

Resources

Safety

matters

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Gas safety



Government of Western Australia
 Department of Mines and Petroleum
 Resources Safety

TALKING ABOUT MENTAL HEALTH AND WELLBEING

WHAT DO OUR STAKEHOLDERS
 THINK?

TOP 10 DANGEROUS GOODS
 SAFETY ISSUES

SAFETY PERFORMANCE DATA
 RELEASED



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The Department of Mines and Petroleum is committed to working with the Western Australian resources sector to reduce serious accidents and incidents, and provide tangible support in achieving a positive cultural change.

To help quantify this commitment, the Resources Safety Division is releasing a rolling three-year regulatory strategy that will be available online.

The strategy will help ensure Resources Safety is clear and consistent in its regulatory approach. It will also help stakeholders better understand the Division's regulatory vision and priorities, with progress in achieving the strategy's goals to be reported annually.

Consultation with industry will play an important role in the ongoing development of the strategy so as to foster a shared vision for occupational safety and health across the resources industry and how it can be achieved.

One key to improving safety is identifying and addressing the human factors that can lead to accidents and incidents. In 2016, Resources Safety held its first *Human Factors Forum for Petroleum and Major Hazard Facility (MHF) Operators*. The topic was also discussed at last year's *Registered Manager's Forum* and the series of *Mines Safety Roadshows*.

At the *Minesafe International 2017* conference to be held in Perth on 1 and 2 May 2017, the Department will outline

the proposed top 11 human factor topics for the Western Australian mining industry. The concept of human factors is not a single element but incorporates the impact of people, equipment, systems and organisational influences on safety outcomes. Recognising and addressing these factors can help drive health and safety improvements.

Directly related to one element of human factors is mental health and wellbeing, another important focus area for Resources Safety. In 2016, the Department conducted an audit of 126 mining companies and 17 petroleum and MHF operators over a ten-month period. This year we released the baseline results of the survey. The process has helped clarify expectations and also identified opportunities for improvement.

Resources Safety will continue to collaborate with the Mental Health Strategies Working Group to help address the mental health and wellbeing of workers in the resources sector.



Simon Ridge
Executive Director Resources Safety
30 March 2017



Left to right: Simon Ridge (Executive Director Resources Safety), Michelle Andrews (Deputy Director General, Department of Mines and Petroleum), Hon. Bill Johnston MLA (Minister for Mines and Petroleum) and Andrew Chaplyn (Director Mines Safety)



WHAT DO OUR STAKEHOLDERS THINK?

The results of the 2016 stakeholder perception survey for Resources Safety were reported by the Department of Mines and Petroleum in October last year.

The first stakeholder survey was conducted in 2010 to establish a baseline against which to measure progress, with follow-up surveys conducted every two years. The survey provides a qualitative external assessment of the Department's regulatory performance and helps inform planning processes. It also captures industry's view of its own performance in achieving a proactive, consultative workplace culture. The 2016 survey is the final in the biennial series conducted by Resources Safety.

The 2016 report compares results with those for the 2014 survey to determine whether and how industry perceptions of Resources Safety's regulatory activities have changed.

The report identifies compliance and awareness-raising activities that stakeholders consider the regulator to be

performing well or where there has been a significant improvement in perception ratings, as well as areas of concern where industry perceptions are less favourable or ratings have decreased.

In 2017, the Department will conduct an annual survey of its stakeholders focusing on three core services:

- provision of resource sector information and advice to industry, community and government
- managing land access for resource-related activities
- regulating and monitoring activities in the resources sector relating to work health and safety, dangerous goods, environment and social responsibility.

A Department-wide survey was trialled in 2016 to establish an annual stakeholder satisfaction key performance indicator (KPI) metric. The aggregated results of this departmental survey will replace Resources Safety's biennial survey.

The 2016 stakeholder perception survey results, as well as previous reports, are available at www.dmp.wa.gov.au/Safety/Resource-Safety-publications-16440.aspx

DMP RESPONSE TO SURVEY

Mines safety

The Department believes that the Reform and Development at Resources Safety strategy (RADARS) has delivered significant improvements in the provision of mines safety regulatory services.

The mines inspectorate is continuing to promote a risk-based approach to occupational safety and health. It has focussed on identifying hazards, risk management strategies and leadership, including promoting positive cultural change and the importance of safety and health representatives. These areas have formed the basis of messages delivered in forums, workshops, site visits, video series and general communications. Redevelopment of the departmental website in 2015 provided an opportunity to update and add mines safety content to assist industry with compliance matters and resource materials.

Using a variety of data sources, including the results of this survey, the inspectorate is targeting areas of continuing concern where improvements can be made.

The team-based structure, leadership team and discipline groups are supporting more consistent approaches to raising awareness, seeking compliance and enforcing the legislation. This is reflected in the improved investigative capability, which has reduced timelines and increased the capacity to promptly share learnings with industry. Regulatory activities are supported by the online Safety Regulation System (SRS), which has enhanced data management and analysis.

Petroleum safety

Petroleum safety recruitment in 2014-16 targeted a new management structure with a director, managers and team leaders. Inductions and training were provided to ensure consistency of regulatory approach and support the new management.

Most regulatory activity has focussed on handling incoming safety case and safety management system assessment work, and conducting safety systems inspections. Significant effort has also been directed at standardising processes and ensuring consistent reporting for inspection-related activities.

Given this background and the increased number of survey respondents, it is perhaps not surprising that the ratings for most of the questions have fluctuated over the survey periods since 2010. In 2016, it is pleasing to note that performance ratings have improved for petroleum safety assessors as a whole, as well as guidance material.

Compliance activities receiving continued attention include:

- setting appropriate safety standards
- conducting audits and inspections
- investigating incidents.

Major hazard facilities (MHFs)

As with petroleum safety, the MHF group has focused on recruitment within the new management structure, as well as inductions and training.

Since the last perceptions survey, there has been a concerted effort to standardise processes and ensure the consistency of reporting for inspection-related activities.

The 2016 survey results indicate improvements in industry's perception of individual officers' performance in interpreting and applying legislation.

Compliance activities receiving continued attention include:

- publishing appropriate industry safety performance indices
- reviewing submitted documents in a timely manner.



MINES SAFETY REGULATION GETS TICK OF APPROVAL

An independent assessment has found the Department of Mines and Petroleum to be an effective safety regulator for the State's mining industry.

Deloitte Consulting found the regulator to be collegiate, focused on helping industry and improving safety performance, and more cost-effective than other safety jurisdictions in Australia.

Acting Director General Dr Tim Griffin said the report found the Department was doing a good job meeting community expectations.

"Industry is keen to see that the Government's decision to fund mine safety through cost-recovery is effective and efficient," Dr Griffin said.

"Safety of workers is not something that should be compromised, so the assessment is good news for everyone.

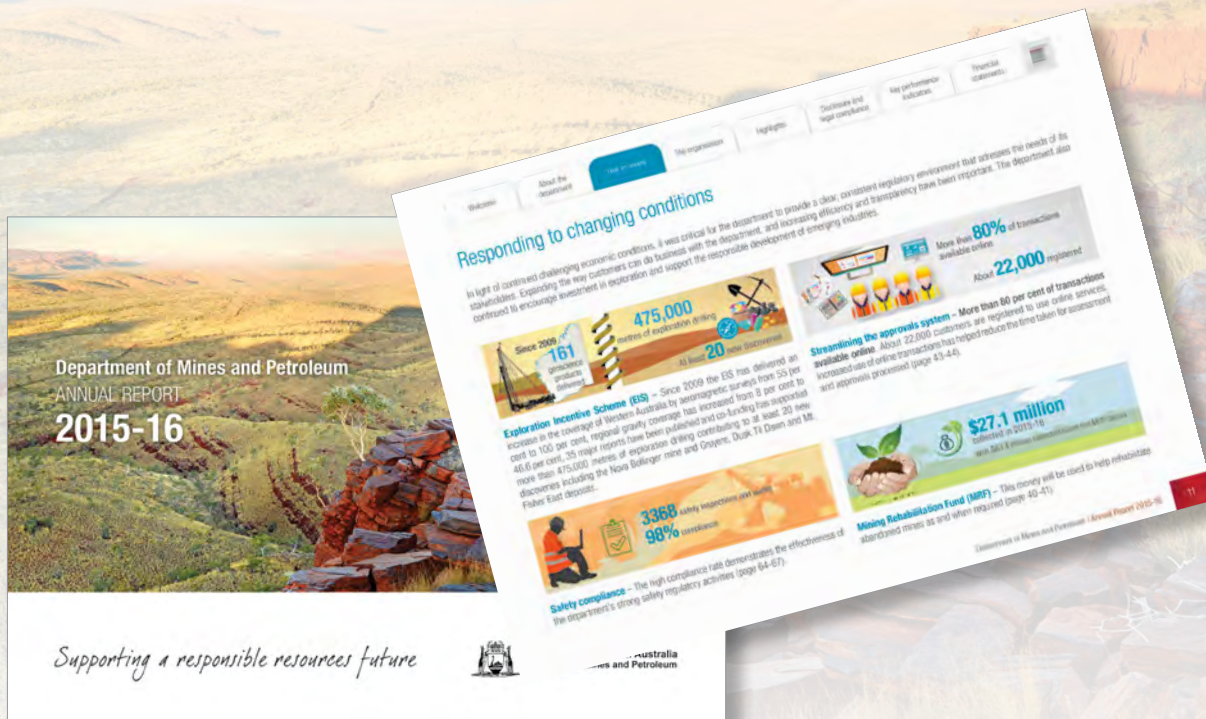
The assessment was undertaken to determine whether the Resources Safety Division's Mines Safety Branch was appropriately resourced and structurally organised to regulate safety in the State's mining sector.

Representatives from industry peak bodies and unions were given an opportunity to input to the process, and documentation provided by the Department and other jurisdictions was also reviewed.

Dr Griffin said the report provided 19 recommendations for process improvements, many of which the department had started implementing.

The Department consults about any proposed changes with the Mining Industry Advisory Committee (MIAC), the statutory body that advises on mine safety legislation.

The report and Department's response are available on the Department's website in the safety publications section.



ANNUAL REPORT HIGHLIGHTS ACHIEVEMENTS

The Department of Mines and Petroleum's role in regulating the development of Western Australia's resources industry has been highlighted with the release of the Department's 2015-16 Annual Report in September 2016.

Acting Director General Dr Tim Griffin said the report highlights some of the Department's key achievements over the past year.

"The role of the Department is to ensure the State's resources sector is developed and managed responsibly for the benefit of all Western Australians," Dr Griffin said.

"As demonstrated throughout the report, the Department has been innovative and adaptive in its approach to fulfilling its role."

Dr Griffin said highlights in the report included winning the Premier's Award for the world-first Mining Rehabilitation Fund, and the development of a multi-agency regulatory framework for shale and tight gas.

"The past year also saw the creation of the Community Partnership Resources Sector Award, and Western Australia being ranked as the world's number one mining jurisdiction for attracting investment," Dr Griffin said.

"These are just some of the success stories for 2015-16."

The continued development of online systems has also played an important role in improving compliance and efficiency.

"This will continue in the coming years, and will enable further improvements in efficiency, transparency and certainty regarding the Department's processes," Dr Griffin said.

The report also highlighted significant issues impacting on the Department's work.

"This includes the decrease in the value of mineral and petroleum production due to lower commodity prices, and responding to changing conditions in the resources sector, such as increasing levels of automation," Dr Griffin said.

The report is available to download at www.dmp.wa.gov.au in the *About us* section.

GOING ONLINE IN THE SAFETY REGULATION SYSTEM

The Safety Regulation System (SRS) is the core system used by Resources Safety and industry stakeholders. SRS continues to be enhanced and improved in line with the objective of improving safety outcomes, as well as supporting digital transactions and increasing efficiency and effectiveness.

KEEP UP TO DATE

When new functionality is released, the Department of Mines and Petroleum provides training, instructional videos and technical support to assist industry.

To receive updates on SRS releases, including information about workshops and training, please subscribe to the weekly news alert by visiting www.dmp.wa.gov.au/ResourcesSafety

NEW FUNCTIONALITY

The following functions are expected to be rolled-out to industry in 2017:

- notification of appointments
- health and hygiene management.

FUTURE ENHANCEMENTS

Work is also progressing on the development of SRS functionality to support:

- technical submissions
- notification of the election of safety and health representatives

These enhancements are expected to be delivered in 2017-18.

ALREADY DELIVERED – SHOTFIRER LICENCE APPLICATIONS

People requiring a shotfirer licence can now apply online using SRS. The online application system commenced in May 2016, and improves service by allowing people to apply for, renew and pay shotfiring licences online using their credit card.

Licence holders can also manage their personal information and provide information online to comply with medical-related licence conditions. Confirmation of the granting or renewal of licences is emailed to applicants as soon as the licence is issued or renewed.

The online system seems to have overall customer acceptance. For applicants requiring assistance with the online process, the Department also provides a kiosk service at its head office at 1 Adelaide Terrace, East Perth.

NOTIFICATION OF APPOINTMENTS

This functionality will allow sites to manage statutory appointments within SRS, streamlining the process and reducing administrative work.

Protocols will be in place to ensure compliance and security of information.

This functionality will apply for the following statutory positions.

Statutory positions that must be notified to the Department

- Registered Manager
- Alternate Registered Manager
- Underground Manager
- Alternate Underground Manager
- Quarry Manager
- Alternate Quarry Manager
- Ventilation Officer
 - Surface
 - Underground
- Exploration Manager

Statutory positions that may be advised to the Department

- Appointed Noise Officer
- Deputy Registered Manager
- Deputy Underground Manager
- Deputy Quarry Manager
- Exploration Activity Manager
- Electrical Supervisor
- High Voltage Operator
- Authorised Mine Surveyor
 - Quarry
 - Underground
- Radiation Safety Officer
- Underground Supervisor
- Excavation Officer
- Construction Supervisor

HEALTH AND HYGIENE MANAGEMENT

A new health and hygiene sampling reporting system is being incorporated into SRS to consolidate the submission of health and hygiene material. The system aims to modernise the way health and hygiene monitoring data is captured by the Department, standardise communications, and improve the focus on risk management in health and hygiene areas.

This functionality, which replaces the current paper-based CONTAM system, will be rolled out in a phased approach, with phase one expected to be available in the second quarter of 2017.

Phase one will enable industry to submit sampling results for personal exposure to airborne contaminants, noise and biological agents through SRS. An update to the bulk sample lodgement functionality may also be required for those organisations using this feature. Any samples identified as exceedances during the sample lodgement process will be managed online.

Phase two will enable industry to upload hygiene management plans for applicable site operation(s) directly into SRS. This will provide functionality for industry to define a sampling program based on the similar exposure groups (SEGs) each site has defined. Phase two is expected to be delivered in 2017-18.

MIAC UPDATE

The Mining Industry Advisory Committee (MIAC) met six times in 2016. Matters considered are summarised below.

CODES OF PRACTICE AND GUIDELINES

Ventilation code of practice: The Department of Mines and Petroleum has amended this code based on feedback gathered from two consultation periods and a stakeholder forum. The code will be presented to MIAC for endorsement in 2017.

Guideline on working in remote or isolated areas: This guideline is expected to be finalised in 2017.

Principal hazard management plans (PHMPs): After review, New South Wales guidance material may be adopted in Western Australia, subject to finalisation of the proposed Work Health and Safety (Resources and Major Hazards) legislation.

NORM code of practice: The Department is updating this code and is expected to release it for public comment in the second quarter 2017.

PARLIAMENTARY INQUIRY INTO IMPACT OF FLY-IN FLY-OUT (FIFO) WORK ON MENTAL HEALTH

The Department and MIAC were tasked with implementing most of the recommendations from the Legislative Assembly Education and Health Standing Committee's 2015 report, *The impact of FIFO work practices on mental health*.

MIAC established a Mental Health Strategies Working Group to progress the report recommendations. Comprising representatives from industry, unions, government agencies and mental health organisations, the group has met six times since June 2016.

The working group has developed an action plan to address the report recommendations, with an initial focus on:

- gathering data on mental health information, tools and programs relevant to the resources industry
- providing advice to the Mental Health Commission regarding its FIFO mental health research
- the selection of criteria for industry to assess mental health training programs, including the objectives of resources-specific training programs
- developing communication strategies

- identifying relevant codes of practice and guidelines (State and national) related to mental health.

Other inquiry recommendations for additional industry reporting and legislative changes will be implemented when the proposed *Work Health and Safety (Resources and Major Hazards) Bill* is implemented. In the meantime, the Department will continue to use its current procedures to investigate matters relating to psychosocial harm such as bullying, fatigue and suspected suicides and attempts.

Resources Safety commenced a program of psychosocial harm audits across mining and petroleum sites from February to October 2016 to establish an industry baseline. The results will be considered by the Mental Health Strategies Working Group in 2017.

The Department has created two new positions, an Inspector of Mines and a Graduate Officer in mental health and wellbeing, who commenced in February and January 2017, respectively. Their roles will include developing mental health strategies and guidance material.

DIESEL PARTICULATES

Diesel particulates are a known hazard for mining operations, especially in underground mines, where the widespread use of diesel vehicles and equipment means that ventilation is critical. Underground miners can be exposed to ten times more diesel exhaust than in other workplaces.

Monitoring of diesel exhaust from newer diesel engines indicates that they produce more diesel particles, which are also smaller in size (10-30 nanometres), known as nano diesel particulate matter (nDPM). These combine to form larger particles and can absorb significant quantities of hydrocarbons and other compounds.

