in their workplace.

Expert services provided by the Western Australian School Canteens Association, Cancer Council WA, Diabetes WA and the Department of Transport will be accessible to management groups seeking specific assistance with policies and programs that address smoking, physical activity, healthy eating and the uptake of active transport.

"Chronic disease remains a serious issue in our community but many diseases can be prevented," Ms Sullivan said.

"The Healthy Workers Initiative provides WA employees with an opportunity to make positive lifestyle choices that will help improve their health and wellbeing."

Heart Foundation Western Australia Chief Executive, Maurice Swanson, said that the Healthy Workers Initiative would allow targeted approaches to meet the needs of different groups of employees, especially those at high risk of chronic disease.

### WHAT CAN I DO IN THE MEANTIME?

You can still create a health and physical activity program for the workplace using the Department of Sport and Recreation's Workplace Resources Kit, which will be accessible at [www.dsr.wa.gov.au/workplaceresourcekit](http://www.dsr.wa.gov.au/workplaceresourcekit) until the Healthy Workers Initiative online one-stop shop goes live in early 2013.

# INTRODUCING THE RESOURCES INDUSTRY TRAINING COUNCIL

*The Resources Industry Training Council (RITC) is a State Government-funded joint venture between the Chamber of Minerals and Energy of Western Australia (CMEWA) and Australian Petroleum Production and Exploration Association (APPEA). It focuses on the workforce development needs of the State's mining, oil and gas, and downstream process manufacturing sectors. In this article, MineSafe finds out what the RITC is doing and how it assists the industry.*

### Q. What is the RITC?

**A.** The RITC is one of ten Industry Training Councils operating in Western Australia that are funded by the State Government through the Department of Training and Workforce Development. It was created in 2009 and recognises the importance of Western Australia's resources development sector to the state.

The RITC is overseen by an advisory board comprising representatives drawn from the broad industry sectors that the RITC covers. Workforce development issues are the core focus of the RITC, and it provides information and advice on workforce development strategies across the mining, oil and gas and downstream process manufacturing industries in WA.

We constantly look for ways to meet workforce demand by getting people actively engaged in training. This includes traineeships, apprenticeships and targeted projects, working with enterprises and training organisations across the State, so that we have a constant supply of appropriately skilled workers.

### Q. What are you currently working on?

**A.** We launched a pilot program, the Aboriginal FastTrack Program, in late 2011 with the aim of increasing the participation of Aboriginal women in the resources industry. The participants are progressing well and are more than halfway through their FIFO traineeship in Surface Extraction Operations, working in the East Pilbara.

Another project endorsed by the RITC Advisory Board is research into automation for the mining, oil and gas and process manufacturing industries. This project looks into future needs, and is an example of an over-the-horizon project that the RITC has commissioned. This work has generated significant interest and, while it is yet to be completed, it is clear that automation is not likely to be the cause in itself of any reduction in employment across the industry. No doubt it will have an impact on the skills mix and skill requirements in the industry, which is an issue that training providers will need to adapt to. We want to be in tune with what the system needs and keep ahead of it if we can.



### Q. What do you see as the major challenges ahead?

**A.** Keeping up with the demand for workers to satisfy the needs of Western Australia's resources projects presents an ongoing challenge and we will be looking at this in three ways.

*Breadth of industry coverage:* Addressing the needs of both large and small companies equally and fairly across all industries that we cover.

*International companies:* Global companies have their own significant human resource and training capabilities. Our aim is to try and complement these capabilities and not duplicate them unnecessarily.

*Workers for the regions:* Most of the State's major resources projects are in regional areas, many remote, so we need to make sure we have the skilled workers where they are needed.

We also see some major challenges in terms of ensuring that "we have the right people in the right place with the right skills at the right time". Ensuring that skills development is delivered in a cost effective way and to an acceptable industry standard are also important considerations in the current industry environment.

### Q. What are your future priorities?

**A.** This has been a busy year so far. Industry activity levels have been high and it is essential that we have the appropriate strategies in place to support industry's needs.

One of the ways we are working towards this is to get more people actively engaged in training — increasing the participation of Western Australians in skills development, working closely with companies across the sector to help them up-skill their existing workforce and train new workers. It is encouraging to see that the number of people in training within our resources sector has increased rapidly over recent years. Since 2010, the number of apprentices and trainees employed in the resources sector has increased by 42 per cent. In the first quarter of 2012, Western Australia's resources sector accounted for 10 per cent of all apprentices and trainees in training in the State, which clearly demonstrates that the industry is pulling its weight in this area.

We are also looking at how apprentices fit into our industries, with research being done on the nature and delivery of apprenticeships and, importantly, making recommendations for change where appropriate.

Our aims are to keep abreast of industry needs and developments, keep it practical, and work collaboratively with all involved to add value to the processes already in place.

To find out more about the RITC, visit [www.ritcwa.com.au](http://www.ritcwa.com.au) or contact Nigel Haywood ([n.haywood@cmewa.com](mailto:n.haywood@cmewa.com), 08 9220 8358) or Jennifer Rumbles ([j.rumbles@cmewa.com](mailto:j.rumbles@cmewa.com), 08 9220 8350).



# SAFETY THROUGH INNOVATION AWARDS

**O**pen to all resource companies, operations and contractors based in Western Australia, the Chamber of Minerals and Energy of Western Australia's Safety and Health Innovation Awards are the peak industry safety innovations accolade.

The awards showcase the best in creativity and ingenuity with the goal of improving safety and health in local workplaces.

In March this year, the Chamber's Chief Executive Reg Howard-Smith congratulated all nine finalists who competed for top honours in three categories for the 2012 Safety and Health Innovation Awards. Finalists presented an overview of their programs to delegates at the Chamber's Safety and Health Conference held at the Perth Convention and Exhibition Centre.

"These companies are at the forefront of finding innovative solutions to improve workplace safety — industry's number one priority," Mr Howard-Smith said. "The safety performance of the WA resources sector continues to improve and industry is always looking at ways of doing things better."

The three category winners for 2012 were:

**People** Innovations that relate to existing personnel, new personnel or organisational changes

- Argyle Diamonds – Thermal Stress Management Plan

**Systems** Innovative implementation or design of systems or procedures that impact on safety and health

- Alcoa World Alumina Australia – Hearing Conservation Program

**Engineering** Maintenance, engineering, operational or infrastructure changes that enhance health and safety

- Leighton Contractors – Remote Camera System

The Industry Choice Award was presented to Barrick Gold for its Low Profile Tyre Handler.

Innovations eligible for entry include, but are not restricted to:

- solutions to specific health and safety problems
- selection, design or safe introduction of new equipment or processes
- introduction of innovative health and safety initiatives and training programs
- the development of safer or healthier work procedures.

Examples of past submissions include:

- new starter safety mentors
- elastic resistance training
- major loss containment (gas or liquid hydrocarbons)
- diesel emissions management plan
- remote camera system
- guarding for centrifugal slurry gland pumps.

Nominations for the Chamber's 2013 Safety and Health Innovation Awards close on 7 November 2012.

Please contact Richard Wilson on (08) 9220 8520 or [r.wilson@cmewa.com](mailto:r.wilson@cmewa.com) for further information.





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## TIRED DRIVERS ARE EVERYONE'S PROBLEM

**S**ome people involved in commercial transport appear to be more concerned about which jurisdiction they are operating under, and whether certain rules and regulations must be applied or not, rather than keeping an eye on the bigger picture.

The bigger picture is that anyone travelling by road could meet a tired driver coming the other way — perhaps on their side of the bitumen or gravel. Assigning responsibility for fatigue management becomes a moot point if you don't survive the crash.