Research around the world suggests nDPM is a harmful carcinogen that can be absorbed through the lungs into the bloodstream as well as causing cardiovascular effects, especially for asthmatics.

Research to evaluate nDPM would assist in developing control measures to protect workers in underground mines and other environments where nDPM is generated. Control measures for industry could include changes to engine design, exhaust filters, mine ventilation, respiratory protective equipment (RPE), or changes to operating and maintenance procedures.



MIAC established the Nano Diesel Particulate Matter Working Group to better understand the impacts of nDPM on workers. The working group, which comprises experts from Government, universities and industry, has met four times since March 2016.

The group discussed the current state of knowledge around nDPM, the proposed research methodology, and funding applications. Two parallel research studies are proposed — one on mine design and operations to mitigate exposure to nDPM, and the other to assess the potential health impacts for workers at an underground mine.

OTHER DISCUSSIONS

- **New tool for industry use:** Dr Colin Boothroyd, General Manager Investigations, presented information about the Department's hazard register for Western Australian mining fatalities. This tool presents the findings from investigations into 64 fatal mining accidents in the Western Australian mining industry from January 2000 to December 2015. It aims to assist industry in preventing similar incidents by raising awareness of the circumstances and hazards associated with fatal incidents, as well as identifying precautions or preventative measures that could avert an incident.
- **MIAC project register:** To assist in prioritising MIAC projects in 2017, a gap analysis was conducted comparing the MIAC projects register with fatality and serious injury data, as well as the Department's priority focus areas.
- **Risk-based occupational hygiene initiative:** Since the implementation of risk-based hygiene management plans by the Department, data indicates that mine sites are doing more sampling and are complying with their plans. The Department is also introducing a *Health and Hygiene Management module* within the Safety Regulation System (SRS), replacing the CONTAM system. SRS will be the repository for noise, biological and airborne contaminants data.
- **Mines safety culture project:** The Department is helping drive improved safety and health outcomes by focusing on human factors and adapting relevant literature for the Western Australian mining industry.
- **Training:** Dr Marcus Cattani of Edith Cowan University presented information about a risk management training

module that would assist with implementation of the proposed *Work Health and Safety (Resources and Major Hazards) Bill*.

- **Training audit:** Ms Morena Stanley of the Training Accreditation Council (TAC) presented the results of an audit of units of competency that lead to the granting of high risk work licences. The audit was undertaken due to concerns about the training provided, and resulted in a number of remedial actions.
- **Management of fibrous minerals on mining operations:** Airborne asbestos fibres are a known carcinogen, and the risk of illness increases with exposure. Information received by the Department raised concerns regarding current detection methods for the identification of asbestos fibres in bulk and airborne samples.
- **Coal miners' pneumoconiosis (black lung):** MIAC discussed a recent case of black lung in a Queensland coal miner who worked exclusively above ground. Western Australia has two open pit coal mines. The Department's position is that workers should not be exposed to hazardous atmospheres. The CONTAM system has been used to collect data on workers' exposure to airborne contaminants. The Department will examine this issue in consultation with industry.

Note: There have also been recent reports of an occurrence of black lung in an open cut coal worker in New South Wales.

- **Exploration drilling incidents:** Members discussed recent serious injuries involving exploration operations.
- **Deloitte report:** An independent assessment by Deloitte Consulting has found the Department to be an effective regulator of safety for Western Australia's mining industry. The report and Department's response are available online.
- At each meeting, MIAC discussed:
 - progress with new legislation
 - progress with MIAC's projects
 - significant incident reports and associated remedial actions
 - trends in mine safety statistics
 - progress reports from MIAC's working groups.

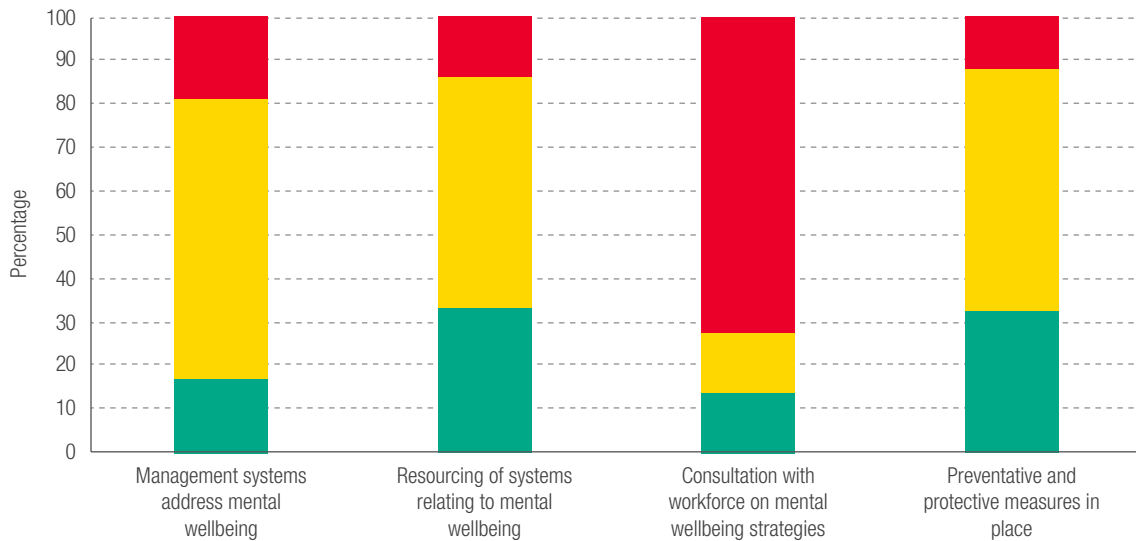
For information about MIAC, visit www.dmp.wa.gov.au/Safety/What-is-the-Mining-Industry-8578.aspx

WANT TO FIND OUT MORE?

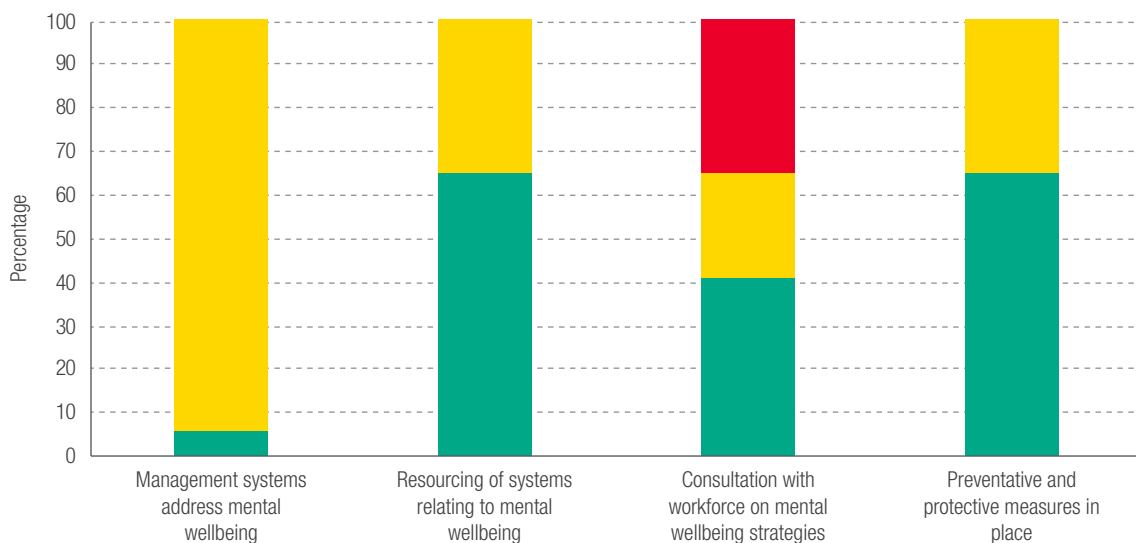
Visit the safety publications section at www.dmp.wa.gov.au to view the report presenting the baseline results for psychosocial harm audits of mining operations, and petroleum and major hazard facilities.

■ Met intent of criterion
 ■ Partially met intent of criterion
 ■ Does not yet meet intent of criterion

Graph showing overall results for mining operations (n = 126)



Graph showing overall results for petroleum and major hazard facilities (n = 17)





RESOURCES AND SUPPORT SERVICES

The Department's website lists a selection of the many online resources and support services relating to mental health and wellbeing. For more information, visit www.dmp.wa.gov.au/Safety/Guidance-about-mental-health-and-7076.aspx

www.mhc.wa.gov.au

The **WA Mental Health Commission** is responsible for a network of mental health and drug and alcohol treatment services and programs. The website offers a variety of resources aimed at producing and supporting positive mental health.

www.mhc.wa.gov.au/about-us/our-services/alcohol-and-drug-support-service/alcohol-and-drug-support-line

The **WA Alcohol and Drug Support Service**, which sits within the WA Mental Health Commission, provides a confidential, non-judgemental 24/7 helpline to support individuals using alcohol or other drugs to cope with work-related stress.

www.publicsector.wa.gov.au/document/supporting-good-mental-health-workplace-resource-agencies

The **WA Mental Health Commission** and **Public Sector Commission** have developed a useful resource for public sector chief executive officers and managers to support positive mental health in the workplace. However, other sectors may find it useful. With a focus on promoting the importance of good mental health, the publication discusses how employees can be supported through effective workforce management strategies, managing performance, and workplace training. The publication outlines the support services and resources that are readily available to employers, supervisors and employees.

www.headsup.org.au

Heads up is a web-based platform providing businesses and individuals with the tools required to create and support a mentally healthy workplace.

www.comcare.gov.au/promoting/Creating_mentally_healthy_workplaces

Comcare offers a range of resources aimed at creating workplace cultures and effective systems for the promotion of positive mental health within the workplace.

www.lifeline.org.au

Lifeline provides 24-hour access to crisis support and suicide prevention services. Call 13 11 14 for 24/7 crisis support or use the online one-on-one crisis support service.

www.mindhealthconnect.org.au

Mindhealthconnect provides mental health and wellbeing information, support and services.

www.beyondblue.org.au

Beyondblue works to increase awareness and understanding of anxiety and depression in Australia, offering support information and resources for individuals and organisations.

www.miningfm.com.au

Mining Family Matters has developed *The Survival Guide for Mining Families*, which describes the practical ways to boost the emotional resilience of workers and keep relationships healthy and strong.

www.cmewa.com/images/files/policy/people-and-communities/Mental-Health-Blueprint.pdf

The **Chamber of Minerals and Energy of WA** has produced a *Blueprint for mental health and wellbeing* outlining effective health programs aimed at improving the mental health and wellbeing of the workforce.



Amy Douglas-Martens (left) and Tyler van der Merwe

“
**AMY AND TYLER ADD
 SIGNIFICANT CAPACITY
 TO RESOURCES SAFETY
 TO HELP US IDENTIFY AND
 ADDRESS ISSUES ASSOCIATED
 WITH MENTAL HEALTH AND
 WELLBEING IN THE SECTOR.**

– **ANDREW CHAPLYN**
 STATE MINING ENGINEER



INCREASING MENTAL HEALTH AND WELLBEING CAPACITY AT RESOURCES SAFETY

The Department has appointed its first Mental Health and Wellbeing Inspector of Mines. Amy Douglas-Martens is a registered psychologist and will work as a part of the mines inspectorate team.

Ms Douglas-Martens will assist with the development of safety and health protocols designed to protect mental health and wellbeing, as well as physical safety.

“I am excited about joining the inspection team and determining how we can work together, and with industry, to improve mental health and wellbeing across the resources sector,” Ms Douglas-Martens said.

“There will definitely be challenges, but I am optimistic about the progress that is currently underway and feel privileged to be a part of it. Our long-term goal is not only to give operators and their employees the necessary tools to manage mental health and the associated risks, but also increase their confidence in putting the tools into action.”

Ms Douglas-Martens said that protecting mental health is at the top of many agendas, but the saturation of information makes it difficult for operators to apply the learnings to their health and safety plans.

“One requirement is to make this information more accessible to the people who are developing workplace health and safety plans, and support them in deciding where to begin,” Ms Douglas-Martens said.

“While our focus is on the mining and extractive resources industries directly, any good work that we do in this area

represents a real opportunity to impact positively on the mental health and lives of the broader WA community as well.”

Along with the recruitment of Ms Douglas-Martens, Tyler van der Merwe, who specialises in mental health and wellbeing, joined the Department in January this year as one of the Department’s new graduate officers.

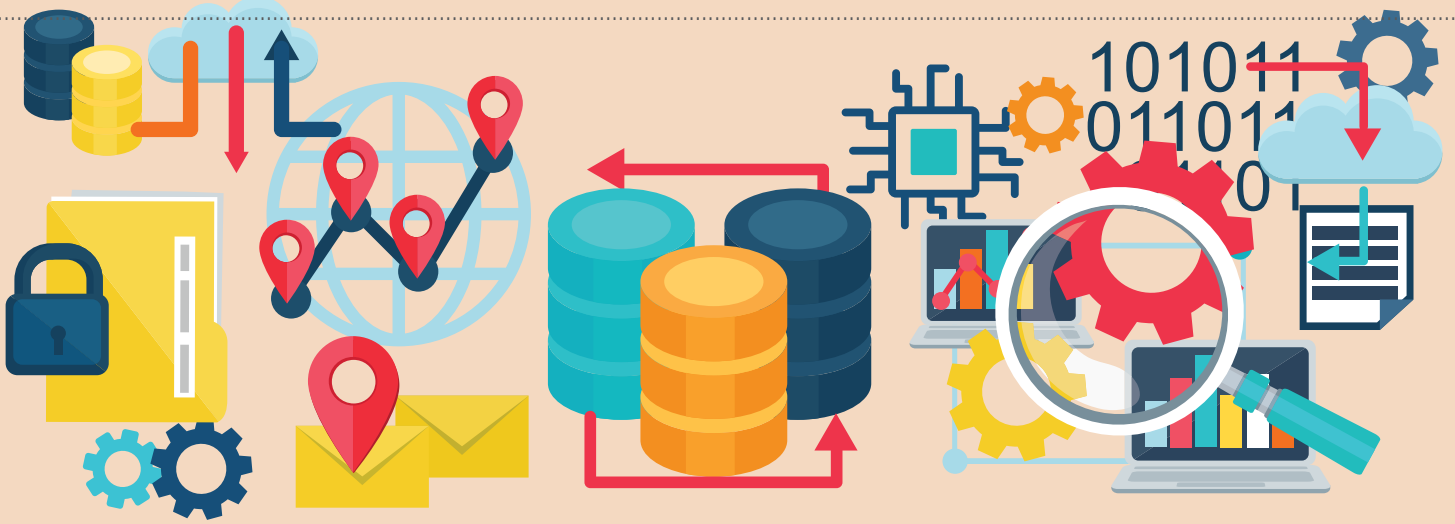
“I’ve been given an opportunity to pursue my passion and turn it into a career,” Ms van der Merwe said.

Currently working with the Resources Safety Division, Ms van der Merwe said that stigma appears to still be the number one barrier to people seeking help, and she looks forward to helping influence change.

“As a graduate, it’s exciting to be working for the Department during a period of change. There is lots of work happening behind the scenes to consolidate the information that is available to operators,” Ms van der Merwe said.

State Mining Engineer and Director Mines Safety Andrew Chaplyn said Ms Douglas-Martens and Ms van der Merwe were important additions to the Resources Safety team.

“Amy and Tyler add significant capacity to Resources Safety to help us identify and address issues associated with mental health and wellbeing in the sector,” Mr Chaplyn said.



LICENSING AND REGULATION

The Licensing and Regulation Branch has now been in existence for just over a year and it is timely to look back at what has been achieved in that time.

A lot of effort has gone into reviewing the Branch structure and staff roles to ensure the distribution of resources and skills matches current and expected future needs, with an emphasis on improving service levels and efficiency for our internal and external customers.

To assist external and internal users of the Safety Regulation System (SRS) and reduce dependence on specialist staff, the Branch has increased its efforts on producing training videos that can be viewed by anyone, anytime and anywhere.

Safety communications staff continue to assist in organising and supporting internal and external events. In 2016, this included significant contributions to the success of events such as the Mines Safety Roadshow, a forum on human factors and industry information sessions.

The Branch's legislative reform team achieved approval of the Decision Regulatory Impact Statement for the proposed Work Health and Safety (Resources) regulations.

A key driver for ongoing service improvement is development of new SRS components. In 2016, the dangerous goods driver licence, shotfirer licence and dangerous goods security card renewal systems went live. In 2017, the Branch will either drive or assist in the roll out of new systems including:

- expansion of the Department's online payment portal for dangerous goods fees
- a new security card application system
- expansion of submissions to include several dangerous goods licence applications
- mining notifications
- mining technical submissions
- petroleum safety enforcement.

2017 should be another busy and productive year, with a good mix of significant achievements as well as continuous improvement.

Philip Hine
Director Licensing and Regulation



TYC

Dangerous goods officers and critical risks inspectors

DANGEROUS GOODS AND PETROLEUM SAFETY

As we move further into 2017, it is important to regularly take stock of what has been achieved, how it has been achieved and what further improvements can be made.

Meaningful change can only take place when there is a genuine commitment to its importance. It should be a live agenda item, discussed openly and frequently, and embedded in the culture of the workplace.

Production targets, fixed and variable cost reductions and health, safety and environmental targets are just measures. Contextually, how you intend to achieve them is far more important. President Kennedy may have committed the United States to sending a man to the moon by the end of the decade but he had one caveat, which was “and then returning them safely to Earth”. The outcome was bounded by this requirement.

Too often the goal does not set the expectation. I remember a conversation early in my management career. I was told “If you can’t manage safety, you can’t manage”. One thing that is obvious to me is that you are never done on safety. Organisations that espouse excellence have a leadership team that inspires those around them to strive for continuously better performance.

Those in senior management roles need to take a personal level of ownership for safety. In other words, if it was their loved ones that worked for the organisation, what commitment would they be willing to accept? It is this level of ownership that makes a difference to an organisation’s safety performance and can drive organisational behaviour.

After a sustained period of low oil price, the Department has already flagged that it will be asking for reports and management overview of maintenance and inspection

programs on facilities. As a regulator, we also understand that costs are an ongoing and important part of an operating plan. What inspectors will be looking for is that the risks from any cost-cutting exercises have been effectively reviewed by management and appropriate mitigations are in place, and that this process is ongoing.

As previously flagged, leadership and accountability are a key measure of a facility’s safety management system, and it is incumbent on the site’s senior management team to lead and manage the safety of their people for the organisation, including process safety requirements.

Last year saw significant commissioning activity at major hazard facilities, including Gorgon and Yara. This will continue in 2017 for the remaining trains at Gorgon and the start-up of Wheatstone.

Dangerous goods inspectors will continue to focus on those sites where there have been past issues with compliance, and will follow up outstanding remediation notices.

Just like industry, the Department also regularly reviews its performance to identify opportunities for improvements and meaningful change.

The development of a rolling regulatory strategy, as outlined in the Executive Director’s foreword, will not only help drive change but also give industry a greater understanding of the Division’s regulatory vision and focus.

Ross Stidolph

*Director Dangerous Goods and Petroleum Safety
and Chief Dangerous Goods Officer*



Mines Inspector's Forum

MINES SAFETY

To better understand safety and health responsibilities in the mining industry, it is important to recognise how Acts, regulations, codes of practice and other guidance work together. They are each an important part of the safety and health regulatory framework.

The purpose of Acts and regulations tend to be understood.

Acts are the formal, broad description of laws that set out the key safety and health principles, duties, obligations and rights.

Regulations are legally binding and support the aims of the Act by providing more detail. This includes information about duties regarding particular hazards, procedures and health and safety obligations. Where regulations are prescriptive, it is because they are non-negotiable (e.g. minimum factor of safety for rope used in friction winding).

Codes of practice contain further information designed to assist operators to meet their duty of care responsibilities. Codes are intended to supplement requirements in the Act and regulations in a uniform way and, as far as possible, clarify any ambiguity or uncertainty. The aim of a code is to set an industry benchmark. Codes are usually consistent with Australian and

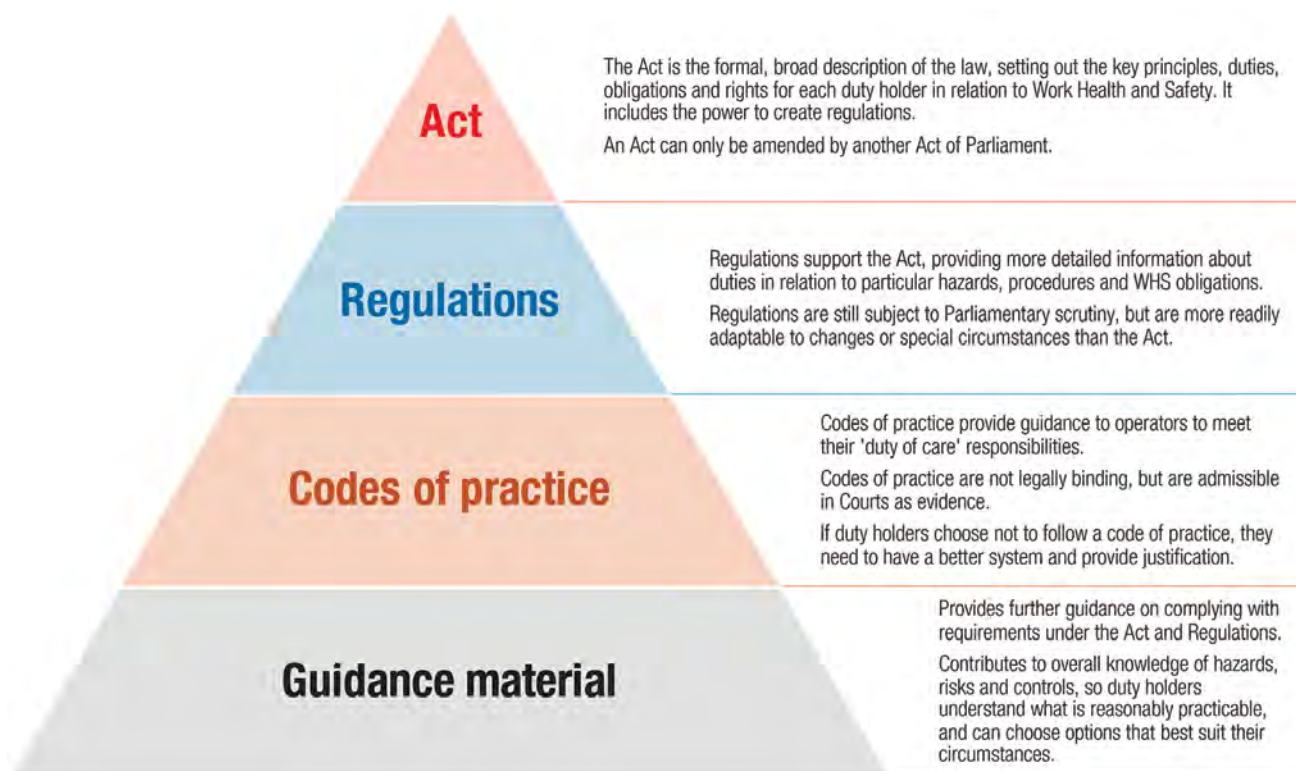
international standards, international guides and codes, and advice from regulatory authorities. Codes of practice are not overly prescriptive and are designed to be flexible in response to changes in technology and legislation.

Other guidance material, such as guidelines, guidance notes, information sheets and brochures provide more detailed information relevant to a specific issue or subject.

LEGAL STANDING

While codes and other guidance are not legally binding, they are admissible in court, just like other publicly available safety information. Courts may regard them as evidence of what is known about a hazard, risk or control, and use them in determining what is 'reasonably practicable'.

The Department of Mines and Petroleum recognises that there may be equivalent or better ways to achieve occupational health and safety outcomes. Compliance with health and safety laws may be achieved by following another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety than the code or guidance.



Relationship between Acts, regulations, codes of practice and guidelines

WHY IS THE DEPARTMENT DEVELOPING MORE CODES OF PRACTICE AND OTHER GUIDANCE?

Mining operations present a wide range of hazards and risks, and are increasingly using a risk-based approach to safety.

As part of this move to a risk-based approach, the Act and regulations need to be made more adaptable to change, with the removal of many prescriptive, detailed requirements. However, health and safety cannot be compromised, and important information will be moved to codes of practice and other guidance.

As well as promoting good practice and raising awareness, codes and other guidance are developed where the Department's data indicates significant industry non-compliance.

HAVE YOUR SAY

There are opportunities to provide input and feedback throughout the development of Acts, regulations and guidance.

WHY IT IS IMPORTANT?

It is this combination of guidance material within a regulatory framework that helps provide a strong foundation for managing the safety and health of workers in the mining industry.

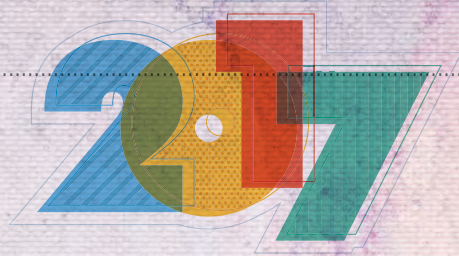
This information is also critical in addressing the three priority themes, or pillars, for mines safety:

- improving hazard awareness and control selection
- promoting the adoption of appropriate risk management strategies
- supporting effective leadership and positive cultural change.

The ultimate goal of Acts, regulations, codes of practice and other guidance is not to place additional regulatory burdens on industry, but to protect workers from being injured and killed.

Andrew Chaplyn

Director Mines Safety and State Mining Engineer



MARK YOUR DIARY

APRIL

28

**WORLD DAY FOR SAFETY AND HEALTH
AT WORK: OPTIMIZE THE COLLECTION AND
USE OF OSH DATA**

28 April, Perth

www.ilo.org/safework/events/safeday/lang--en/index.htm

MAY

01

MINESAFE INTERNATIONAL 2017

1-2 May, Perth

www.minesafe.ausimm.com.au

05

**SURFACE MINE EMERGENCY RESPONSE
COMPETITION**

5-7 May, Kalgoorlie

www.cmewa.com

16

**HUMAN AND ORGANISATIONAL FACTORS
FORUM**

16 May, Perth

AUGUST

01

REGISTERED MANAGERS FORUM

TBA, Perth

OCTOBER

01

SAFE WORK AUSTRALIA MONTH 2017

All of October

www.safeworkaustralia.gov.au

08

MENTAL HEALTH WEEK

8-14 October

www.waamh.org.au

DMP AWARDS FOR EXCELLENCE*

TBA, Perth

03

2017 MINES SAFETY ROADSHOW*

3 October, Kalgoorlie

4 October, Leonora

10 or 11 October, Newman (two sessions)

12 October, Tom Price

17 October, Karratha

18 October, Port Hedland

24 October, Bunbury

25 October, Mandurah

31 October, Geraldton

NOVEMBER

02

2017 MINES SAFETY ROADSHOW*

2 or 3 November, Perth (two sessions)

**UNDERGROUND MINE EMERGENCY
RESPONSE COMPETITION***

TBA, Kalgoorlie

24

THE MERC

24-26 November, Perth

www.themerc.com.au

**Provisional – event to be confirmed*

The events listed are either presented by the Department of Mines and Petroleum or involve Resources Safety as presenters or exhibitors.

Departmental events are provisional until registration details are released. For the latest information, visit dmp.wa.gov.au/events or use the QR link.



Mines Safety Roadshow

2017



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



Let's talk about safety

The 13th annual Mines Safety Roadshow travels across the State this October and November.

Be the first to see the new 'traffic management' awareness videos and workshop solutions that make a difference.

Join the conversation, sign up for the Resources Safety news alerts to find out more.

Bunbury Geraldton Kalgoorlie Karratha Leonora
Mandurah Newman Perth Port Hedland Tom Price

EXPLORING HUMAN FACTORS

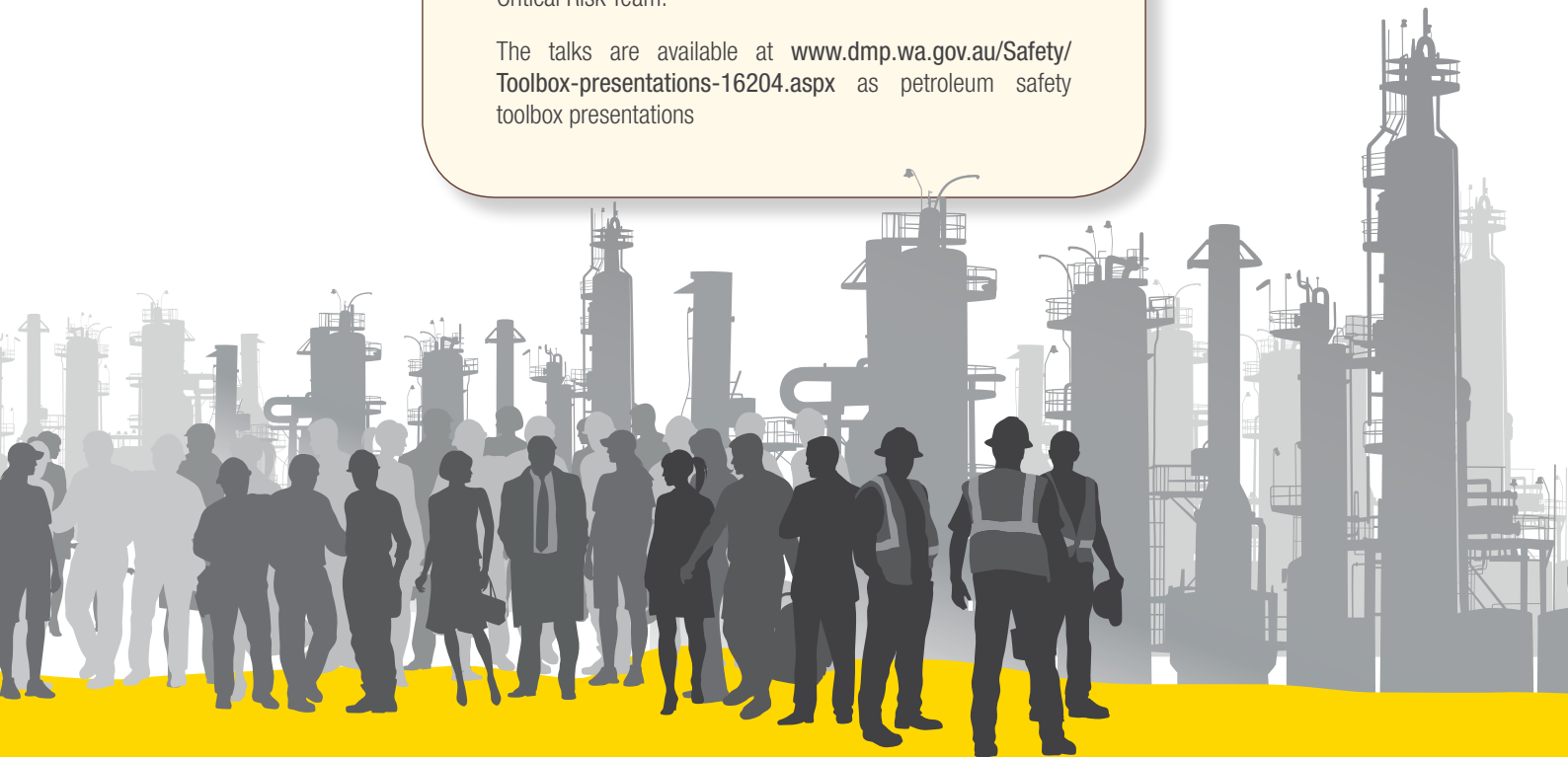
On 28 April 2016, Resources Safety's Dangerous Goods and Petroleum Branch held its first Human Factors Industry Forum.

The forum focussed on:

- raising awareness of human factors and their role in safety outcomes
- providing information about the ways in which organisational, individual and job factors influence human reliability
- addressing how organisations can minimise or optimise the effect of those factors to:
 - assist in the prevention and mitigation of hazard events
 - drive continuous improvements in safety, integrity, leadership and performance outcomes through integration into the safety case.

Industry experts Dr Brett Molesworth from the UNSW School of Aviation and Martin Anderson from Woodside Energy Ltd spoke to the forum's 131 attendees about the key learnings in human factors from the aviation industry, and influencing the behaviours and decisions that people make (optimising human factors). There were also presentations from the Branch's Critical Risk Team.

The talks are available at www.dmp.wa.gov.au/Safety/Toolbox-presentations-16204.aspx as petroleum safety toolbox presentations



CHECKING VILLAGE ACCOMMODATION

Resources Safety held its first forum for accommodation providers in the mining industry on 12 April 2016. As part of the event, the 82 owner operators and contractors who attended the forum industry were invited to supply feedback on a draft version of the village audit.

.....

This feedback has helped shape a series of audit guides and templates, which are now available in the safety publications section of the Department's website:

- Village: Electrical – audit guide and template
- Village: Infrastructure – audit guide and template
- Village: Occupational health and safety (OHS) – audit guide and template
- Village: Mechanical – audit guide and template.



ER



**DANGEROUS
GOODS**

WESTERN AUSTRALIA

TYC

TRANSFAE WA ROAD TRANSPORT INDUSTRY SAFETY FORUM – KARRATHA

Following the success of previous regional seminars, the Transafe WA Road Transport Industry Safety Forum took its roadshow to Karratha on 3 November 2016.

The town was an ideal location to reach industry in the Burrup Peninsula and Pilbara area, which are large regional hubs for oil and gas processing, and iron ore mining. The transport of bulk and packaged dangerous goods by road tankers in this region happens on a massive scale, 24-hours a day, seven days a week.

Sponsored by Resources Safety, the event attracted a range of presenters and attendees from the manufacturing and transport industry.

Senior Dangerous Goods Officer Stephen Lane, who is also a Transafe committee member, discussed the Department's proactive involvement with the transport industry and launched the *Dangerous goods transport hazard overview*.

Mr Lane's presentation generated much discussion on the management of dangerous goods transport risks within the region.

A highlight of the forum was the dangerous goods transport case study presented by Energy Developments Ltd (EDL) and DirectHaul. The study dissected the operator challenges and community benefits inherent in liquefied natural gas (LNG) road tanker transport from the Maitland Industrial Estate, near Karratha, to four Kimberley power stations.

The merits of various fatigue management systems and in-cabin innovation were discussed by speakers from Toll Liquids and Centurion Transport, as well as a fatigue specialist from Beyond Midnight.

Copies of the Karratha Forum presentations are available from the TransafeWA website at www.transafewa.com.au/forums

CHECK OUT THE NEW TOOL FOR DANGEROUS GOODS RISK ASSESSMENT

It is critical that the risks associated with transporting dangerous goods on Western Australian roads are minimised.

To help guide companies, Resources Safety's Dangerous Goods and Petroleum Branch has developed the *Dangerous goods transport hazard overview* with input from the transport industry.