No matter who is responsible for commercial drivers, whether on mine sites or public roads, whether they are a mining employee or truck driver delivering equipment to a mine site, it is in everyone's best interest to ensure the person is not driving tired. WorkSafe WA has issued Safety Alert 09/11 to address this issue. The safety alert is reproduced below and is available for download at [www.commerce.wa.gov.au/WorkSafe](http://www.commerce.wa.gov.au/WorkSafe)

### FATIGUE MANAGEMENT FOR FLY IN / FLY OUT COMMERCIAL VEHICLE DRIVERS

The purpose of this alert is to advise and promote industry awareness regarding compliance with the operating standards that apply to commercial vehicle operations on public roads in Western Australia.

### BACKGROUND

Commercial vehicle drivers operating on both mine sites and public roads are being scheduled to work mine-site rosters that could be in breach of the Western Australian Occupational Safety and Health Regulations 1996.

### CONTRIBUTING FACTORS

- Recent WorkSafe investigations have identified that the responsible person at the workplace had failed to ensure that commercial vehicles are operated in accordance with vehicle operating standards governed by regulation 3.132(2) of the Occupational Safety and Health Regulations 1996.
- The roster prevented solo commercial vehicle drivers from having at least two periods of 24 consecutive hours of non-work time in any 14-day period, increasing the risk of driver fatigue. An alternative to this is that in any 28-day period the driver has at least four periods of 24 consecutive hours of non-work time if, and only if, the driver has no more than 144 hours of work time in any 14-day period that is part of the 28-day period.
- The responsible person at the workplace failed to ensure that the fatigue management plan allocated to fly-in fly-out commercial vehicle drivers was effective in managing the risk of driver fatigue.

### ACTION REQUIRED

- A responsible person at the workplace must ensure that the rostering of commercial vehicle drivers operating commercial vehicles within Western Australia does not exceed these operating standards. This may be achieved by effectively reviewing and checking for compliance against the completed trip records of commercial vehicle drivers that are kept at the workplace.

### FURTHER INFORMATION

WorkSafe WA's code of practice on fatigue management for commercial vehicle drivers provides practical guidance for commercial vehicle drivers and those responsible for the operation of commercial vehicles in workplaces.



## DON'T LET PARKING GET AWAY FROM YOU

Resources Safety does not prescribe what companies must do when establishing parking areas for mobile equipment as each site is different. However, adopting the recommendations below will reduce the risks:

- locate parking on flat, level ground
- provide fundamentally safe parking devices
- be consistent in the design and layout of parking areas throughout the mining operation
- where possible, have one-way vehicle movement (i.e. limit need for reversing)
- keep light and heavy vehicles separate
- limit pedestrian interaction with mobile equipment
- use clear signage.

An advantage of a drive-in drive-out parking system over forward or reverse parking is that a clear field of vision can be maintained throughout the entire movement.

Whether the vehicle is parked in a V-drain or over a hump will determine its fundamental stability. For a V-drain, the front or rear wheels are in the drain and the handbrake is applied. Using a hump requires the vehicle to have its wheels against the hump with the handbrake applied, as well as being isolated in gear. The uncontrolled movement of a vehicle starting in gear should not be an issue as no equipment should be started without verifying that the transmission is in the neutral or parked position.

Parking on declines and inclines should be avoided. Where this is not possible on a decline, the mobile equipment should be parked as close to the bund as practicable, with the wheels turned into the bund, park brake applied, vehicle isolated in reverse gear, and chocks used. The same conditions apply for a vehicle parked on an incline except that the vehicle should be isolated in first gear.

Regardless of the approach adopted by a site, regulation 13.2(4) of the Mines Safety and Inspection Regulations 1995 requires that a vehicle must not be left unattended unless it is parked in a safe manner, with the controls in the correct position for parking and the parking brakes fully applied.

TYC



# MAKING A BREAK TO IMPROVE DRILLING SAFETY

*The principal hazards associated with drilling are well documented and understood, and include rotating rods and machinery, compressed air, fire, hazardous dust, heat-related disorders, noise and hazardous manual tasks. In the past decade, many of these hazards, particularly those with high-consequence potential, have been significantly addressed through the introduction of effective engineering controls such as mechanical rod handling equipment, stocking-type hose restraints, noise enclosures and fire suppression systems. The drilling industry is commended for adopting these changes, many of which involved considerable rig modification. However, mitigation of some residual hazards has lagged, despite the availability of safe engineering controls.*

*During the consultation phase for the mineral exploration drilling code of practice, Rob Mincham, a safety consultant with many years of industry experience, provided feedback about some of the safety issues. To encourage continued safety innovation in exploration drilling, he has prepared this report for MineSafe looking at some leading practice controls available for drill rod breakouts.*

## MANUAL TASKS AND DRILLING

Manual handling has historically been a common cause of many drilling-related injuries and remains so. Hazardous manual tasks commonly associated with injuries have included rod loading and unloading and the rod breakout functions.

The risks associated with rod loading and unloading, especially for reverse circulation (RC) drilling rigs, have been reduced significantly with the introduction of mechanical or automated rod handling equipment. Mechanical rod handling systems have been such an effective engineering solution to addressing the risks associated with the hook and clamshell method of rod loading, that it is now very rare to see an operating RC rig without one fitted. However, the same cannot be said for the hazards associated with the rod breakout function, despite the increasing number of safer alternatives available.

The task of breaking RC drill rod joints has typically involved the use of a combination of a manual rod spanner and pipe wrenches (commonly known as Stilsons) either in a hydraulic application or with the use of a strong arm or the rotation head for extra torque. The replacement of the manual rod spanner by hydraulic or air-operated rod spanners in more recent years has been a significant improvement to the process. However, neither the regulator nor the larger mining companies view the continued use of hydraulically operated pipe wrenches by many drilling contractors in a favourable light. The greatly increased torque and leverage that can be applied, in many cases, far exceeds the design parameters of the tool and often results in jaw failure, tool slippage, rod damage or endangerment to drilling crew members. The principal manufacturer of Stilson pipe wrenches, Rigid Tools (US), has disassociated itself from modifications to its tools for use in hydraulic

applications and condemned the practice, indemnifying itself against any liability in the event of adverse consequences.

There is a renewed focus on the misuse of hydraulic or powered pipe wrenches for breakout operations because of:

- the cumulative number of serious breakout incidents that have occurred throughout Australia
- increased attention by the safety regulators
- a greater emphasis by mining companies on a risk management approach to drilling hazards and the demand for effective engineering controls.
- the development of an increasing number of suitable alternatives.

A wide variety of tools is currently used by drilling contractors for rod breakout operations. The techniques and sequence of actions used also vary considerably. While many drillers are happy to use the head rotation as a breakout tool, others prefer to have a breakout tool perform the action. Opinions are also varied on hydraulic rod spanners versus air spanners versus manual rod spanners.

Those consulted on current systems and practices, and current and future developments expressed a common view:

- no one system is suited to all rigs or all types of drilling
- the principal area of risk is in the normal rod breakout action
- no one breakout tool will perform all breakout functions necessary on a rig
- no viable hands-free alternative has yet been developed for RAB or aircore applications
- significant development of new alternatives is still occurring
- some of the preferred alternatives are very expensive to purchase and install
- RC drilling has the highest risk and should be the first priority for the elimination of hydraulic pipe wrenches.

## DIAMOND DRILLING

Three alternatives to hydraulic pipe wrenches are now widely used in diamond drilling applications.

The first of these is a parallel-jawed, self-adjusting tool originally designed for the oil drilling industry but now available in a smaller version for mineral drilling applications. It is a safer, more robust and relatively inexpensive alternative to pipe wrenches, with the disadvantage that it still requires a degree of manual handling to hold the spring-loaded jaws open while it is manoeuvred into position. It is not normally fitted to operate in the same plane and can require an uncomfortable degree of manual handling to hold it parallel while locating it in position.