"The overview is designed to help companies assess the risks posed by transporting dangerous goods to ensure the risks are reduced to as low as reasonably practicable or ALARP," said Senior Dangerous Goods Officer Stephen Lane.

"The overview focuses primarily on the physical hazards of dangerous goods packages and the consolidation of goods onto trailers and into freight containers.

"It also itemises the inherent chemical risks associated with the nine classes of dangerous goods, from the perspective of the hazards confronting the carrier.

"And, lastly, it examines the consignment system and procedural aspects of transport, including the activation of a company's transport emergency response plan."

To download the template or to find out more about transporting dangerous goods safely, visit dangerous goods section at www.dmp.wa.gov.au



BM

EMERGENCY PREPAREDNESS ON THE AGENDA

On 25 November 2016, Resources Safety held an information session on *Preparing for emergencies – a resources industry perspective*.

The information session helped launch the draft code of practice *Emergency preparedness for mining operations* and the *Emergency exercise evaluation tool for major hazard facilities and other dangerous goods sites*.

It also covered the importance of incident management and emergency response, and included a presentation from the

Department of Fire and Emergency Services (DFES) on how different data sources can help.

Seventy-one industry representatives who have functions and responsibilities for planning, designing, implementing and maintaining emergency response systems participated in the event.

Following the presentation, participants were invited to tour the Mining Emergency Response Competition venue at Langley Park in Perth.

EMERGENCY PREPAREDNESS GUIDANCE BEING DEVELOPED

Following a period of public comment, the Department of Mines and Petroleum is finalising a code of practice for emergency preparedness for mines in Western Australia.

The draft code provides guidance on emergency response systems used in surface and underground mines and quarries and developing and evaluating safe work procedures for such systems.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said the code aims to enhance the planning, implementation and maintenance of emergency systems.

"This code is a tool to inform and guide those developing risk-based emergency management systems, and has had significant input from emergency response coordinators and trainers," Mr Chaplyn said.

EMERGENCY EXERCISE EVALUATION TOOL

An evaluation tool for assessing emergency training exercises at major hazard facilities and other dangerous goods sites has been released by the Department of Mines and Petroleum. The tool was created to assist those sites assess their emergency response exercises.

Using the tool, sites can gauge the adequacy of their emergency response plans and how well they are implemented, and identify opportunities for improvements.

The evaluation tool is available in the safety publications section at www.dmp.wa.gov.au

Mines Safety Roadshow 2016

Pressing concerns

PREVENTION FROM GETTING CAUGHT, TRAPPED AND CRUSHED

Bunbury Geraldton Kalgoorlie Karratha
Mandurah Newman Perth Port Hedland Tom Price

PRESSING CONCERNS AT THE 2016 MINES SAFETY ROADSHOW

Resources Safety is committed to communicating key safety messages to industry. For twelve years, the Mines Safety Roadshow has been one of the Department of Mines and Petroleum's most important events to raise industry awareness of safety issues and mines inspectorate concerns.

Pressing concerns was the theme of the 2016 roadshow — how to prevent people from getting caught, trapped and crushed, which is the number one cause of mining injuries in Western Australia.

Participation in the roadshow increased by 28 per cent from the previous year, with 710 industry stakeholders attending the 12 sessions in nine locations across the State – Kalgoorlie, Newman, Karratha, Port Hedland, Bunbury, Mandurah, Geraldton, Perth and, for the first time in several years, Tom Price.

Survey feedback indicated that sessions were well received by most participants, and they came away from the event with an increased knowledge and understanding of the topics discussed.

Following the acknowledgement of or welcome to country, a video recording of Mines and Petroleum Minister Sean L'Estrange was played to welcome attendees and commend them on their commitment to safety.

The focus of the roadshow was the risks associated with getting caught, trapped or crushed. Discussions also centred around the state-of-the-State address, proposed legislation, human factors, mental wellbeing and the role of safety and health representatives.

Three additions to the Know Your Hazards awareness video series were debuted during the event. The Pressing concerns videos explain how getting crushed by, caught between or trapped within can harm the human body. The videos also highlight the personal costs to Western Australian miners and families through those who have personally been affected by such incidents. At the roadshow, the Department acknowledged Johannes Ceronio, Mason Fenner, and Carey Vervaart and partner Katie Klimeck for sharing their stories.

Interactive workshops were an integral feature of the program, aimed at stimulating discussion, sharing solutions and promoting audience communication. The three workshops sought input on:

- hazards on site and the effective controls
- human factors in the workplace
- the importance of the safety and health representative.

The findings from these workshops are presented here. The openness of those who participated in these sessions is appreciated, and the feedback helps inform the Department's future strategies.

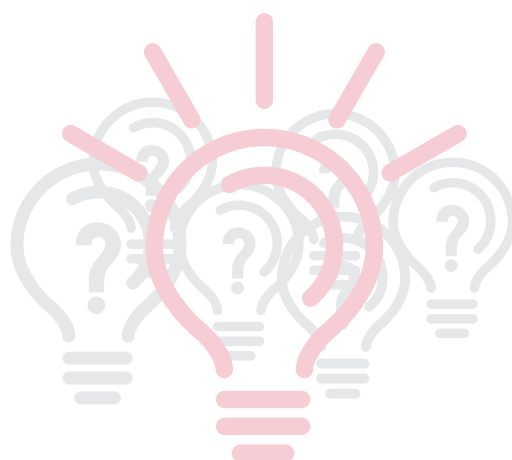


DOWNLOAD THE PRESSING CONCERNS VIDEOS NOW

The latest instalments in the Department of Mines and Petroleum’s hazard awareness video series, launched during the 2016 Mines Safety Roadshow, are now available for public viewing. Developed for the Western Australian resources sector, the series aims to help workers and supervisors identify potential hazards in the workplace.

The videos are available for sharing or download from vimeo.com and may be distributed for educational purposes.

To download your free copy, visit the Department’s website at www.dmp.wa.gov.au/HazardVideos



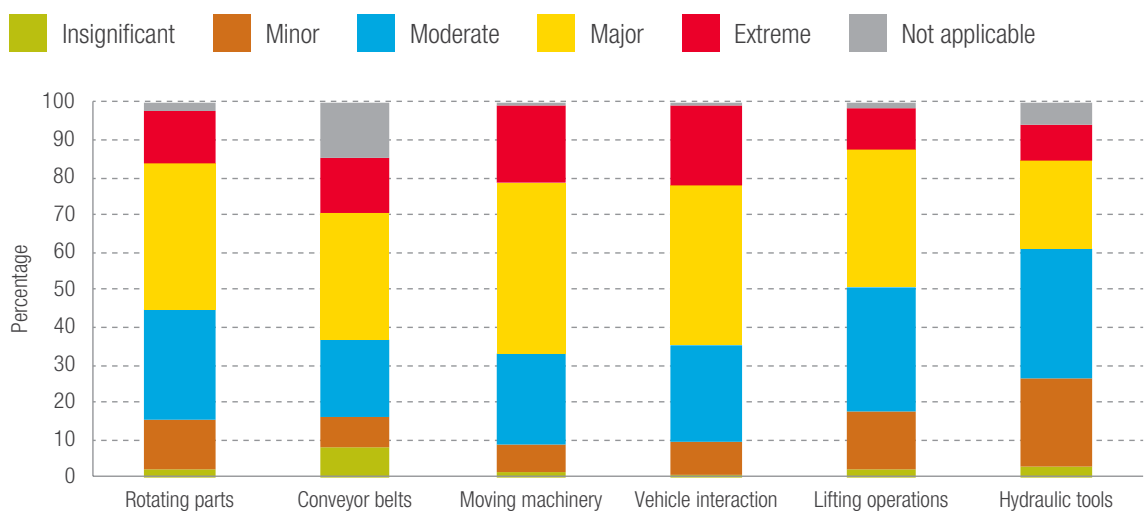
WHAT NEXT?

Planning for the next Mines Safety Roadshow has commenced. The 2017 event will tackle incidents related to traffic management and include the release of videos addressing this theme.

The 2017 Mines Safety Roadshow will travel to ten locations, with Leonora added to the itinerary. We hope this initiative is supported by increased industry participation.

WORKSHOP 1: HOW CAN WE PREVENT GETTING CAUGHT, TRAPPED OR CRUSHED?

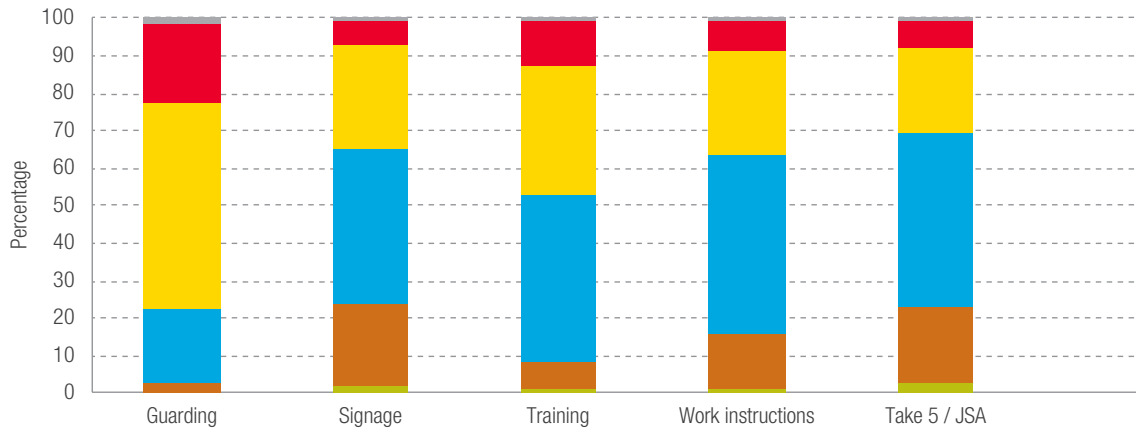
Question 1 asked attendees to rate the potential severity of various caught, trapped or crushed hazards at their site.



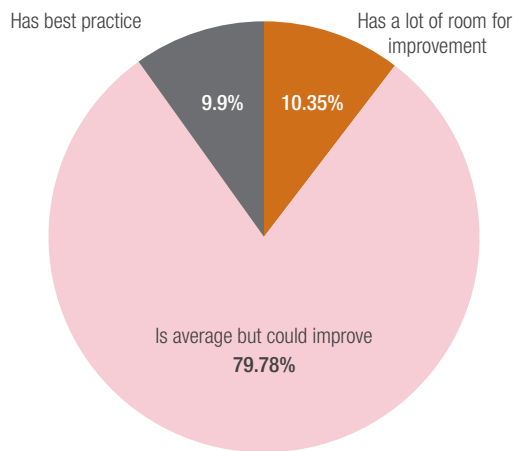
WORKSHOP 1: HOW CAN WE PREVENT GETTING CAUGHT, TRAPPED OR CRUSHED?
(CONTINUED)

Question 2 asked attendees to rate how effective the following preventative measures are at their site for controlling risks associated with caught, trapped and crushed hazards.

- Not at all effective
- Slightly effective
- Moderately effective
- Very effective
- Extremely effective
- Not applicable

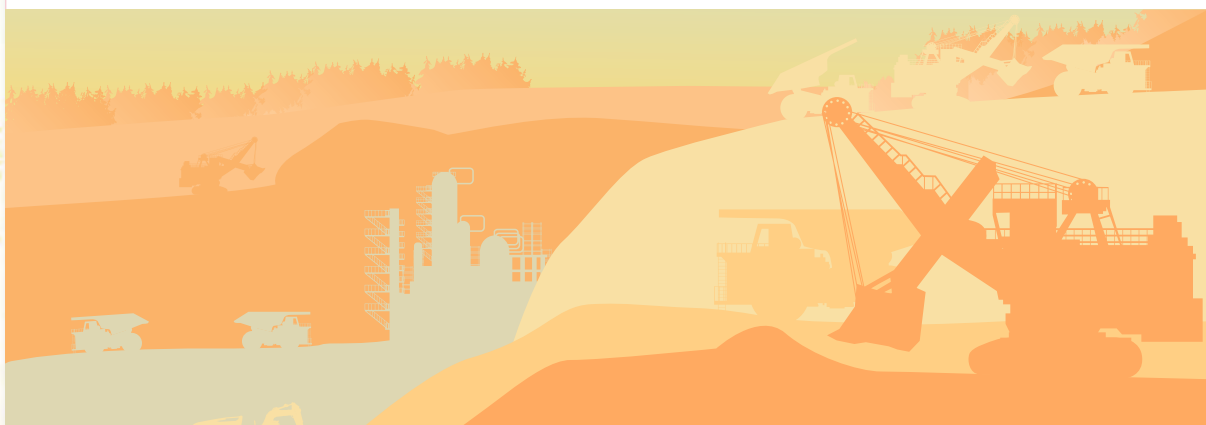
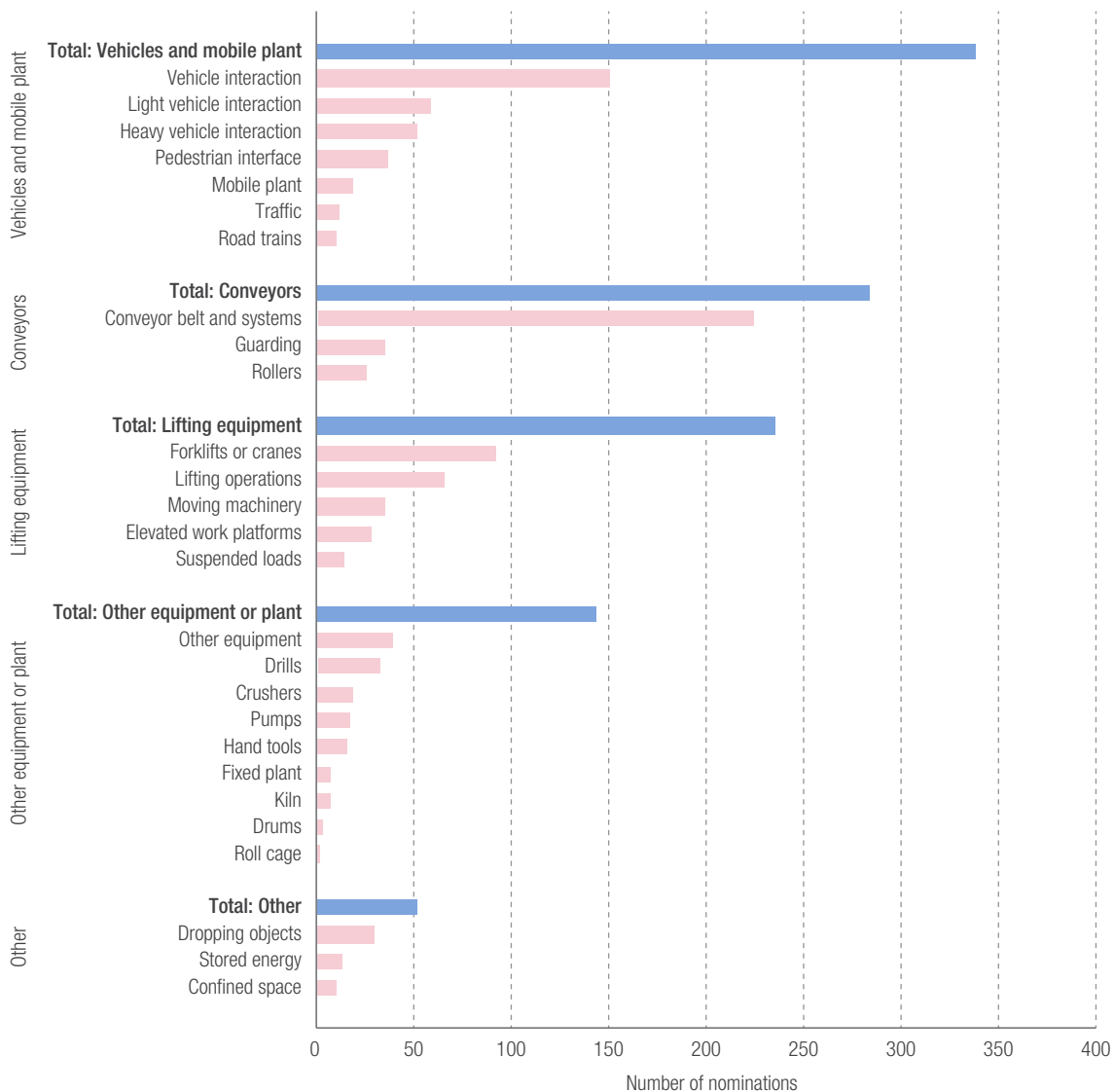


Question 3 asked what attendees thought about their site with regards to caught, trapped and crushed hazards.



WORKSHOP 1: HOW CAN WE PREVENT GETTING CAUGHT, TRAPPED OR CRUSHED? (CONTINUED)

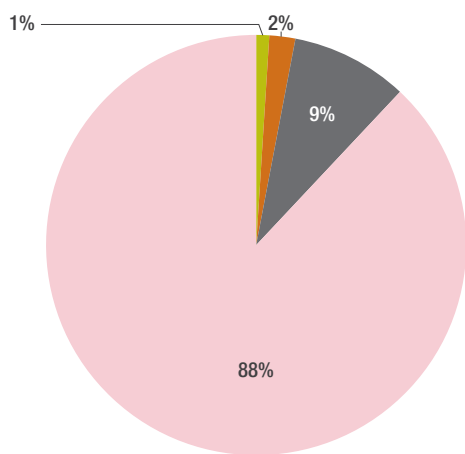
Question 4 asked attendees to nominate the greatest caught, trapped and crushed hazards on their site. 1,052 hazards were nominated.



WORKSHOP 2: HOW CAN A COMPANY'S SAFETY CULTURE PLAY A ROLE IN SAFETY OUTCOMES?

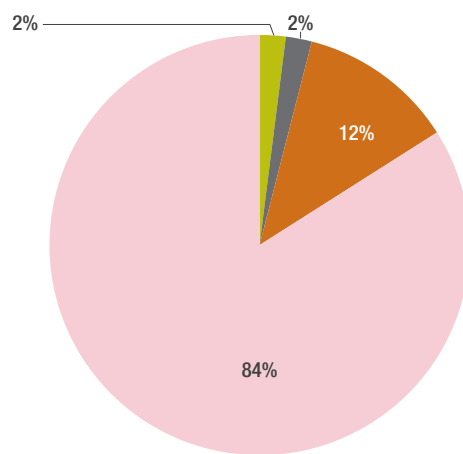
Human factor topic: Designing for people

Ergonomic principles are used when designing control rooms, vehicle cabs, tools, equipment, controls and displays etc. Ergonomic design principles are also used to manage lighting, thermal comfort, noise, vibration and atmospheric contaminants. This means that equipment is easy to understand, use and maintain, and difficult to operate accidentally.



Human factors topic: Safety-critical communication during operations

A well-structured process is in place for crew, shift and task handover, communication of vehicle movements via radio, use of warning signs, communication protocols, log books etc. This helps to prevent miscommunication and misunderstandings.



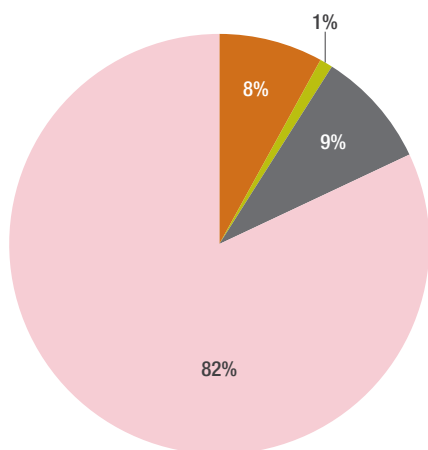
- This topic is not relevant to our operation
- We have not worked on this topic, and in our opinion it is not necessary
- This topic is being addressed to our satisfaction, and no more needs to be done
- We have not done anything about this topic yet, and we believe it is something we should do
- We have done some work on this topic, but more needs to be done



WORKSHOP 2: HOW CAN A COMPANY'S SAFETY CULTURE PLAY A ROLE IN SAFETY OUTCOMES? (CONTINUED)

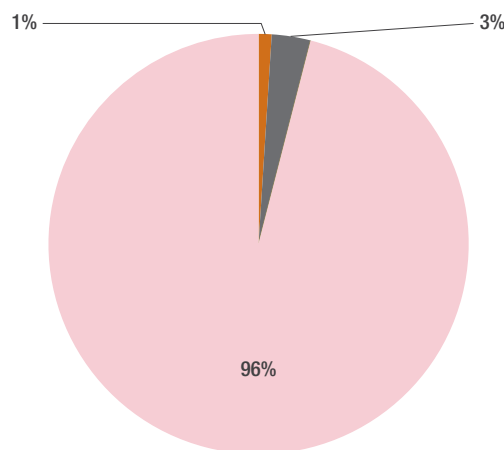
Human factor topic: Human factors in incident investigations

A structured analysis of human failure (violations and errors) takes place during incident investigation, to understand and address the underlying reasons for failure.



Human factors topic: Error during maintenance inspection and testing

Maintenance error is very common in the Western Australian mining industry. A well-managed maintenance organisation would have a structured process to minimise errors in place (including a well-designed permit system) coupled with widespread awareness of the risk of error during maintenance, inspection and testing tasks.



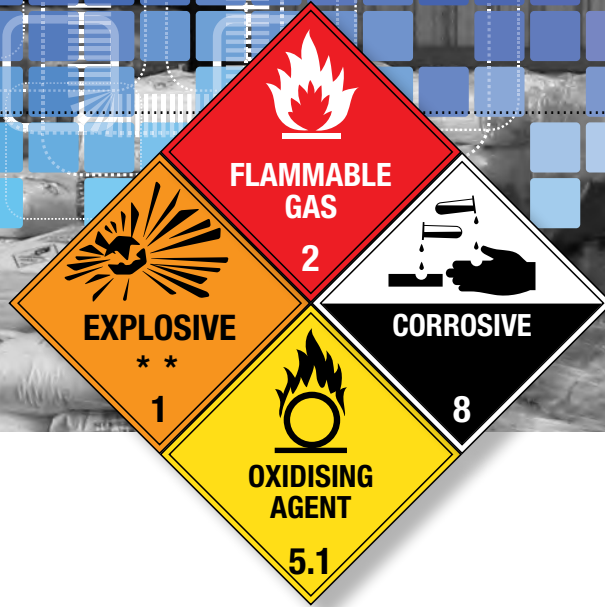
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- We have not worked on this topic, and in our opinion it is not necessary
- This topic is being addressed to our satisfaction, and no more needs to be done
- We have not done anything about this topic yet, and we believe it is something we should do
- We have done some work on this topic, but more needs to be done

WORKSHOP 3: WHAT IS THE INVOLVEMENT OF THE SAFETY AND HEALTH REPRESENTATIVE TO ENSURE A SAFE WORKPLACE?

Question: What examples of safety and health representative involvement have you seen that had a great outcome in the workplace?

There were 430 responses describing some great actions by safety and health representatives.

We encourage sites to nominate their initiatives for the annual Safety and Health Resources Sector Awards. There is a category for leadership in the workplace by an elected safety and health representative who has introduced and driven a new approach or program to improve the safety, health and wellbeing of the workforce (e.g. training program, safety culture initiative, fitness for work program, mental health and wellness program, accident investigation method). Visit www.dmp.wa.gov.au for details.



TOP 10 DANGEROUS GOODS SAFETY ISSUES

Dangerous goods officers travel across Western Australia to ensure dangerous goods are stored, handled and transported safely. Following the 2015-16 inspection program, Resources Safety has developed a summary of the top 10 non-compliance areas to help educate and raise compliance levels at dangerous goods sites.

The summary also includes references to guidance material and the Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007 (the Storage and Handling Regulations).

10. WRONG INFORMATION ON LICENCE

Circumstances that may require a change to the licence could include a change of business name, change of quantity of dangerous goods stored on site or additional types of dangerous goods stored on site.

Resources Safety's webpage on *Notifying change of details for dangerous goods licences* provides information on how to contact department when circumstances change. Also refer to r. 44, Storage and Handling Regulations.

9. NOTIFICATION TO NEIGHBOURS

Licensed dangerous goods sites are required to provide information to adjacent sites if the risks in relation to the dangerous goods could extend to that neighbouring site [r. 76A, Storage and Handling Regulations]. Examples of dangerous goods that can impact neighbours include toxic gases, such as ammonia and chlorine, and large flammable liquid storage facilities.

8. DANGEROUS GOODS REGISTER

Sites are required to have a dangerous goods register that lists relevant dangerous goods stored and handled at the site.

For further information, see chapter 3 of Resources Safety's *Storage and handling of dangerous goods – code of practice* and r. 77, Storage and Handling Regulations.

7. MATERIAL SAFETY DATA SHEETS

Material safety data sheets (MSDS) should be kept for all dangerous goods on site and they must be current.

For further information, see chapter 3 of the code of practice.

6. SEGREGATION

Segregation is another important risk control measure to ensure safety on sites with dangerous goods. Seek specialist advice if you are in doubt about which dangerous goods require segregation.

Refer to r. 52, Storage and Handling Regulations, and section 6.9 of the code of practice for more information.

5. INDUCTION, TRAINING AND SUPERVISION

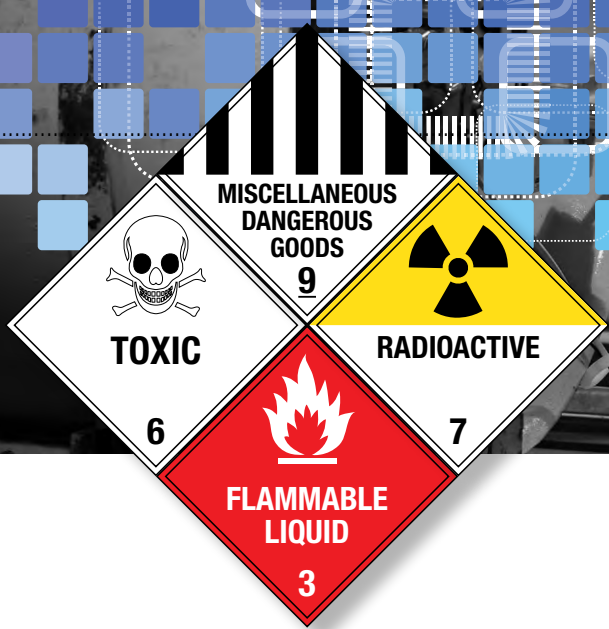
It is a legal requirement that an operator of a dangerous goods site provides training to personnel on site handling dangerous goods and maintains a record of the training performed [r. 81, Storage and Handling Regulations].

See chapter 15 of the code of practice for details.

4. CONTROL OF FIRE HAZARDS

It is a requirement that, where reasonably practicable, all steps are taken to control potential fire hazards near dangerous goods storage areas.

For further information, refer to section 4.4 of the code of practice and r. 67, Storage and Handling Regulations.



3. EMERGENCY PLAN

Procedures should be prepared for likely scenarios on site, such as fires, spills and burns. In addition, the emergency plan should include the contact details for anyone who could be required in an incident, such as managers, emergency services and utility providers [r. 75, Storage and Handling Regulations].

Visit Resources Safety's *What is required for dangerous goods storage and handling licences?* webpage to learn more about emergency plans.

2. RISK ASSESSMENT

Dangerous goods sites must have a risk assessment for goods stored and handled on site [r. 48, Storage and Handling Regulations]. The risk assessment can be in the form of a compliance check against an appropriate approved code of practice, such as an Australian Standard.

Resources Safety's *Risk assessment for dangerous goods – guidance note* provides further details.

1. MANIFEST AND SITE PLAN

A dangerous goods site must have a manifest and site plan [r. 78, Storage and Handling Regulations]. It is important to get the site plan and manifest right as the Department of Fire and Emergency Services (DFES) relies on this information when responding to dangerous goods incidents at a site.

See Resources Safety's *Manifest and site plan requirements for dangerous goods sites – guidance note* for the requirements.

REFERENCES AND RESOURCES

Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007

www.slp.wa.gov.au

Storage and handling of dangerous goods – code of practice

<https://goo.gl/QywGUw>

Risk assessment for dangerous goods – guidance note

<https://goo.gl/z30X69>

Manifest and site plan requirements for dangerous goods sites – guidance note

<https://goo.gl/djXthw>

Notifying change of details for dangerous goods licences

<https://goo.gl/VfUpcX>

What is required for dangerous goods storage and handling licences?

<https://goo.gl/PQYjM5>

FIRE PROTECTION INDUSTRY PERMIT – WHAT IS IT?

The Fire Protection Industry Permit scheme is a national scheme that covers the handling, use, acquisition, storage and disposal of scheduled extinguishing agents that are ozone-depleting substances or synthetic greenhouse gases used in Australia. The scheme includes the building, marine, mining and aviation industries.

The Fire Protection Industry Board was appointed by the Federal Minister for the Environment under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 to implement the scheme.

The Board has developed a fact sheet and other information to raise awareness of legislative requirements when using gaseous fire suppression systems containing scheduled extinguishing agents. Visit www.fpa.com.au/ozone/industry-education to find out more.



TYC

INVOLVING SAFETY AND HEALTH REPRESENTATIVES IN MINING INVESTIGATIONS

Mine management should be aware that there is a legal requirement for an elected safety and health representative, where one exists, to carry out an investigation immediately following an accident or dangerous occurrence.

The Department of Mines and Petroleum has identified cases where safety and health representatives have been excluded from the investigation process. Resources Safety encourages mine managers to familiarise themselves with section 53(1)(b) of the *Mines Safety and Inspection Act 1994*, and support safety and health representatives in complying with the intent of this legislation. This means providing representatives with the necessary skills to participate in or conduct an investigation, and involving them in site investigations.

Safety and health representatives should not conduct separate investigations, but should be included in the company's investigation team. It also makes good sense to provide training to safety and health representatives in the site's preferred investigation methodology.

Representatives have an intricate understanding of work areas and can be an invaluable source of knowledge during site investigations. They bring an understanding of workplace systems, health and safety, and experience in liaising with workers and supervisors.

An information sheet for safety and health representatives investigating incidents can be found on the Department's website at www.dmp.wa.gov.au/Documents/Safety/MSH_IS_InvestigatingIncidents.pdf

NO LONGER A SAFETY AND HEALTH REPRESENTATIVE?



Safety and health representatives are elected for a term of two years to represent employees in an area, workplace or group determined during consultation before the election. This term starts ten days after the date of the election, so a safety and health representative's term expires two years and ten days after election, unless re-elected before the expiry date.

Safety and health representatives also cease to hold their positions if they:

- leave their job
- resign from the position
- transfer from the area they were elected to represent
- are disqualified by the Occupational Safety and Health Tribunal.

In any of these circumstances, Resources Safety should be notified so the database can be updated.

Email mineshreps@dmp.wa.gov.au



METH HELPLINE LAUNCHED

The Meth Helpline was officially launched on 12 September 2016. Situated within the Alcohol and Drug Support Service, the helpline provides a 24/7, confidential, non-judgmental telephone counselling, information and referral service for anyone seeking help for their own or another person's methamphetamine use.

The Meth Helpline is part of the State's methamphetamine strategy, and aims to increase access to support and help reduce the impact of methamphetamine use in Western Australia.

The Alcohol and Drug Support Service will continue to provide 24/7, state-wide telephone counselling, information, referral and support to anyone concerned about their own or another person's alcohol or other drug use via the:

- Alcohol and Drug Support Line
- Parent and Family Drug Support Line
- Working Away Alcohol and Drug Support Line

The support lines can also be accessed via Live Chat, email, the Translating and Interpreting Service, and the National Relay Service.

The Alcohol and Drug Support Service will also continue to provide the booking service for cannabis and other drug intervention requirement schemes.

Contact with the support lines is one-to-one, confidential and provided by a professionally trained counsellor.

For further information about services, contact 1800 874 878, send an email to alcoholdrugsupport@mhc.wa.gov.au or visit the webpage at drugaware.com.au/getting-help/how-to-get-help/#Meth-Helpline

DOES YOUR SITE'S HOUSEKEEPING REFLECT ITS WORKPLACE CULTURE?

You can tell a lot about an organisation by looking at how it looks after a site. It can indicate the commitment of site management, the culture present in the workforce, and the competency of the operation and maintenance crews.

Housekeeping practices form part of the workplace quality program as well as the safety program. Good housekeeping is fundamental to maintaining a clean, tidy and safe working environment. This generally reflects good management practices and pride in the workplace, signalling that the company cares about safety.

Poor housekeeping practices, such as inadequate cleaning of work areas and equipment, and a general appearance of poor maintenance do not instil confidence in the site's ability to manage safety. Such practices can cause accidents in the workplace, from contributing to slips, trips and falls to providing fuel for fires. This may reflect the competency or commitment of the teams, or indicate that the work crews are so overworked that they simply do not have the time to do basic housekeeping tasks. If so, what else are they missing?

HOW CAN THE RISKS OF POOR HOUSEKEEPING BE REDUCED?

Good housekeeping practices and supervision are crucial to basic workplace safety.

Adopting a risk management approach means systematically identifying the risks associated with poor housekeeping and implementing control measures to eliminate the risks or, if that

is not possible, reducing them to the lowest practicable level (e.g. as low as is reasonably practicable or ALARP; so far as is reasonable practicable or SFAIRP).

Actions include:

- identifying cleaning and maintenance requirements in all areas of the workplace
- assessing the risks associated with each situation
- identifying and implementing control measures that reduce the risks to ALARP
- reviewing the effectiveness of these control measures and making adjustments as needed
- conducting regular workplace inspections that include checking housekeeping and taking corrective actions as appropriate
- reporting, investigating and implementing control measures in regard to any incidents to prevent them happening again
- documenting the process so that there is evidence of everything that has been done in the workplace to reduce the risks to ALARP
- conducting training for all staff on the importance of good housekeeping practices, their role in maintaining standards, and the need for them to report hazards to their supervisor.

EXAMPLES OF GOOD HOUSEKEEPING

These simple steps can make a difference at your site.

- Include housekeeping in regular workplace inspections by management.
- Operations team regularly clean before, during and after shifts.
- Maintenance teams clean up when a task is completed.
- Clean up spills during the shift.
- Implement regular, scheduled maintenance for plant and equipment that include housekeeping tasks and monitor the program's effectiveness.
- Keep work areas well lit, with no lights out.
- Keep walkways clear of obstructions
- Store materials and equipment properly, not in production areas.
- Repair damaged plant and equipment in a reasonable time.
- Conveniently locate and install suitable containers for waste products, and ensure they are regularly emptied so there is no waste build-up.
- Replace damaged, missing or illegible signage.
- Remove rust, and repair and repaint the area if appropriate.



IDENTIFYING HUMAN FACTORS IN WESTERN AUSTRALIAN MINING

Improving safety culture or “the way we do things around here” has been a common response from mine sites when asked by the Department of Mines and Petroleum about how the regulator could assist them to improve safety performance.