# THE BAD OLD DAYS

The second alternative is a rod spinning tool. Its operation is difficult to explain without a demonstration, but the principle involved is that of a hydraulically operated chuck through which the rods are pulled. The chuck has cam-operated jaws that are able to operate in both clockwise and counter-clockwise (make or break) directions. When the jaws are locked onto the rod, the chuck assembly is hydraulically rotated breaking the rod joint. The operation of the unit is simpler than it sounds and works effectively for the rod pulling operation. Some early difficulties were reported with lack of torque or tool slippage when undoing casing or more heavily torqued rod joints but these have been overcome. This tool does have the disadvantage of requiring a manual or alternative breakout of the first rod joint to allow the unit to be swung into position over the rods.

The third tool has two parallel jaws, one of which is hydraulically operated. The tool is swung into place and the jaws clamped onto the rod. Another hydraulic ram applies rotation to the tool and torque to the rod joint. The tool is fixed in the same plane and is easily swung into place via a handle. It has another handle that allows the unit to be rotated through 180 degrees to allow for use in 'making' a rod joint if required. The requirement for the unit to be manually swung into place is a minor drawback. This tool is relatively easily retro-fitted to rigs with only minor modifications required to the mast and rig.

## RC DRILLING

The size, weight and higher torque involved in RC rods — and the greater potential for injury — mean that the development of alternative RC rod breakout devices is more advanced. Unfortunately, these RC drilling characteristics also mean that many of the alternative solutions are large, complex, difficult to install and expensive.

One off-the-shelf tool currently used by some contractors is essentially a pipe clamp that is hinged in several places. It is wrapped around the drill rod with the main arm of the tool locking the clamp into position. As leverage is applied to the arm (usually hydraulically), the clamping force increases, applying rotational force to the rod until the rod joint breaks. A number of faults were reported by users of the original tool, particularly relating to the strength and quality of manufacture. However, the latest version appears to be stronger and more reliable. The principal disadvantage is that the operator's hands must be placed in and around the drill rod to close and lock the tool, with the potential for hand injuries.

Until recently, the preferred and best alternative from a safety and function perspective comprised two opposing hydraulic cylinders (with replaceable jaws) that clamp and rotate the rod in one operation. The unit is built into the mast and is retractable when not in use. It is a hands-free make-and-break system, normally used in conjunction with a hydraulic or pneumatic rod spanner. There is also an advanced system that includes a second gripper assembly.

*Continued page 22*







*Continued from page 21*

The next breakout system considered is also built into the slips table and uses hydraulically operated jaws that clamp onto the rods and then rotate. It is a two-tier system, however, with two sets of jaws stacked closely together. The narrow gap between the sets of jaws facilitates hammer disassembly and eliminates the need for a rod spanner, although one is normally fitted. It is a compact unit, which should make it easier to incorporate into the mast or slips table design on new rigs or for retro-fitting to existing RC rigs.

The third breakout tool described for diamond drilling is also available for RC applications.

### ROTARY AIRBLAST (RAB) AND AIRCORE DRILLING

The purpose of RAB and aircore drilling is to provide inexpensive, first pass, geochemical information. The development of effective alternatives to hydraulic pipe wrenches for the drill rigs has been hindered by the commercial need for the rapid drilling rates to remain competitive, and the drilling methods themselves. RAB and aircore drilling are characterised by:

- fast drilling speeds
- use of three metre and relatively lighter rods
- very short time interval between rod changes
- confined nature of the slips area
- smaller mast structure
- manual method of rod handling
- reduced torque required to break rod joints
- need for rapid rod changes to keep the hole dry.

To date, no effective commercially available alternatives to hydraulic pipe wrenches have been identified. A tool similar in function and operation to the Stilson-type pipe wrench has been developed for aircore rigs to at least eliminate the potential hazard of broken jaws. Any alternatives developed for RAB and aircore drill rigs will need to be simple and able to operate within the constraints identified above.

### WHERE TO NOW?

The innovation and changes in design that have produced many of the safety improvements we see today on drilling rigs are continuing, although economic uncertainty in some quarters of the industry has resulted in a loss of momentum. It is hoped that introduction of the code of practice for mineral exploration drilling in Western Australia will generate demand from drilling contractors and client companies, and provide the stimulus for continued research and development into drilling safety improvements, particularly for drill rod breakouts.

## DRILLING FAQ

**Q. Are any lifting operations on a drill rig classified as high risk work and, therefore, require a licence and verification of competency?**

**A.** Anyone applying slinging techniques or selecting methods to lift or move a suspended load at a drilling operation will require a dogging (class DG) high risk work licence as a minimum. This also applies to people who inspect lifting gear.

There is also a requirement under regulation 4.13 of the Mines Safety and Inspection Regulations 1995 for anyone doing such work to be assessed to ensure they are competent to use the equipment provided.



## IMPORTANCE OF REFRESHER TRAINING

**A** safety alert issued by the UK-based Health and Safety Executive in June this year highlights the importance of refresher training and regular practice, particularly for emergency equipment.

HSE Bulletin SID 1-2012 describes the small but real risk of oxygen self-rescuers catching fire if not correctly activated. Some workers donned self-rescuers to evacuate a gas-affected area in a coal mine. Upon reaching fresh air, they removed their self-rescuers and placed them on the ground. When one of the team later picked up one of the used rescuers by the mouthpiece, there was a popping sound, smoke appeared from around the exhale valve, and it burst in to flames.

It appears that the wearer had not triggered the starter when putting on the self-rescuer. The starter had activated when the used rescuer was picked up by the breathing tube because the unit was already hot and the additional oxygen provided fuel for the fire. No-one was injured.

Visit [www.hse.gov.uk/safetybulletins](http://www.hse.gov.uk/safetybulletins) for more information on this incident.

What can we learn from this alert? To maintain certification, first aid competency is assessed regularly as it is recognised that skills and knowledge can diminish over time if not routinely applied or practised. The same approach should apply for emergency equipment, which is rarely used. Refresher training with a practical assessment will confirm whether people are still competent to use the equipment — and whether they understand the importance of following the correct start-up procedure, even when the consequences of misuse are not immediately obvious.

## SEPARATE AND VENTILATE IS THE DANGEROUS GOODS MESSAGE FOR SAFE WORK AUSTRALIA WEEK

**M**any people carrying small quantities of dangerous goods on public roads do not understand the inherent risks associated with their transport and consequently adopt poor transport practices.

Dangerous goods licences are not required for these small quantities so people may not be aware of the requirements. They probably don't consider issues like segregating or separating mixed loads of dangerous goods, and ensuring that the goods are adequately ventilated.

While transport industry operators are guided by the Australian Dangerous Goods Code, private citizens are often unaware of their exposure when transporting fuels, cooking gas, welding gases and toxic products such as fumigants, pool chemicals and cleaning agents.

As part of Safe Work Australia Week 2012, which runs from 21 to 27 October, the Resources Safety Division of the Department of Mines and Petroleum is running an awareness campaign targeting these individuals.

The goal of the public awareness campaign is to alert the public to the risks involved in transporting dangerous goods, and to direct people to appropriate advice on safe practice.

Four common situations where individuals transport retail quantities of dangerous goods for their household or business use are highlighted in the campaign.

- LP Gas cylinders and jerry cans filled with petrol being carted in passenger vehicles
- Couriers delivering a mixed load of pool chemicals in the back of their vans
- Tradesmen carrying oxy-acetylene gear in work vans and utes with the regulators still attached
- Fumigants for rural use being carried inside the cabins of work vehicles.

If some chemicals come into contact with each other, there is a risk that they will react, which can lead to fires, explosions or the production of toxic gases. It is important to know which chemicals need to be separated or kept apart.

If flammable liquids, such as petrol, or flammable gases, such as LP Gas, are carried in enclosed vehicle cabins with no fresh air flowing through, there is an ignition risk if the container vents or spills. A driver was badly burnt after lighting a cigarette in a vehicle where LP Gas had accumulated. Effective ventilation is essential.

Of course, the suppliers and manufacturers of dangerous goods are the primary points of contact for advice on good transport practice. They are required to provide information in the form of a material data safety sheet (MSDS) for each dangerous good.

Visit [www.dmp.wa.gov.au/DangerousGoods](http://www.dmp.wa.gov.au/DangerousGoods) for more information.





## COMPETING TEAMS

Alacer Gold South Kalgoorlie Operations [Alacer Gold]

Barrick Kanowna [Barrick Australia Pacific]

COMET (Combined Operations Mine Emergency Training)  
[Barrick Australia Pacific (Granny Smith), Minara Resources,  
Xstrata Nickel (Cosmos), AngloGold Ashanti Australia  
(Sunrise Dam)]

KCGM Ratz [Kalgoorlie Consolidated Gold Mines]

La Mancha Kalgoorlie Operations [La Mancha Resources]

Murrin Murrin Operations [Minara Resources]

Newmont Boddington Gold [Newmont Asia Pacific]

Newmont Combined Team [Newmont Asia Pacific]

Paddington Operations [Norton Gold Fields]

St Barbara Leonora [St Barbara]

St Ives Gold [Gold Fields Australia]

United Minerals [BHP Billiton (Kambalda Nickel Smelter and  
Concentrator), Focus Minerals, Saracen Gold Mines]

Yilgarn One [Barrick Australia Pacific]

Yilgarn Two [Barrick Australia Pacific]

## HONOUR BOARD

<b>1st best team</b>	Yilgarn One
<b>2nd best team</b>	Barrick Kanowna
<b>3rd best team</b>	La Mancha Resources
<b>Confined space rescue</b>	Murrin Murrin Operations
<b>Fire fighting</b>	La Mancha Resources
<b>First aid</b>	Paddington Operations
<b>Hazardous Chemicals (HazChem)</b>	KCGM Ratz
<b>Incident management</b>	Craig Stonham (Yilgarn One)
<b>Rope Rescue</b>	Alacer Gold
<b>Team skills</b>	Alacer Gold
<b>Vehicle extrication</b>	Yilgarn One
<b>Theory</b>	Yilgarn Two
<b>Theory individual</b>	Alex Fincher (Yilgarn Two) and Matthew Blood (United Minerals)
<b>Team safety</b>	Yilgarn One
<b>Overall BA skills</b>	United Minerals
<b>Overall first aid</b>	Newmont Boddington Gold
<b>Best scenario</b>	Confined space
<b>Best captain</b>	Jess Kinnerley, KCGM Ratz
<b>Best new captain</b>	Connel Sinclair (Murrin Murrin Operations)
<b>Best new team</b>	Yilgarn Two





Yilgarn One TYC

## SAFETY COMPETITION OFFERS GREAT REWARDS

**S**afety is important to the Western Australian resources industry and is brought to the fore when a mines rescue competitions kicks off. Emergency response skills were tested in May at the 2012 Surface Mine Emergency Response Competition, held in the City of Kalgoorlie-Boulder.

The competition was presented by the Chamber of Minerals and Energy's Eastern Regional Council. Event facilities were provided by Silverlake Resources, Kalgoorlie Consolidated Gold Mines (KCGM) and Paul & Warner Recco (PWR).

Fourteen teams took on the competition's challenges. Realistic high-pressure scenarios were staged to test team skills, including the hazardous chemicals (HazChem) event, which was sponsored by the Department of Mines and Petroleum. The HazChem trophy was won by the KCGM Ratz team, led by Jessica Kinnersley, who also took out the Best Captain Award. Jess, who won Best New Captain in 2011, found the competition to be hugely rewarding.

"The event really does take team sports to a whole new level, as it gets you as close to real-life scenarios as possible without anyone being put in danger or hurt," she said.

"The team building in these sorts of competitions is crucial because, at the end of the day, we are all here to help each other in the unlikely case of an emergency. Having well established relationships makes this assistance easier."

But KCGM was not the only leading performer at the competition. Barrick's Yilgarn One team added to its silverware – landing Best Team for the overall competition.

"We are very proud of what we achieved at the recent mine safety competition," said Dave Colopy, Barrick Australia Pacific's Director of Health and Safety.

"Our strong performance clearly demonstrates the quality of training and support in mines rescue at all of our mine sites.

"Our team members were drawn from many of our operations, which highlights that high standards in safety is a value that is truly embraced by our people and our company," Dave added.

Barrick's Kanowna team took out second place for Best Team, while La Mancha Resources followed closely behind.

Other events included fire fighting, first aid, rope rescue, team skills, confined space rescue, incident management, vehicle extrication and theory.

State Mining Engineer Simon Ridge said that he was pleased at the great turnout.

"The fact that so many teams participated really shows us just how important safety is to industry across this State — and that is pleasing to any regulator," he said.

"Now that this competition has wrapped up, I have every confidence that operators will continue to develop the skills and experience they need to respond to any emergencies in the future. It is all about mining companies taking the responsibility for maintaining high safety standards and practices across the board."

Reinforcing this message was Chris McKay, who spoke at the competition's presentation night.

"Chris received serious injuries at the Agnew gold mine earlier this year when reinforcing mesh fell on him and two workmates. He shared this experience with us all," Simon said. "I can tell you, it really drove the message home — safety should always be the number one priority."



## CONFINED SPACE RESCUE



## FIRE FIGHTING



## FIRST AID



## HAZCHEM



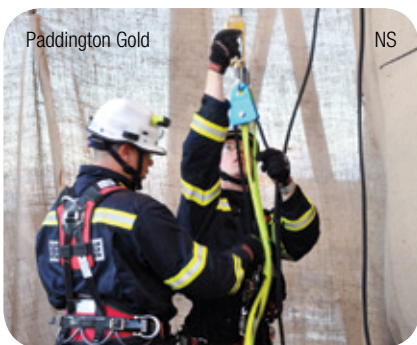


# 2012 SURFACE MINE EMERGENCY RESPONSE COMPETITION

## INCIDENT MANAGEMENT SCENARIO



## ROPE RESCUE



## TEAM SKILLS



## THEORY





VEHICLE EXTRICATION



ADJUDICATORS AND VOLUNTEERS





## HONOUR BOARD

<b>Best team winner</b>	Premier Coal
<b>Best team runner up</b>	Newmont Boddington Gold
<b>Confined space rescue</b>	Premier Coal
<b>Fire fighting</b>	Premier Coal
<b>First aid</b>	Premier Coal
<b>Hazardous materials (HazMat)</b>	Newmont Combined Team
<b>Rope rescue</b>	Premier Coal
<b>Theory</b>	Premier Coal
<b>Theory (reserve award)</b>	Benjamin Martin (BHP Nickel West)
<b>Team safety</b>	Premier Coal
<b>Vehicle extrication</b>	BHP Billiton Nickel West

## COMPETING TEAMS

BHP Billiton Nickel West  
BHP Billiton Worsley Alumina  
Newmont Boddington Gold  
Newmont Combined team  
Premier Coal

Newmont Combined Team TYC



## CHANGE OF SCENERY FOR SWERSC

**The 2012 South West Emergency Response Skills Challenge (SWERC) was held on 31 August and 1 September at Newmont's Boddington gold mine, after being presented at Greenbushes for the previous three years. It continued the trend of hosting the competitions at working operations, which adds to the realism.**

The event was coordinated by the Chamber of Minerals and Energy of Western Australia. It provided the opportunity for five emergency response teams to use, test and compare their emergency response skills in a controlled environment. Teams were drawn from companies based in the South West, Peel and Kwinana, with a few participants from the Kimberley and Eastern Goldfields.