An assessment of literature and activities by other regulators identified that human factors could provide a useful framework for addressing safety culture. In particular, the United Kingdom’s Health and Safety Executive (UK HSE) top 10 human factor topics were seen as being highly relevant to the concept of developing a “resilient safety culture”.

The Department then assessed the applicability of the UK HSE top 10 human factor topics to Western Australian mining. Available data sources were reviewed to identify human factor trends, with sources including industry research, incident data, mines safety literature, and Department records including safety alerts, site inspection records and reports. Internal focus groups were also consulted during the review.

The review found that, with minor modifications, the UK HSE top 10 human factors would provide a useful framework for operational and safety and health professionals wishing to adopt a strategic approach to managing human reliability and failure in Western Australia’s minerals industry.

At the 2016 Registered Managers Forum, the subject of human factors was presented, including a list of proposed

top 11 human factors topics. Attendees reviewed each topic to assess its relevance and inclusion in a safety framework. No major changes were required.

Attendees at the 2016 Mines Safety Roadshow also provided feedback on the proposed topics. After introducing the subject, attendees were asked to review one of the following human factor topics:

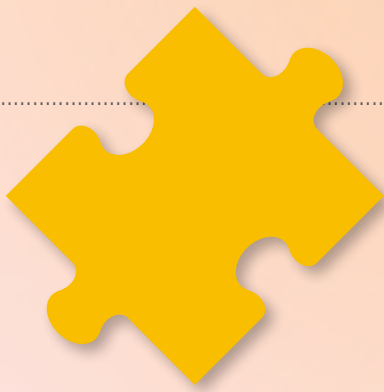
- designing for people
- safety-critical communications
- human factors in incident investigations
- maintenance error.

They were then asked to rate the relevance of the topic to their own mine site.

This work has helped confirm that the UK HSE top 10 human factors topics are relevant and applicable to Western Australian mining. Importantly, the UK HSE human factors framework is well supported in terms of educational literature and assessment tools.

A clear opportunity exists for the regulator to adapt and utilise available human factors literature and resources. This would help in the development of integrated safety improvement initiatives that recognise the role that human error plays at all levels. This role includes those outside the organisation, such as equipment manufacturers, suppliers and designers — not just the last person to touch the equipment.





THE TOP 11 HUMAN FACTORS FOR WESTERN AUSTRALIAN MINE SITES

Topic	Sub-topic	Brief description
1.0 Managing human reliability	1.1 Preventing human failure	Structured inclusion of influences on human failure (violations and errors) during design, technical changes and risk assessment
	1.2 Human factors in incident investigation	As above, but for incident investigation
2.0 Usable procedures		Provision of user-friendly procedures that support error-free performance
3.0 Training and competence		Combination of skills, experience and knowledge to undertake responsibilities and consistently perform activities to a recognised standard — includes contractors, and retention of organisational competence to manage and quality-assure contractor work
4.0 Staffing and workload	4.1 Staffing levels	Appropriate level of skilled people available for adequate supervision, and safe task performance and lone working
	4.2 Workload	Manageable workload, especially during critical tasks, upsets and emergencies
5.0 Organisational change		Human aspects of organisational change risk-assessed and controlled
6.0 Safety-critical communications	6.1 During operations	Structured process in place for activities such as shift and task handover, communication of vehicle movements via radio, and use of warning signs, communication protocols, log books
	6.2 During permits and isolations	Structured process for work permits, isolations and confined space work, which aids communication and reduces error
7.0 Designing for people	7.1 Human-machine interface	Ergonomic design principles used for control rooms and vehicle cabs
	7.2 Alarm management	Ergonomic design principles used to prevent alarm “floods”
	7.3 Equipment ergonomics	Ergonomic design principles applied to enhance access to equipment, prevent musculoskeletal injury, and promote engineering solutions to design or alter equipment
	7.4 Work environment	Ergonomic design principles applied to manage lighting, thermal comfort, noise, vibration and atmospheric contaminants

Topic	Sub-topic	Brief description
8.0 Fitness for work	8.1 Fatigue risk management	Organisational and individual responsibilities to prevent, manage and recover from impairment
	8.2 Drugs and alcohol	
	8.3 Physical fitness	
	8.4 Mental wellbeing	
9.0 Health and safety culture	9.1 Health and safety leadership (including learning lessons)	Includes supervision of contractors, experience and effectiveness of supervision, time available for supervisors to manage safety, and examples set by supervisors
	9.2 Effective supervision	
	9.3 Individual duty of care	
	9.4 Procedural compliance	
	9.5 Contractor management	
10.0 Maintenance, inspection and testing error		Structured process to minimise errors in place, coupled with widespread awareness of risk during maintenance tasks
11.0 Emergency response		Includes effective organisation, plans, training, procedures, clear roles, drills, staffing, and radio communication





SECURITY COMPLIANCE FOR AMMONIUM NITRATE

A project looking at compliance during the manufacture, transport, storage and use of ammonium nitrate has helped the Department of Mines and Petroleum identify areas for improvement.

Director Dangerous Goods and Petroleum Safety Ross Stidolph said dangerous goods officers conducted security inspections as part of the five-month project conducted in 2016.

“Although the Department conducts inspections throughout the year, this project focussed on gaining security compliance data for the whole ammonium nitrate life-cycle,” Mr Stidolph said. “This data has been used to guide education and compliance strategies.”

The project found there was a high level of regulatory ammonium nitrate security compliance, and physical security requirements were in place and being maintained.

Mr Stidolph said most non-compliance related to inadequate training of employees about the security plan and legislation.

“We also identified issues with authorisation and monitoring, and shortfalls regarding documented security plans and risk assessments.”

The officers also found those responsible for issuing or creating security access cards were not always secure nominees. They also noted that security access cards should not identify where and what they can be used to access.

“This minimises the risk of unauthorised use if a card is lost or stolen and has not been deactivated,” Mr Stidolph said.

In Western Australia, compliance with the Dangerous Goods Safety (Security Sensitive Ammonium Nitrate) Regulations 2007 is required to help ensure ammonium nitrate is kept secure and only accessed by authorised persons.

Those involved with ammonium nitrate are encouraged to examine the adequacy of their security plan, risk assessment and operations in light of the project findings.

Q. What is security sensitive ammonium nitrate?

A. A substance containing more than 45 per cent ammonium nitrate.





STAY ALERT

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

Sign up to Resources Safety's weekly news alerts to receive the safety alerts when they are issued.

FAILURE OF CRANE HEAD SHEAVE

As a mobile crane was unloading a truck the head sheave catastrophically failed. Part of the nylon sheave fell 10 m to the ground narrowly missing a rigger. When the sheave was inspected it appeared that it been damaged prior to the lift.

Mines Safety Significant Incident Report No. 237 reminds competent persons in charge of mobile cranes of the importance of inspections, checking maintenance records, and operating cranes in accordance with the original equipment manufacturer's (OEM's) specifications.

INCIDENTS INVOLVING MOBILE PLANT

There have been two incidents involving mobile plant, one of which resulted in crush injuries. Both reports remind mine operators of the importance of positive communication protocols, and developing, implementing and reviewing a traffic management plan.

In *Mines Safety Significant Incident Report No. 238*, a worker received crush injuries while photographing an integrated tool carrier (IT) parked in a main level access. A long-hole drill rig pinned the worker between the rig's horseshoe and the IT's basket.

In *Mines Safety Significant Incident Report No. 240*, a grader was working into oncoming traffic, near the entrance of an active waste dump. As a haul truck turned onto the haul road, the grader moved out of truck's anticipated path of travel. The truck's driver did not see the grader, and collided with the left side of the machine.

ELECTRICAL ARC FLASHES

The uncontrolled release of energy caused by an electric arc can seriously harm people and damage equipment. Four safety alerts have been released to raise awareness of arc flash hazards and the need to implement appropriate controls.

In *Mines Safety Significant Incident Report No. 239*, there was an explosion and an arc flash following the use of an aerosol lubricant by an electrician to free up a switch's tripping mechanism.

Mines Safety Significant Incident Report No. 245 was issued where an electrician, undertaking wiring modifications to a motor control centre (MCC), received minor burns following an arc flash and blast.

The jointly issued *Dangerous Goods Safety Significant Incident Report No. 03-16* and *Petroleum Safety Significant Incident Report No. 02/2016* reminds operators to ensure appropriate measures and systems are in place to manage the risks posed by arc flash events and substation fires.

In *Mines Safety Bulletin No. 138*, actions relating to design and installation, supervision, training and work practices are provided to reduce the potential for arc flash incidents and risk of harm to workers.

WORKER CRUSHED BETWEEN IT BASKET AND ROOF OF EXCAVATION

In *Mines Safety Significant Incident Report No. 241*, a serviceman received serious head injuries while leaning over the front of an integrated tool carrier basket. He was crushed between the rail of the basket and the roof of the excavation when the basket was tilted upwards.

The report reminds mine operators of the importance of developing safe systems of work for working in IT or elevated work platform (EWP) work baskets. Recommended actions include identifying the potential for workers to be crushed,



confirming equipment is fit-for-purpose, promoting positive communication, and adequate instruction, training, assessment and supervision for workers.

CRUSH INJURIES FOR TYRE FITTER

When a tyre fitter positioning a hydraulic bead breaker flicked the pendant control cable over the power pack, the action inadvertently activated the power pack. The sliding section of the bead breaker was set in motion, crushing three of the worker's fingers.

To reduce the potential for injury while working with hydraulic equipment, *Mines Safety Significant Incident Report No. 242* recommends that hazards associated with the operation of the equipment be identified, the risk to workers assessed, and appropriate controls implemented.

ISOLATION OF HAZARDOUS ENERGIES – FATAL ACCIDENT AND SERIOUS INJURY

Mines Safety Significant Incident Report Nos. 243 and 247 outline the findings of the ongoing investigation into an incident where a drill fitter died after being crushed between the drill rod centraliser arm and the drill head. The fitter had been maintaining a blast-hole drill rig.

The importance of implementing and enforcing suitable isolation procedures, undertaking risk assessments, rectifying defects or faults, and thoroughly inspecting and assessing plant during recommissioning is discussed.

In *Mines Safety Significant Incident Report No. 248*, a boilermaker working alone had both his arms drawn into a nip point on a conveyor's tail-end pulley.

The importance of adequate guarding and isolation procedures was discussed, as well as recommendations on safe systems of work. Statistics on conveyor-related serious injuries were also provided.

FATAL ACCIDENT – STRUCTURAL FAILURE

Mines Safety Significant Incident Report No. 244 was issued following an incident where a boilermaker, who was removing the rake shaft in a thickener tank, died when the corroded gantry bridge above him failed and collapsed.

Mining operators are reminded of their responsibilities regarding construction work (including demolition) under the Mines Safety and Inspection Regulations 1995. The bulletin recommendations also cover inspection, monitoring and competency.

EXPLORATION WORKER INCIDENTS

In *Mines Safety Significant Incident Report No. 246*, a drill offsider was lifted into the air as a helicopter was moving a drill rig. The offsider, whose leg was caught in a tag line, fell over 5 metres to the ground, injuring his back.

The importance of risk assessments and holding appropriate high-risk work licences were some of the findings from the investigation.

In *Mines Safety Significant Incident Report No. 249*, a drill offsider was injured when he fell while trying to climb back into the cab of his tracked vehicle. The vehicle, which was still tramming, ran over him, with one track passing over the length of his body.

Recommended actions to reduce the potential for injury when working with mobile plant include addressing modifications to plant, undertaking documented risk assessments, providing adequate supervision and training, and maintaining plant to provide safe and easy access.

BOILER EXPLOSION

During the de-isolation process on a hydrogen-fired boiler, there was an explosion in the combustion chamber. There was significant damage to the boiler and the adjacent cooling tower pipework. Fortunately, no one was injured.



The jointly issued *Dangerous Goods Safety Significant Incident Report No. 01-16* and *Petroleum Safety Significant Incident Report No. 01/2016* highlights the importance of ensuring appropriate controls are in place to manage the risks posed by dangerous goods such as hydrogen. Recommended actions cover engineering controls, work permits and handover, risk management, training and responsibilities.

LP GAS FIRE

Dangerous Goods Safety Significant Incident Report No. 02-16 was issued following a fire that started as LP gas was being decanted. The fire caused damage to the building adjacent to the decanting area and a warehouse. Staff at the site and adjoining businesses had to be evacuated.

Recommendations were made regarding training for staff, placement of cylinders to minimise static electricity, safe practices and appropriate protective clothing and equipment.

ASBESTOS MANAGEMENT

If not effectively managed, asbestos can pose a significant hazard on mine sites and in mine-site-provided accommodation. *Mines Safety Bulletin No. 129* was released following several incidents where products with asbestos-containing material (ACM) were discovered during the course of work activities, while workers were not wearing appropriate personal protective equipment.

The bulletin recommends actions to minimise as far as is reasonably practicable the hazards of ACM in the workplace, and provides a list of guidance and supporting information to assist operators.

INCORRECT LABELLING AND TRANSPORT OF GOLD-LEACHING REAGENT

Mines Safety Bulletin No. 130 and *Dangerous Goods Safety Bulletin No. 0116* were issued jointly to remind mining operators to exercise due diligence when dealing with companies claiming to have a gold-leaching reagent that is environmentally friendly. Samples of the reagent, which was found to contain cyanide (17 to 24 wt %), had been transported in containers that were inappropriate for the hazardous nature of the contents.

The bulletin also recommends storing and handling any product claiming to be a substitute for sodium cyanide as sodium cyanide until verified by a reputable testing agency. Caution should be exercised when using material safety data sheets (MSDSs) from companies with an unknown origin or reputation.

LOAD RESTRAINT SYSTEMS

Dangerous Goods Safety Bulletin No. 0216 was issued following a number of observed and reported instances of non-compliant load restraints for packaged dangerous goods on Western Australian roads.

Actions to ensure appropriate stowage and restraint of packaged dangerous goods are given, as well as links to guidance on stowage and restraint.

REACH TRUCK RESTRAINING DEVICES

It has been observed that a number of seated-model reach trucks on Western Australian mines do not have a restraining device (i.e. seat belt) fitted. Use of these trucks could lead to serious injury or worse if the machine were to tip over, brake suddenly or strike an object.

Mines Safety Bulletin No. 132 reminds importers, principal employers and mine managers of their responsibilities under the Mines Safety and Inspection Regulations 1995 towards plant and the provision of seat belts in vehicles.

STAY SAFE WHEN TRANSPORTING DANGEROUS GOODS

In the past year there were a few notable reminders of the risks from common dangerous goods. In Sydney an exploding LP gas cylinder seriously injured two people. Locally, an incident involving pool chemicals closed a street in Dalkeith and injured a pool maintenance worker.

Department of Mines and Petroleum principal dangerous goods officer Peter Xanthis said even household quantities of dangerous goods presented potentially deadly risks.

"When the weather warms up, we do see an increase in the amount of these dangerous goods being transported by people in the community," Mr Xanthis said.

"That's why it is important the community is aware of some common safety tips for transporting these products."

The Department has important safety information for transporting dangerous goods such as pool chemicals and LP gas cylinders on its website.

"If LP gas leaks from a cylinder inside a vehicle, it can form an explosive fuel and air mixture," Mr Xanthis said.

"If there is an ignition source, this mixture can then explode and injure, or even kill, the driver and passengers."

Improper transport of pool chemicals can also create a potentially deadly situation. Before transporting pool chemicals, the packaging should be checked to ensure it is in good condition and there are no leaks.

"If pool chemicals mix, one of the possible by-products is chlorine gas — which can irritate the nose and throat," Mr Xanthis said.

"Chlorine gas is toxic and the consequences can be fatal."

The Department has further information regarding transporting common dangerous goods at www.dmp.wa.gov.au/Transporting-retail-amounts-of-3211.aspx

TAKING THE LEAD ON LEAD ACID BATTERIES

The Department of Mines and Petroleum is reminding companies of the importance of safely transporting used lead acid batteries on Western Australian roads.

The batteries, used in vehicles, retain a dangerous goods classification as Class 8 Corrosive articles even after they have been used.

Senior dangerous goods officer Stephen Lane said some companies were unaware of the safety requirements.

"The Department is aware of a number of situations where used lead acid batteries have been transported without dangerous goods transport documentation or adequate overpacking and restraint," Mr Lane said.

"Poor packaging and restraint of used lead acid batteries poses a serious safety and health risk to operators and the public."

Mr Lane said the Department recommended prime contractors and consignors review consignment practices for used lead acid batteries.

"Companies need to ensure these batteries are transported in accordance with the Dangerous Goods Safety (Road and Rail Transport of Non-Explosives) Regulations 2007," he said.

"They also need to meet the statutory requirements of the Environmental Protection (Controlled Waste) Regulations 2004 administered by the Department of Environment Regulation."

More information is available from:

- www.batteryrecycling.org.au/guidelines-for-packaging-used-batteries
- [www.ntc.gov.au/Media/Reports/\(E62BE286-4870-ED95-1914-1A70F3250782\).pdf](http://www.ntc.gov.au/Media/Reports/(E62BE286-4870-ED95-1914-1A70F3250782).pdf)





CHECK OUT THE SAFETY ALERT
AT [WWW.DMP.WA.GOV.AU/
RESOURCESSAFETY](http://WWW.DMP.WA.GOV.AU/RESOURCESSAFETY)

MSB No. 130 and DGSB No. 0116: *Gold-leaching reagent containing cyanide – incorrectly labelled and transported by supplier*

CYANIDE FOUND IN “ENVIRONMENTALLY FRIENDLY” LEACHING AGENTS

Last year, a product advertised by an overseas-based company as an “environmentally friendly” alternative for gold processing was found to contain highly toxic sodium cyanide was reported to the Department of Mines and Petroleum. After investigating, the Department released a safety alert to raise awareness of this issue.