"With only a few resource companies in the South West, it is great to see the majority of them taking part in this competition," said David Todd, the Chamber's Executive Officer – Occupational Safety and Health.

The prime coordinator for the weekend's activities was Ben Armstrong, Emergency Services Coordinator at Newmont Boddington Gold, who organised the scenarios and ensured the two-day program ran smoothly for the teams and visitors.

Accommodation was provided at the Newmont Boddington Gold mine camp, which reduced travel time and allowed convenient access to onsite events. The camp was also used for the induction, briefings, theory exam, and welcome and presentation dinners.

The Department of Mines and Petroleum is a strong supporter of mine emergency response competitions and Resources Safety sponsored the best team category for this event. The award was presented by Simon Ridge, State Mining Engineer. Other staff involved in the weekend's activities were Peter O'Loughlin as a chief adjudicator, Andrew Harris as a fire fighting adjudicator, Gary Hussey as a confined space adjudicator, and Tse Yin Chang and Peter Payne as official photographers.

For each event, teams were briefed before arriving at the incident scene. Teams had to assess the scene quickly, with captains taking the lead role in organising team members to undertake specific aspects of the intended rescue. Each scenario was well designed to test emergency response skills, with some surprising twists.

### FIRE FIGHTING

Teams were required to rescue at least one victim, possibly more, trapped in a burning building (represented by a large container). They had to assess the situation quickly, fight and extinguish a reigniting fire, and contend with smoke throughout the building. Once rescued, the victims required first aid to assist with recovery.

### CONFINED SPACE RESCUE

Teams were faced with rescuing a worker who had a welding accident in a confined space. The worker had been working deep within a water tank when communication was lost. The tank had a maze of compartments, and finding a non-communicating victim within the allocated time proved too much for some teams.

### FIRST AID

Rescuers arrived at the crib room to find four victims with a variety of injuries. A sealed baked bean tin had been heated in a microwave, resulting in an explosion that had scattered a mixture of glass and baked beans around the room. Rescue teams were hard pressed dealing with spinal, leg and facial injuries and burns, but all came through with flying colours.

### HAZMAT

Teams had to rescue two victims from the processing plant following a suspected cyanide spill. The source of the spill had to be identified and controlled before team members could search for and extract the casualties from the contaminated area. Teams were then required to decontaminate the victims and the search party. Skills in dealing with contamination were well tested in this scenario.

### ROPE RESCUE

Teams were faced with rescuing a worker who had fallen onto piping and broken a leg while working at the top of the processing plant. This proved to be a very challenging scenario, with teams firstly having to stabilise the casualty while working in a very awkward location, before moving the person to the walkway. They then had to consider rope-work requirements to safely lower the patient eight floors to the ground. Teams worked very well with the casualty and considered alternatives for completing the rescue, but time proved the winner in all cases.

### VEHICLE EXTRICATION

In the open pit, teams were faced with rescuing an injured driver from a light vehicle partially trapped beneath a big haul truck. Teams used a variety of techniques to remove parts of the car so the injured driver could be rescued, only to be faced with the victim losing both lower limbs when his "amputated" synthetic limbs fell into the vehicle.

### THEORY

All team members were faced with a comprehensive examination of the theoretical aspects of mines rescue.



# 2012 SOUTH WEST EMERGENCY RESPONSE SKILLS CHALLENGE



TYC

## VOLUNTEERS AND SPONSORS



PP



TYC



PP

## THE WINNERS



Benjamin Martin

TYC



Newmont Combined

TYC



Nickel West

TYC



Newmont Boddington

TYC



Premier Coal

TYC

## VEHICLE EXTRICATION



Worsley Alumina

PP



Newmont Combined

TYC



TYC



TYC



## CONFINED SPACE RESCUE



## FIRE FIGHTING



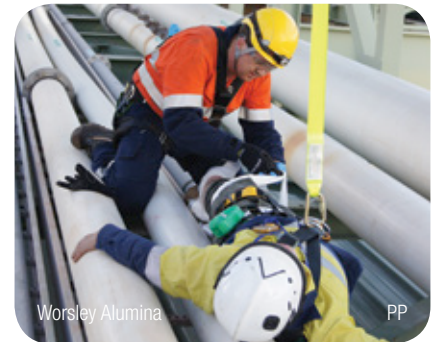
## FIRST AID



## HAZMAT



## ROPE RESCUE



## THEORY







## IS YOUR SITE USING THE LATEST RISK MANAGEMENT STANDARD?

**S**ome mining companies, mine sites and consultants may not be aware of the more recent publications from Standards Australia that may be relevant to risk management, and should check their documentation to ensure it is based on current information. Safety and health representatives may wish to follow this up with their supervisors or managers.

.....  
In particular, the AS/NZS document on risk management, published by Standards Australia, was revised in 2004 and again in 2009. Some mining companies and mine sites are still referring to the 1999 version of AS/NZS 4360 *Risk management* in their documentation.

Current versions of Standards Australia documents that may be relevant to risk management include:

- AS/NZS ISO 31000:2009 *Risk management – Principles and guidelines*
- HB 89:2012 *Risk management – Guidelines on risk assessment techniques*
- HB 158:2010 *Delivering assurance based on ISO 31000:2009 Risk management – Principles and guidelines*
- HB 327:2010 *Communicating and consulting about risk.*

These documents can be purchased from SAI Global at [www.saiglobal.com](http://www.saiglobal.com)

## MORE ABOUT THE STANDARDS

See pages 12 and 13 of the September 2011 *MineSafe* (vol. 20 no. 2) for more information about imbedding risk management in business processes and the latest Australian Standard.

## A VERY USEFUL GUIDE FROM NSW

Sites wanting to develop an effective risk management system, or reviewing their current arrangements, should check out MDG 1010, *Minerals industry safety and health risk management guideline*, which was published by the NSW Department of Industry and Investment in January 2011.

In a resilient safety culture, all site personnel should be comfortable with the nature and logic of the risk management process, and this easy-to-use guide will help achieve this aim.



## WHAT IS RESILIENCE ENGINEERING?

*Barry Healy is Resources Safety's Training and Education Officer. He regularly contributes to MineSafe's "Barry's bookshelf" series. Although published some six years ago, Barry says that the book reviewed here is worth reading, given the increasing focus on human factors in the safety equation.*

Imagine you are working in a hospital, with a modern, state-of-the-art, computerised medication administration system automatically prescribing precise doses of the correct medicine for every patient. Then imagine that somebody in the IT department accidentally fails to reload a backup program correctly. Suddenly, without warning, every prescription is wrong.

This isn't a daydream — it has happened and is one of the case examples examined in *Resilience Engineering: Concepts and Precepts*, edited by Erik Hollnagel, David Woods and Nancy Leveson, and published in 2006.

What happened in the hospital? Nurses spotted the errors and pharmacy staff improvised a manual system. Not a single wrong dose was administered.

The question raised is, given how close the system came "to falling off the edge", did the problem demonstrate its resilience or its brittleness?

How would you relate to the incident? As a nightmare or an opportunity?

Welcome to the land of resilience engineering, a relatively recent development in safety science that is gaining in importance. Resilience engineering assumes that in the real world things constantly change and so the best designed safety system will start to wear thin. As it does, people will adapt and change things to compensate for its weaknesses.

Sooner or later, those adaptations will not align with the real world and a safety incident will occur. That is, a safety incident is a "decompensation" for the weaknesses of the safety system, allowing you to see its holes.

How resilience practitioners relate to incidents is using them as an indication that a system is reaching its limits of safe operation. They classify different types of adaptive behaviours in order to monitor the "boundary conditions" of the current system, and anticipate the changing shape of risk before failures and harm occur.

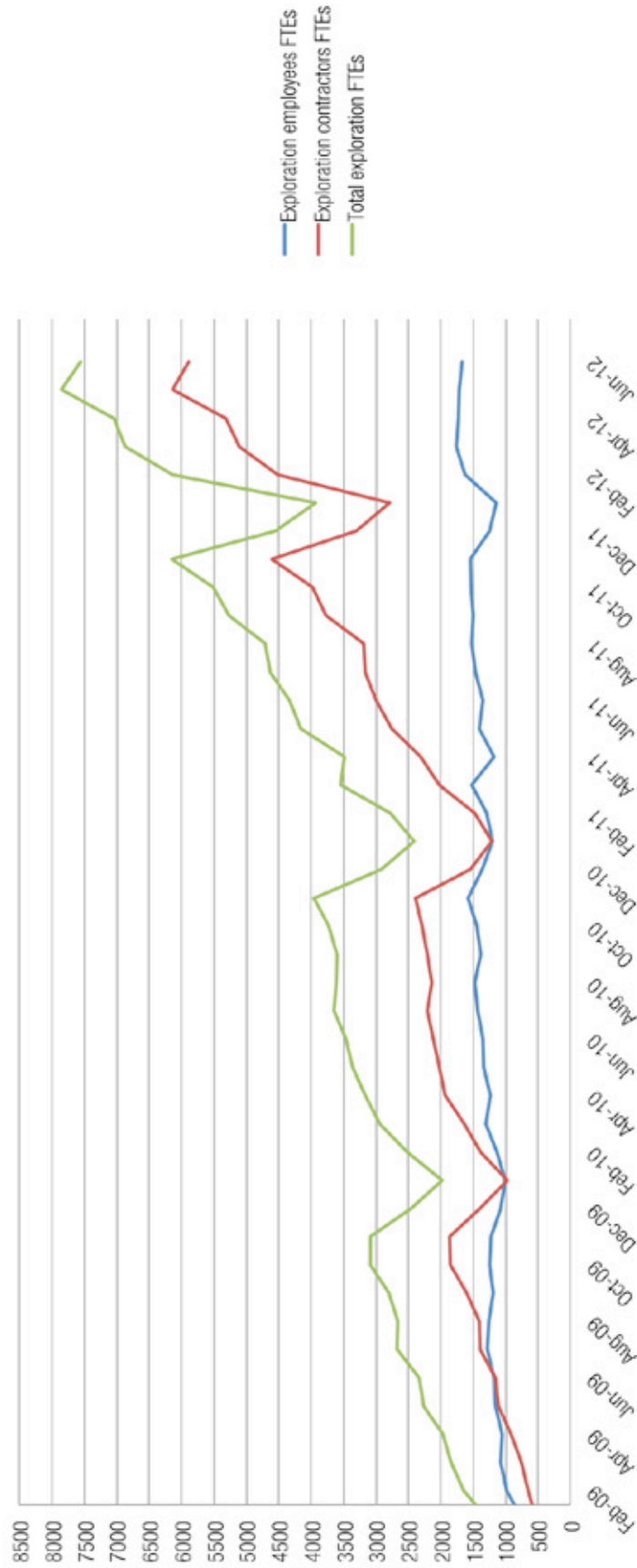
"Incidents are valuable because they provide information about what stretches the system and how well the system can stretch," the authors write. This mindset allows resilience managers to invest energy and resources where they are most needed.

You can see why this topic is increasingly of interest to safety professionals worldwide. Is resilience engineering the end of all your problems? Perhaps, but don't go to sleep on the job. Resilience engineering is based on "a constant sense of unease"!



MONTHLY 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



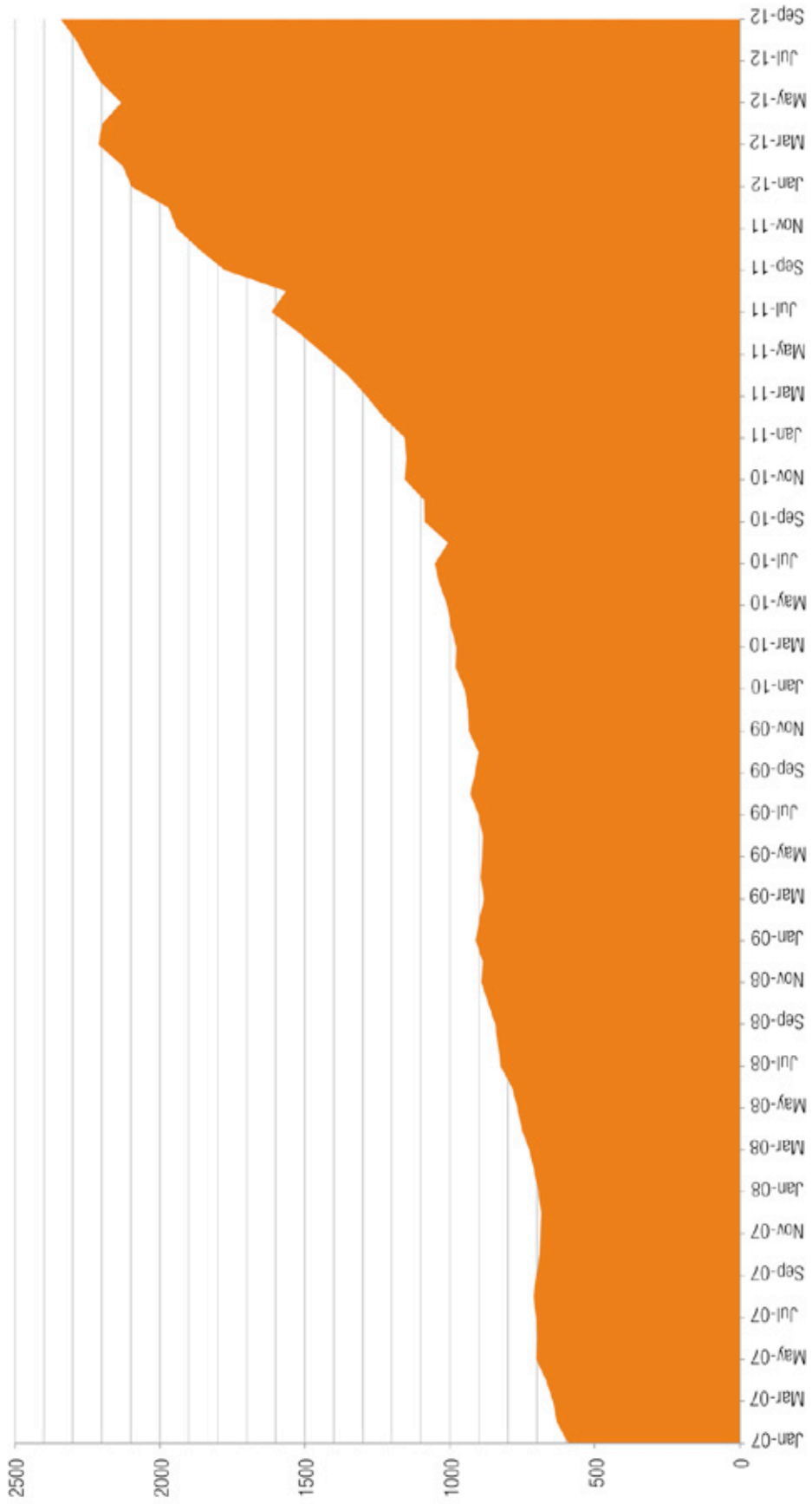
# MONTHLY MINING WORKFORCE

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





NUMBER OF ELECTED SAFETY AND HEALTH REPRESENTATIVES



## MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 179

### SERIOUS CRUSH INJURIES CAUSED BY FALLING MESH SHEETS

ISSUED: 24 APRIL 2012

#### Summary of incident

Three workers were seriously injured at an underground mine when an upright stack of more than 70 sheets of construction re-enforcing mesh fell onto them. The mesh became unstable and fell onto the workers when two sheets were being manually removed. Two of the injured workers were trapped under the mesh and suffered fractured pelvises. The third worker was struck by the falling mesh and pushed out of the way. He suffered a compound fracture of the leg.