Several mining companies had received samples of *Earth Gold* and *Gold Dressing Agent*, which were being marketed as an alternative to cyanide for gold processing. The companies notified the Department after tests found the samples contained sodium cyanide.

Manager Dangerous Goods Iain Dainty said the products were anything but environmentally friendly.

“The samples that were tested were found to contain between 17 to 27 per cent sodium cyanide,” Mr Dainty said.

“There are no warnings about the hazardous nature of the product, and it is potentially being transported and handled as if it were non-hazardous.”

Sodium cyanide is regularly used during gold processing in Western Australia. However, there are strict regulations and requirements regarding its transport, handling and storage.

“The problem with this product is there is nothing warning users of the dangers,” Mr Dainty said. “Not only is it not environmentally friendly, but it can be extremely dangerous without taking the right precautions.”

Mr Dainty said mining companies should exercise caution when dealing with products from suppliers claiming to have a substitute for sodium cyanide.

“In the cases that have been identified, even the material safety data sheets that came with the samples had conflicting information and stated that the product required no hazardous chemical labelling,” he said.

“The Department recommends that any product claiming to be a substitute for sodium cyanide should be handled as if it contains sodium cyanide until it can be verified otherwise by a reputable testing agency.

“If it sounds too good to be true, chances are it is.”

GUN OWNERS GUIDE TO SAFE AMMUNITION HANDLING

Licensed gun owners should always handle, store and transport black powder, propellant powder and ammunition securely and safely.

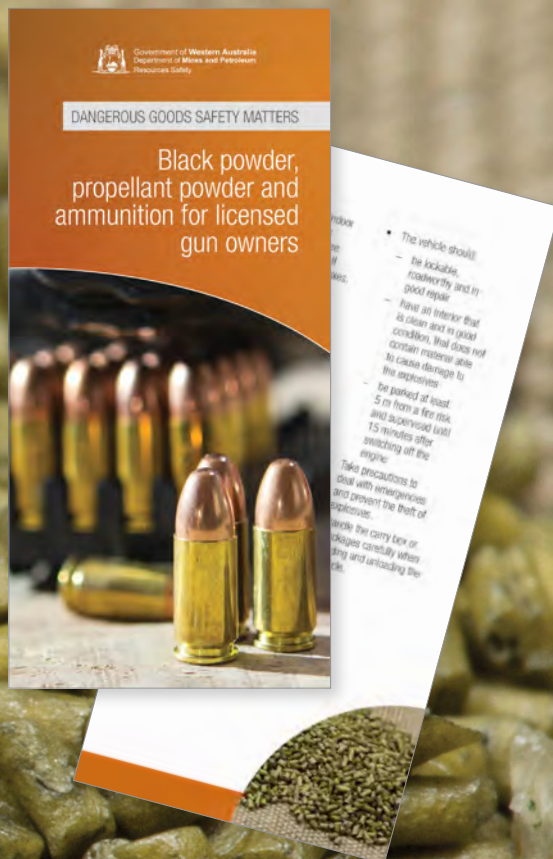
Department of Mines and Petroleum's Director Dangerous Goods and Petroleum Safety Ross Stidolph said an information campaign had been launched highlighting important safety steps for storage, handling and transportation, as well as the legal quantities allowed to be stored and transported by licensed gun owners.

"Licensed gun owners are authorised to possess ammunition under the *Firearms Act 1973*," Mr Stidolph said. "While owners do not require dangerous goods explosive licences for exempt quantities of black powder, propellant powder and ammunition, there is a requirement under dangerous goods legislation to store, handle and transport these goods safely and securely at all times."

Mr Stidolph said the information developed gives important safety requirements and guidance for licensed gun owners.

"The Department also has a team of dangerous goods officers who can provide further information and advice to licensed gun owners."

Further information is available from the Department's website at www.dmp.wa.gov.au — use "ammunition" as the search term. A free pamphlet for gun owners can also be ordered.





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USE OF RECLOSERS ON MINE SITES

Electrical inspectors of mines are still asked if reclosers may be used to control and protect high voltage (HV) electrical equipment and HV overhead distribution powerlines located on mine sites.

Reclosers are self-contained HV switching devices programmed with the logic to trip the line when overcurrents and fault currents are detected, and to re-energize the line by reclosing automatically. If a fault is permanent, the recloser locks open after a preset number of operations (usually between one and four), isolating the faulted section from the healthy part of the system. A short duration fault, such as a bird strike, will usually be cleared after the first trip, allowing the recloser to reclose and restore supply automatically.

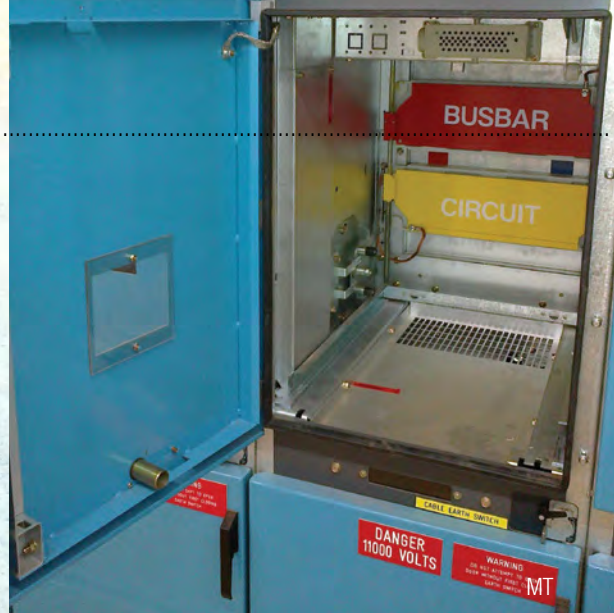
The prohibition on the use of reclosers on mine sites was included in the old SECWA *Electrical Requirements, Part 14 – Mining Installations*. It was included to limit the consequences of mobile machinery contact with overhead power lines. This document has been through several revisions to become the *Western Australian Electrical Requirements (WAER)*, which does not contain a section dealing with mining electrical installations. The prohibition on the use of reclosers on

overhead powerlines located on mine sites has not been continued in any other Western Australian legislation or Australian Standards.

Reclosers are now commonly used to control and protect overhead powerlines on mine sites. In many cases, reclosers are cheaper and more readily available than air break switches or expulsion dropout fuse assemblies. The benefits and advantages of using reclosers, including protection coordination and metering functions, must now be considered when deciding equipment specifications. Reclosers can be particularly useful with overhead powerlines to borefields or other remotely located loads.

Many sites disable the reclose function and select one shot and lockout, effectively using the recloser as a circuit breaker. This is advisable where there is the potential for mobile machinery contact and should be considered in the risk management process.

Also complete a careful and thorough risk evaluation before specifying the use of a recloser to control and protect overhead distribution powerlines in towns or accommodation villages, where a motor vehicle accident could damage power distribution assets.



TAKING CARE WHEN SUSPENDING OPERATIONS

Before a site is placed into open or total suspension (care and maintenance), there are many tasks that need to be undertaken. The following are some of the electrical issues that need to be considered by the site's electrical supervisor.

DRAWINGS, MANUALS, RECORDS AND ELECTRICAL LOG BOOK

- Collect all electrical drawings, records, manuals and the electrical log book and place in secure storage.

PORTABLE TOOLS AND EQUIPMENT

- Collect all portable electrical tools and equipment, attach out-of-service tags and place in secure storage. Note that these must not be returned to service until tested and tagged.

IDENTIFICATION OF CIRCUITS TO REMAIN ENERGISED

Is power required for security lighting, security buildings, boom gates, alarm systems, or pumps?

Is it intended to rotate any machinery during care and maintenance?

- Use single line drawings (SLDs) to identify circuits that are required to remain energised (e.g. autolubrication systems) and the distribution boards from which the circuits originate.

- Consider maintaining power supplies to uninterruptible power supply (UPS) devices to prevent premature battery failure.
- Consider connecting power supplies to programmable logic controller (PLC) and supervisory control and data acquisition (SCADA) systems to prevent program corruption. Back up and securely store PLC and SCADA control programs.
- Identify necessary generator supplies and connection points, and arrange circuits to island equipment as required.

PREPARATION OF ELECTRICAL EQUIPMENT

What needs to be done to prepare equipment for downtime?

- Lift the brush gear from drives incorporating commutators, and place warning signs on terminal boxes.
- Consider energising drive heater circuits, where installed, and place warning signs on terminal boxes.
- Check silica gel breathers on all transformers. Replace or reactivate as necessary.
- Check the insulating oil levels in all transformers, switchgear and circuit breakers. Top up as necessary.
- Where installed, close and lock earthing switches onto unused high voltage (HV) cables.
- Open and lock all air break switches on unused overhead power lines.
- Disable all reclosers on unused overhead power lines.
- Securely lock and weatherproof all substations, motor control centres (MCCs), distribution boards and electrical equipment enclosures.

CABLES

- Where cables are redundant and disconnected, short all active cores together and to earth, and bag or fit heat shrink caps at both ends. Refer to the *Wiring Rules*.

CMD ALLOCATION

- If the site is connected to the South West Interconnected System (SWIS), carefully consider the surrender of the site's contracted maximum demand (CMD) allocation to Western Power Corporation (WPC) as it might not be reinstated if needed later.

REGULATORY ISSUES

- If any circuits and installations remain energised on site, then an electrical supervisor must remain appointed in accordance with regulation 5.10 of the Mines Safety and Inspection Regulations 1995 and section 44 of the *Mines Safety and Inspection Act 1994*.
- If it is intended to perform any electrical installation work while the site is under care and maintenance, consider maintaining the work licence for electrical in house installing and any exemption from submission of notices.

THE WIRING RULES UPDATED

Australian Standard AS/NZS 3000 *Electrical installations* is also known as the Australian/New Zealand Wiring Rules.

The Wiring Rules applies to all of the electrical industry in Australia, including the mining industry. The standard is mandated in Western Australia by regulation 49 of the Electricity (Licensing) Regulations 1991 and regulation 5.3 of the Mines Safety and Inspection Regulations 1995.

The 2007 standard is being revised and will be issued as a new edition, the 13th published since 1931. The draft of the new edition is accessible via the Standards Australia website at www.standards.org.au

The period for public comment closed on 20 June 2016, with feedback considered by Standards Australia Committee EL 1. The new edition will be released in 2017.

Note: Until the new standard is released, the draft must not be used in place of the existing standard AS/NZS 3000:2007. The draft has not yet been mandated by legislation, and it is anticipated that it will not be applied on a mandatory basis for at least six months after publication.

While the new standard retains existing layout of Parts 1 and 2, with both parts bound as one document, it will feature over 200 changes to the 2007 edition, including:

- 30 new definitions
- 92 new clauses
- 247 redefinitions of existing clauses
- nine new diagrams in Section 2
- revised residual-current device (RCD) requirements
- addition of requirements for arc fault detection devices and charging stations for electric vehicles
- removal of one appendix
- six new appendices
- correction of grammatical errors and updated external references.



HOW ADEQUATE ARE YOUR SITE'S STRUCTURES?

Structures require inherent strength to resist gravity, wind, thermal, seismic and other energies. Structural safety is controlled through design, construction and continued maintenance.

When a structure such as buildings, bridges, tanks and supports for equipment fails, large forces are at play and energy is transferred. For those who work in and around these structures, a collapse can result in people being subjected to impact energy greater than 300 Joules (J). Given that people exposed to 300 J of impact energy have about a 98 per cent risk of being fatally injured, it can be seen why structural collapse can result in multiple fatalities. Even when parts of structures fall off, such as during high wind conditions, there is a high probability of the detached part causing a fatal injury if it strikes a person.

When a structure collapses, there is also the potential for the release of secondary energies, increasing the risk of fatal injury. Let's consider the scenario where a processing tank contains an acidic slurry at 100°C. If the tank collapses, people in the vicinity could be exposed to:

- the risk of impact or crush injuries from the collapsing tank or parts thereof
- engulfment (impact and drowning) by the slurry
- burns from the elevated temperature, and secondary infections through the acidic nature of the slurry.

This example highlights why the continuous integrity of all structures is imperative.

RESPONSIBILITIES TOWARDS STRUCTURES

Understanding what constitutes adequate design, construction, use and maintenance is necessary to help prevent the conditions for collapse.

Owners should know:

- if construction of the structure followed a regimented design and construction process, to industry norms and standards
- if construction was done under the guidance of persons competent at structural engineering, or by a pre-approved

method agreed by structural engineers, to assure the adequacy of the final structure

- if adequate examination (or inspection) by competent persons was made during construction and on completion (as agreed between the designer and manufacturer) to confirm the design intent and quality expectations were met
- the limitations of the structure's design, including requirements for maintenance and loading limits of the structure.

Note: These assurances are normally by way of accurate as-built drawings, records of construction quality control and final sign-off by a competent person.

CONTINUED STRUCTURAL STRENGTH

Another consideration for owners is the reduction of strength of a structure through corrosion, degradation, impact damage, or uncontrolled modification. There is an unacceptable and unquantified risk of collapse unless this reduced strength state is assessed by a person competent at structural engineering.

The assessment of a structure's strength to an acceptable norm is called the reliability level. If the standards (e.g. Australian or international) have not been met, calculations can be used to prove the reliability level. Testing methods may also be used, although these are usually relatively expensive compared to an engineering assessment.

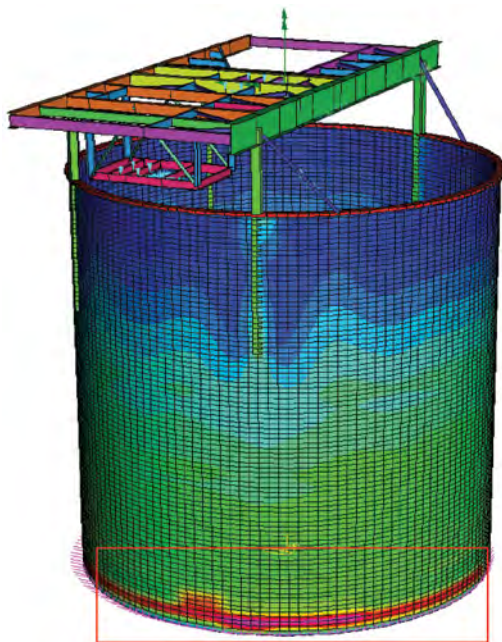
The engineering assessment to prove adequacy should be used if proof cannot be established from existing records (e.g. design, construction, maintenance). The assessment should follow the principles described in AS ISO 13822 *Basis for design of structures – Assessment of existing structures*. This will determine whether the structure has the strength, stability and durability to resist all loading and environmental conditions.

If this cannot be assured, immediate steps should be taken to prevent exposure to harm, followed by remedial steps in a prioritised and timely manner (as advised by competent persons). This is essential to ensure people are not exposed to the risks associated with collapse while the structure is remediated, strengthened, loading lowered, demolished or similar.

CLOSE CALL FOR CIL TANK

During a departmental site inspection, leaks from a carbon-in-leach (CIL) tank were observed. When followed up, the tank was taken offline and underwent immediate repairs.

The second-hand tank had been bought and reused without an adequate structural reliability assessment.



Area of high stress

The diagram shows the results from finite element analysis (FEA) of the CIL tank. The area of over stress (represented by hot colours) is due to unidentified thinning of the tank.

RESOURCES

The following guidance may be useful in helping those with responsibilities towards structures.

- Standards Australia, www.standards.org.au
AS ISO 13822 *Basis for design of structures – Assessment of existing structures*
- Department of Mines and Petroleum, Mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx

Safety alerts

- Mines Safety Bulletin No. 124 *Structural safety of buildings, plant and other structures*
- Mines Safety Bulletin No. 140 *Structural collapse of buildings and temporary structures during wind events*

Toolbox presentations

- *Structural integrity forum – The issues (2015)*
- *Structural integrity forum — practical applications and survey (2015)*
- *Improving hazard awareness – lifting the game (2014)* [slides13-14]

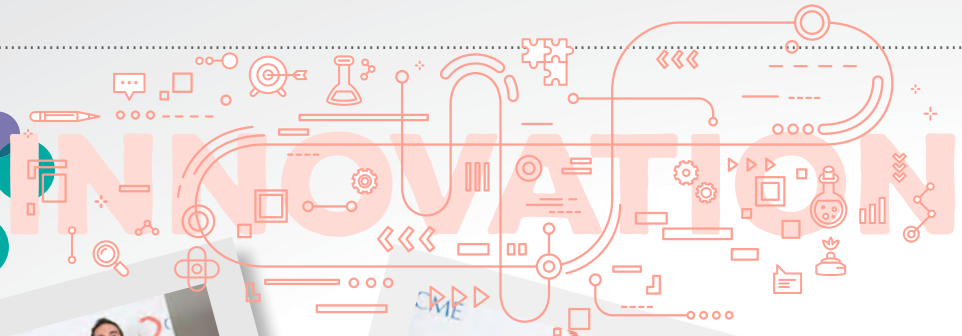
SUB-LEASING AND RENTING STRUCTURES

Owners need to ensure their structures are adequate in all respects on an ongoing basis. An agreement should be made by the parties involved to manage the integrity of a structure when sub-leasing and renting it out. Various models are possible, including:

Owner remains responsible — Owner has an ongoing inspection and maintenance program to ensure structural integrity.

Lessee is responsible — Usually, an assessment is carried out at handover, with any required remediation completed before the lessee undertakes ongoing inspections and a maintenance programme.