The mesh was being used for the construction of a floor. The sheets were 6.0 m long by 2.4 m wide and weighed about 40 kg each.

#### Probable causes

This incident is under investigation; however, the resulting injuries demonstrate the hazard posed to workers when handling mesh sheets.

#### Action required

Where mesh sheets are used at a mine, a formal procedure must be developed for their safe transportation, handling and storage – both on the surface and underground. Workers involved with mesh sheets must be trained in this procedure.

The procedure for storing mesh sheets should ensure that any sheets stacked upright are secure at all times.

#### Further information

Visit the publication section of the Resources Safety website at [www.dmp.wa.gov.au/ResourcesSafety](http://www.dmp.wa.gov.au/ResourcesSafety) for the following safety alert about a similar incident some years ago, but with a fatal outcome.

- Mines Safety Bulletin No. 50 *Crushed by mesh sheets – fatal accident*

In January 1998, an underground operator was fatally injured when 15 sheets of ground support mesh weighing about 435 kg fell on him. At the Coronial Inquest into the death, the Coroner issued the following recommendation in his finding:

*Following the death (Employer) developed a formal procedure for the transportation, storage and manual handling of steel wire mesh, including that no more than two sheets may be stored together leaning against a wall, and that larger numbers may only be stored flat on the ground. I would recommend that wherever mesh is used in similar situations, similar safe procedures be adopted to ensure that there is no repeat to the tragic consequences that occurred in this case.*



## MINES SAFETY BULLETIN NO. 98

### SERIOUS CRUSH INJURIES FROM PEDAL-CONTROLLED SKID STEER EQUIPMENT (RE-ISSUED)

ISSUED: 15 MAY 2012

#### Summary of hazard

Recently, there have been two serious incidents involving pedal-controlled skid steer equipment where the operator's leg was crushed in a pinch point, resulting in serious fractures. The incidents occurred in a three-month period and the circumstances were the same. This safety bulletin is prompted by concern that many employers, supervisors, operators and contractors may not be sufficiently aware that cramped conditions and lack of guarding lead to a crushing hazard associated with this type of equipment.

In both incidents, the operator had stretched his right leg over the entrance step in front to relieve cramping. The resulting shift in weight had transferred pressure to the left foot, activating the boom control pedal and causing the boom to descend. The operator's right leg had been crushed between the entrance step and a cross member on the boom.

In both incidents, the operator was experienced in this style of equipment. The operator was wearing a seat belt, the safety lock-out bar was lowered and the boom was partially raised. The operator's cabin had meshed sides but no door at the front. Signage inside the skid steer unit indicated the pinch point. The equipment was new and all safety devices were found to be functioning correctly when tested following the incident.

#### Contributory factors

- The confined cabin space can restrict operator movement, leading to leg cramps.
- There is no physical barrier to prevent the extension of a limb into the area of the pinch point.

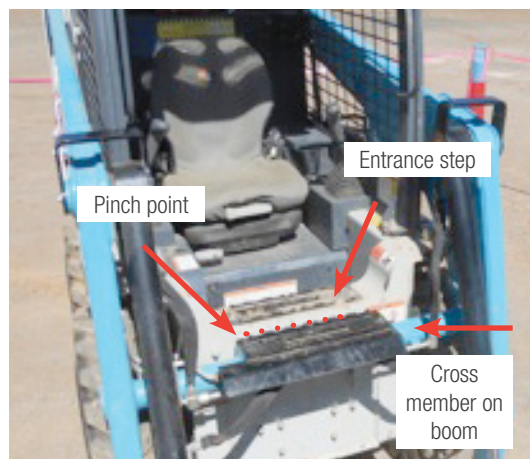
- Foot pedal controls can be inadvertently activated by a shift in the operator's weight.

#### Recommendations

Under regulation 4.4(3) of the Mines Safety and Inspection Regulations 1995, employers are required to "ensure that any moving machinery that creates a risk of injury to an employee through inadvertent contact is screened or guarded to prevent such contact." For skid steer equipment with confined cabin space and a pinch point hazard, this may be achieved by:

- installing a cabin door (e.g. meshed or fully enclosed tempered glass with a stone guard) that is interlocked to the operation of the machine
- ensuring doors, if provided by the supplier, are not removed when the unit is placed into service
- supervisors encouraging operators to take regular breaks and stretch.

There have been reports of operators remaining seated while releasing the quick release on the machine with the foot. This is bad practice and potentially very dangerous.



Example of skid steer involved in both incidents showing line of pinch point between entrance step and cross member on boom

# DANGEROUS GOODS SAFETY BULLETIN NO. 0212

## MANAGING RISK FROM UNDERGROUND STORAGE OF EXPLOSIVES

ISSUED: 30 APRIL 2012

### Background

In recent years there has been a definite trend of increased use of underground magazines for explosives storage in Western Australia. While this practice avoids some of the downsides of traditional surface storage, it creates new challenges that may not have been recognised, or properly addressed, particularly the potential effects of unconfined blasts.

A review of research papers indicates that the overpressure from unconfined underground blasts is more destructive than is generally understood. Blast waves propagate significantly further through underground tunnels than on the surface. Cross-cuts and corners have limited effect and only decrease the overpressure by some 10 to 25 per cent for high pressures. Pressure waves may be intensified as they reflect off walls and other surfaces, resulting in peak pressures that are greater than the initial blast overpressure.

### Hazard

Incorrect assumptions about the blast wave behaviour may result in flawed risk assessments that do not consider the possibility of total control failure and a subsequent detonation of all explosives within the magazine, but instead rely on the magazine deluge system to extinguish a fire, and the ventilation system to adequately manage any fumes.

The consequences of an unconfined explosion of many tonnes of explosives within an underground mine must not be underestimated – they could be fatal.

### Recommendations

Resources Safety strongly recommends that mines with underground explosives magazines take the actions listed below.

- Review existing risk assessments and ensure the potential effects of an unconfined explosion are adequately addressed. Consider potential effects such as:
  - damage or destruction of ventilation fans
  - people and plant both near and away from the magazine being thrown against walls and objects
  - collapse of the mine or parts of the mine, with isolation of access and escape routes.
- Ensure crib rooms and other non-production facilities are adequately separated from the magazine. As a rule of thumb, a separation distance of twice the vulnerable facilities distance specified in Table 3.2.3.2 of Australian Standard AS 2187.1 for the NEQ stored is suggested, as measured through tunnels and passages. For example, the separation distance between a crib room and a magazine storing 15 tonnes of explosives would be 2,200 m.
- Assess refuge chambers to determine if they are adequately engineered to withstand the forces of an unconfined blast or the resulting reverse-blast wave (backdraft).
- Develop an emergency response plan for the worst-case scenario of an unconfined explosion at a magazine. Any rescue scenario is likely to involve challenges and difficulties unlike other anticipated emergencies.
- Minimise the quantity of explosives stored underground — consider using a combination of surface and underground storage to meet production needs.

Also see Mines Safety Significant Incident Report No. 075 *Explosion in underground magazine* issued 29 May 1997.



## MINES SAFETY BULLETIN NO. **100** AND DANGEROUS GOODS SAFETY BULLETIN NO. **0312**

### SAFE USE OF FLAMMABLE REFRIGERANTS

ISSUED: 1 AUGUST 2012

#### Summary of hazard

Employers in Western Australia need to recognise that they may change the hazard profile of their operation if they replace the original equipment manufacturer (OEM) supplied refrigerant with a hydrocarbon refrigerant in their mobile equipment air-conditioners or other refrigeration systems.

A hydrocarbon refrigerant may reduce some hazards (e.g. toxicity, environmental damage), but other hazards may be increased (e.g. fire).

Mines Safety Significant Incident Report No. 177, issued on 18 April 2012, described an incident where an employee received burns following an incident involving the ignition of hydrocarbon gas that had leaked from the vehicle's air-conditioning system.

#### Contributory factors

The higher cost of fluorocarbon refrigerants compared with hydrocarbon refrigerants, may provide an economic incentive to convert from one to the other.

The use of hydrocarbon refrigerants may also be seen as a lower cost alternative when the certification requirements of the tradespeople involved in handling fluorocarbon refrigerants is taken into account.

#### Requirements

- The employer, designer, manufacturer, importer and supplier all have a duty of care under the *Mines Safety and Inspection Act 1994* (see sections 9 and 14) in relation to the refrigerant used in mobile equipment air-conditioners and other refrigeration systems.
- Under section 8 of the *Dangerous Goods Safety Act 2004*, persons involved in the storage and handling of dangerous goods have a duty to minimise risk to as low as reasonably practicable.
- Any person who handles fluorocarbon refrigerant gases, such as R12, R22, R134a and R410a, must hold a National Refrigerant Handling Licence. For example, any technician who decants or reclaims gas, decommissions or installs refrigeration systems is required to be licensed.
- Gas detection equipment is required if the rated refrigeration plant exceeds 100kW(R) – see r. 9.25(3) of the Mines Safety and Inspection Regulations 1995.
- Under the dangerous goods safety legislation, hydrocarbon refrigerants and the cylinders used to store such refrigerants should comply with relevant Australian Standards.

#### Safer practices

The employer is responsible for arriving at a defensible, informed and documented decision regarding any substitution of refrigerants used in mobile equipment air-conditioners and other refrigeration systems at the operation.

The following actions are considered by the refrigeration industry to deliver safer practice.

- Before using hydrocarbon refrigerants as a substitute to re-gas an air-conditioner or other refrigeration system, obtain written advice from the system's designer, manufacturer or supplier on their safe use.

- Implement a preventative maintenance program for air-conditioners and other refrigeration systems.
- Only competent personnel should work on air-conditioners and other refrigeration systems, particularly those containing hydrocarbon refrigerants.
- Do not top up a refrigeration system without first checking for and fixing any leaks.
- Only use equipment that is rated for hazardous zone use (i.e. flame-proof) near sources of flammable refrigerant.
- Whenever a flammable refrigerant is placed in a mobile equipment air-conditioning system, affix a label in a prominent place in the engine bay to make it clear what refrigerant is used, and how much is used. It should incorporate the flammable gas (Division 2.1) class label.
- Hydrocarbon refrigerants should be odourised to aid in their detection.

### Additional information

- Australian Refrigeration Council Ltd  
The Australian automotive code of practice 2008: Control of refrigerant gases during manufacture, installation, servicing or de-commissioning of motor vehicle air conditioners [www.arctick.org/faq\\_1.php](http://www.arctick.org/faq_1.php)
  - WorkCover New South Wales and Motor Vehicle Repair Industry Authority  
*Safety alert – Use of flammable hydrocarbon gases in MVACS*  
[www.workcover.nsw.gov.au/formspublications/publications/Documents/safety\\_alert\\_use\\_flammable\\_hydrocarbons\\_mvacs\\_4793.pdf](http://www.workcover.nsw.gov.au/formspublications/publications/Documents/safety_alert_use_flammable_hydrocarbons_mvacs_4793.pdf)
  - SafeWork, South Australia  
*Hazard alert – Use of flammable refrigerants including hydrocarbon mixes*  
[www.safework.sa.gov.au/uploaded\\_files/hazalert84a.pdf](http://www.safework.sa.gov.au/uploaded_files/hazalert84a.pdf)
  - Department of Labour, New Zealand  
*Hazard alert – Coolstore hydrocarbon refrigerant injures technician, Factsheet – Safe use of hydrocarbon refrigerants*  
[osh.dol.govt.nz/publications/series/haz70-coolstore-refrigerant.html](http://osh.dol.govt.nz/publications/series/haz70-coolstore-refrigerant.html) and  
[osh.dol.govt.nz/order/catalogue/pdf/hydrocarbon-refrigerants.pdf](http://osh.dol.govt.nz/order/catalogue/pdf/hydrocarbon-refrigerants.pdf)
  - Australian Standards
    - AS 1210:2010 Pressure vessels
    - AS/NZS 1596:2008 The storage and handling of LP Gas
    - AS/NZS 1677 Set:1998 Refrigerating systems
    - AS/NZS 3788:2006 Pressure equipment – In-service inspection
    - AS/NZS 3823 Set:2012 Performance of electrical appliances – Air conditioners and heat pumps
    - AS 4041:2006 Pressure piping
    - AS 4343:2005 Pressure equipment – Hazard levels
    - AS/NZS 60079.10.1:2009 Explosive atmospheres – Classification of areas
    - HB 40 Set:2005 Australian refrigeration and air-conditioning code of good practice set
  - Compressed Gas Association Safety Bulletins
    - CGA SB 1:2011 Hazards of refilling or reusing compressed refrigerant (halogenated hydrocarbon) gas cylinders
    - CGA SB 18:2000 Use of refrigerant (halogenated hydrocarbons) recovery cylinders
- [www.saiglobal.com](http://www.saiglobal.com)
- [www.cganet.com](http://www.cganet.com)



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**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)

## DANGEROUS GOODS SAFETY AND LICENSING

**including explosives, fireworks and major hazard facilities**

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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 onshore petroleum pipelines and operations, and geothermal energy**

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**Email:** psb@dmp.wa.gov.au

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**Email:** RSDComms@dmp.wa.gov.au

## UPDATE YOUR CONTACT INFORMATION

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

Publications  
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

## USE A SMARTPHONE OR TABLET?



Scan this QR code for Resources Safety contacts



## 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 [MineHealth], contaminant monitoring and reporting [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)  
contamanager@dmp.wa.gov.au (contaminant monitoring and reporting)  
minehealthreporting@dmp.wa.gov.au (health surveillance)

For a serious mining accident or incident, the mine or exploration manager must advise their District Inspector as soon as practicable

## NORTH INSPECTORATE

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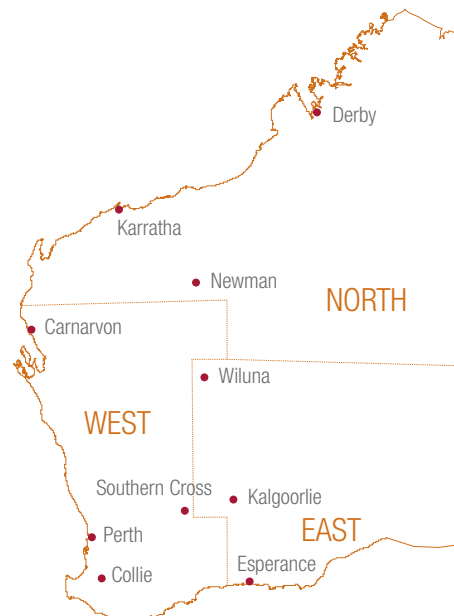
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