Irrespective of the contractual arrangement, the ongoing assessment of the structure is required. This should determine whether environmental and other influences, including neglect, have compromised the original design specifications and build quality to an unacceptable lowered state of integrity.



Barmenco won the Systems category
Photo courtesy CMEWA



Karara Mining Limited took out the Industry Choice Award
Photo courtesy CMEWA

SAFETY AND HEALTH INNOVATION AWARDS 2016



Innovations to reduce airborne contaminants and train staff using virtual reality were among the winners of the 2016 CME Safety and Health Innovation Awards.

The Chamber of Minerals and Energy of Western Australia's awards recognised the use of innovative solutions to health and safety issues within the resources sector. They also support the sharing of innovations developed by industry so those who have similar issues on their sites can improve safety and health.

Chamber Deputy Chief Executive Nicole Roocke congratulated the 2016 winners and finalists who presented their innovations during an industry forum.

"This event promotes the application and sharing of innovation across the Western Australian resources sector, as this is essential to ensuring continuous improvement in safety and health performance," Ms Roocke said.

"These innovations are often developed on the shop floor and championed by the people directly involved on the ground. Our award finalists have demonstrated a strong commitment to improving safety and health through the development of these prototypes and concepts."

2016 CME SAFETY AND HEALTH INNOVATION AWARDS WINNERS

Engineering category

Karara Mining Limited — Micro-mist dust suppression system for primary crusher run-of-mine bin

Systems category

Barmenco — Interactive virtual reality safety training system

People category

Rio Tinto — Improving safety through breakthrough methodology and solutions

Industry Choice Award

Karara Mining Limited — Micro-mist dust suppression system for primary crusher run-of-mine bin



Department of Mines and Petroleum

AWARDS FOR EXCELLENCE

Golden Gecko • Community Partnership • Safety & Health

DMP ACCEPTS THE SAFETY AWARDS BATON

The Department of Mines and Petroleum has taken over hosting duties for the former CME Safety and Health Innovation Awards, which have been added to the Department's 2017 Awards for Excellence.

This year's awards will incorporate three areas recognising excellence in the resources industry. The Safety and Health Resources Sector Awards (Safety Awards) join the prestigious Golden Gecko and Community Partnership Awards, acknowledging innovation, outstanding performance and leadership to ensure that the State's resources are developed in a responsible manner for the benefit of all West Australians.

The Safety Awards recognise individuals, teams and companies that have developed an original solution to specific safety and health problems in the workplace. They aim to promote the application of safety and health innovation across the Western Australian resources sector. This may involve:

- initiatives and leadership by elected safety and health representatives that support the safety, health and wellbeing of the workforce
- in response to specific safety and health challenges
 - implementation or design of a new system or procedures
 - innovation in maintenance, engineering or infrastructure.

Entry is open to all Western Australian resources sector companies and sites, including contractors.

For more information, visit www.dmp.wa.gov.au/safetyawards

COMMUNITY PARTNERSHIP RESOURCES SECTOR AWARD

The Community Partnership Resources Sector Award recognises outstanding achievements and leadership in building constructive community partnerships that provide positive outcomes and promote strong guiding behaviour for industry.

The award publicly recognises partnerships between resource companies and communities that extend beyond the normal obligations and requirements to leave a positive and lasting legacy.

That recognition aims to build the reputation of resources and extractive industry operators that are working closely with communities, or community groups, to understand local concerns and issues, provide constructive outcomes, and leave a positive legacy extending well beyond gaining a social licence to operate.

GOLDEN GECKO AWARDS FOR ENVIRONMENTAL EXCELLENCE

Established in 1992, the Golden Gecko Awards for Environmental Excellence recognise leading practice and innovation in environmental management and provide an opportunity to share experiences between government, industry and the community.

Since the inception of these awards, the department has presented 59 Award recipients and 51 Certificate of Merit acknowledging outstanding contributions to develop Western Australia's resources in a responsible manner.

The awards provide an opportunity to share experiences between the Department, industry and the community, while helping operators build a reputation for being a responsible corporate citizen with a responsible attitude to the environment.



TYC

Gold Fields Combined team participating in the confined space event

COMPETITION RETURNS TO FAMILIAR STOMPING GROUNDS

The 25th anniversary of the Surface Mine Emergency Response Competition in 2016 saw the popular event return to its customary home in Kalgoorlie, the Hannans North Tourist Mine (previously known as the Australian Prospectors and Miners Hall of Fame). Hosted by the Eastern Regional Council of the Chamber of Mineral and Energy of Western Australia (CME), for the previous two years, the annual competition was held at Focus Mineral's Three Mile Hill Operations in Coolgardie.

Over the second weekend in May, seven teams competed in eight challenging 45-minute events and an individual theory assessment. Each event was designed to test their emergency response skills in simulated, yet realistic, emergency situations. This year the organising committee added a new level of difficulty, with competing teams remaining uninformed of their scenarios until 20 minutes before each event.

CME Chief Executive Reg Howard-Smith said recreating the urgency associated with an onsite crisis was the main focus of this year's event.

"Teams did not receive a timetable and were called upon at any stage over the weekend to assemble their equipment and head to an emergency scenario," he said.

Addressing the teams at the welcome evening, Holly Phillips, CME Eastern Region Manager and Kelly Bodman, Chairman of the Mine Rescue Committee, thanked the competing teams for their continued support of the event.

Both Ms Phillips and Mr Bodman agreed that having the competition return to its familiar stomping ground was welcome. Allowing family, friends and the community to share the experience contributed to a strong sense of community support and encouragement. Hearing children ask, "When is daddy coming out?" highlighted the importance of the competition, training and fighting to save lives so that workers can safely return home to their families.

Representatives from the Department of Mines and Petroleum's Resources Safety Division were on hand to provide support for the competition. The Department sponsored the team skills event, provided adjudicators for the competition and event photography as in-kind sponsorship.

The competition pushes teams, which benefits their performance when faced with real-life situations.



TYC

Sandfire Resources team participating in the rope rescue event

ROPES, RAFT AND BABY CRIES

The Team Skills scenario featured various team building exercises with a focus on team collaboration and strong leadership from the captains.

The tasks were based around team members working together and communicating, as well as leadership by the team captains. A big part of this event was testing team members physically and mentally in both timed skill events and a surprise situation.

Tests included individual and team rope knowledge and skills assessment and problem solving skills in the form of building a Leonardo Da Vinci's Bridge. However, the stand-out exercise was a surprise simulated birth, and an associated media crew sent to cover the incident. This added a real challenge for teams as they dealt with the incident and the media at the same time.

Norton Gold Fields was the overall winner, following up on its win at the 2015 Surface Mine Emergency Response Competition. Gold Fields St Ives was the runner up, with Sandfire Resources claiming third place. Wade Leeson from Gold Fields St Ives received the award as overall Best Captain.

In addition to the Best Team Award, Norton Gold Fields won Rope Rescue, Team Skills, Fire Fighting and Overall BA Skills. Team captain Tari Pawlyk also won the Theory Individual award.

Fire Fighting took out the best scenario as voted by competing teams, and First Aid was voted as the Chief Adjudicator's Award for Event Management. The event manager for First Aid said the scenario was based on a significant incident report found on the Department's website.

At the presentation evening, Peter O'Loughlin and James Donnelly gave a short presentation on 25 years of surface mine emergency response competitions: then and now. Another special event was the presentation of the prestigious Harry Steinhauser Award to Mack McCormack of Saferight.

The enthusiasm and sense of pride exuded by the teams and volunteers over the weekend was infectious, and helped make the 25th anniversary competition a great success. Here's to the next 25 years and counting!

MACK MCCORMACK RECEIVES STEINHAUSER AWARD

The Steinhauser Award recognises excellence and commitment to mines rescue and emergency response. Recipients are decided by the Mine Rescue Committee and previous Steinhauser Award recipients. Once a worthy recipient is agreed upon, the award is bestowed at the competition presentation evening.

Mack McCormack received the 2016 award for his height and depth rescue work in the Goldfields since 1992. His roles have included sponsor, adjudicator and providing expertise for mines rescue competitions, nationally and internationally.

Mack championed the removal of restraint products from the Australian Standards and mandated the use of adjustable, energy-absorbing fall protection products. This practice has now been adopted globally as the minimum good practice. Mack also designed and installed the largest and most used fall prevention system in the world – the Sydney Harbour Bridge Climb.

HONOUR BOARD

1st best team	Norton Gold Fields
2nd best team	Gold Fields St Ives
3rd best team	Sandfire Resources
Best captain	Wade Leeson, Gold Fields St Ives
Best new team	Sandfire Resources
Best new captain	Wade Leeson, Gold Fields St Ives
Theory	Gold Fields Combined Team
Theory individual	Tari Pawlyk, Norton Gold Fields
Team skills	Norton Gold Fields
Vehicle extrication	Gold Fields St Ives
HazChem	Gold Fields St Ives
Rope rescue	Norton Gold Fields
Fire fighting	Norton Gold Fields
Confined space rescue	Gold Fields St Ives
First aid	Norton Gold Fields
Team safety	Gold Fields St Ives
Incident management scenario	Tracey Beck, KCGM
Overall BA skills	Norton Gold Fields
Overall first aid	KCGM
Best scenario (voted by competing teams)	Fire Fighting
Chief Adjudicators' award for event management	First Aid

COMPETING TEAMS

BHP Billiton Nickel West Southern Region
 Gold Fields Combined – Agnew Gold / Darlot / Granny
 Smith
 Gold Fields St Ives Lions
 KCGM
 Northern Star Kalgoorlie Operations - Knights
 Norton Gold Fields
 Sandfire Resources

KCGM team participating in the fire fighting event

TYC

2016 SURFACE MINE EMERGENCY RESPONSE COMPETITION

CONFINED SPACE



FIRE FIGHTING



FIRST AID



HAZCHEM



THEORY



TEAM SKILLS



ROPE RESCUE



INCIDENT MANAGEMENT SCENARIO



VEHICLE EXTRICATION



KANOWNA BELLE HOSTS UNDERGROUND COMPETITION

In 2016, the Underground Mine Emergency Response Competition returned to Northern Star Resources' Kanowna Belle decline for the second year running.

Coordinated by the Eastern Regional Council of the Western Australian Chamber of Minerals and Energy (CME), the annual competition brings together emergency response teams from across Western Australia.

Scenarios varied from first aid, to fire fighting and large-scale search and rescue. Organisers developed realistic scenarios, with some recreated from real-life significant incidents reported to the Department of Mines and Petroleum.

Competing teams were tested across an array of emergency response scenarios. The teams were provided with locations and times, but were only briefed on the specifics of the scenario at the very last minute. This helped recreate the experience of responding to a real-life emergency.

During the welcome by the CME, competing teams were thanked for their ongoing support and encouragement of the competition, despite the State's mining industry experiencing economic challenges.

This message was reiterated with numerous teams returning year in and out, and the Western Australian School of Mines (WASM) entering its first mines rescue team.

Representatives from the Department's Resources Safety Division were on hand to provide support for the competition. This year, the Department sponsored Team Safety, which was awarded to AngloGold Ashanti Australia Ltd's Sunrise Dam Operations.

With hundreds of competitors and volunteers on-site during the weekend, Kanowna Belle prepared months in advance. The events required significant planning, preparing each scenario and implementing frames for each incident. The team skills scenario required a light vehicle to be placed upside down on top of a haul truck tray and driven underground. In recreating a realistic search and rescue, the officials simulated the scenario at the deepest depths of the mine, exposing the rescue teams to higher temperatures, steep declines and unconscious casualties.

The scenarios provided the teams with invaluable training opportunities, with teams devoting their physical and mental all to each challenge.

Based on a real-life incident, the first aid event simulated a 'meshing fall', where meshing that was leaning against a wall fell, crushing three workers. The scenario tested each member of the team, who had to apply their first aid skills and reassure the casualties until ambulance services arrived.

Gold Fields St Ives team participating in the fire fighting event



TYC

The winners of the competition were announced at a presentation dinner held at the Goldfields Institute of Technology.

St Barbara Limited took out overall honours for Best Team, with Norton Gold Fields Ltd and Evolution Mining taking second and third place, respectively.

Wade Leeson from Gold Fields Australia Pty Ltd's St Ives Operations was named Best Captain, with the Best New Captain going to Rory McHarrie from Northern Star Resources' Kalgoorlie Operations.

Mines inspector and event adjudicator Peter O'Loughlin said the weekend was a great success with event managers, competition teams and volunteers working tirelessly over the weekend.

"It was particularly pleasing to see most teams win an event," Mr O'Loughlin said.

"We also saw a 50 per cent increase in competing teams compared to last year, including a student team from the Western Australian School of Mines. The student team performed remarkably well, including achieving a second place in Search and Rescue."

STUDENT TEAM ENTERS THE RANKS

WASM's Incident Control Manager (ICM), Daniella Jaen Sevilla, was completing vacation work at Northern Star Resources' Kundana Mine when a member of the CME Mine Rescue Committee, Tim Campbell, presented on emergency response. This ignited the idea and passion to enter the very first WASM team into the Goldfields underground competition.

WASM had a well thought out and executed selection criteria, which required numerous levels of fitness testing. Daniella said the toughest part wasn't the physical labour, but training with minimal resources. Luckily for WASM, RECEO, which is a safety and emergency management consultancy, came to the rescue offering them much needed support.

November 2015 through to July 2016 comprised a stringent training schedule and plenty of paperwork, readying the team to face the elite groups that compete

in the Goldfields Underground Emergency Response Competition.

The WASM team consisted of university students with a variety of skills and backgrounds, with one student being an ex-army professional. For some, the competition was their first time underground. For others it was an opportunity to build on their knowledge. Daniella volunteered at the earlier 2016 Surface Emergency Response Competition, gaining an idea of what the team might experience.

WASM experienced difficulties during the lead-up to the competition, with last-minute changes to timetables and approvals to compete not granted minimising opportunities for practice. None-the-less, WASM hit the ground running, gaining invaluable experience for students completing their university degrees. Daniella said the competition provided students with a unique opportunity to gain invaluable experience and exposure to the industry, better preparing them for when they graduate and enter the workforce.

WASM team participating in the search and rescue event

TYC



HONOUR BOARD

1st best team	St Barbara Limited
2nd best team	Norton Gold Fields
3rd best team	Evolution Mining
Best captain	Wade Leeson, Gold Fields Australia, St Ives Operations
Best new team	Northern Star Resources, Kalgoorlie Operations
Best new captain	Rory McHarrie, Northern Star Resources, Kalgoorlie Operations
Theory	AngloGold Ashanti Australia
Theory individual	Helen Wood, AngloGold Ashanti Australia
Team skills	BHP Billiton Nickel West
Breathing apparatus (BA) skills	Northern Star Resources, Kalgoorlie Operations
Search and rescue	St Barbara Limited
Rope rescue	AngloGold Ashanti Australia
Fire fighting	Newcrest Mining
First aid	Agnew Gold Mine
Team safety	AngloGold Ashanti Australia
Incident management scenario	Stasi Capsanis, Northern Star Resources, Kalgoorlie Operations
Overall BA skills	Norton Gold Fields
Overall first aid	Norton Gold Fields

COMPETING TEAMS

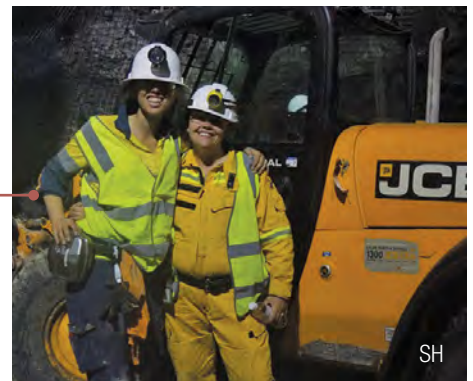
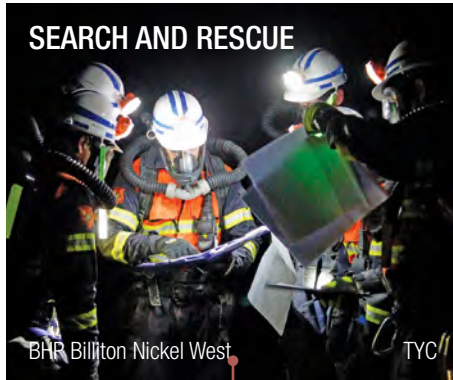
AngloGold Ashanti Australia Ltd, Sunrise Dam Operations
BHP Billiton Nickel West, Northern Operations
Evolution Mining, Mungari Operations
Gold Fields Australia Pty Ltd, Agnew Gold Mine
Gold Fields Australia Pty Ltd, St Ives Operations
KCGM
Newcrest Mining Limited, Telfer Operations
Northern Star Resources, All Stars
Northern Star Resources, Kalgoorlie Operations
Norton Gold Fields Ltd
St Barbara Limited, Leonora Operations
Western Australian School of Mines

St Barbara team participating in the rope rescue event

TYC



2016 UNDERGROUND MINE EMERGENCY RESPONSE COMPETITION





*The Synergy team with MERC chief adjudicators and event managers
Photo courtesy MERC*

EMERGENCY RESPONSE AT LANGLEY PARK

The weekend of 26 and 27 November saw nine teams from across the State compete at Langley Park to showcase their emergency response skills as part of the 2016 Mining Emergency Response Competition (MERC).

Battling hot weather and fierce competition across seven realistic scenarios, the team from Synergy Muja Power Station took out top honours as best overall team. They were closely followed by the team from Rio Tinto Iron Ore in second place and Rio Tinto Argyle Diamonds in third.

MERC aims to improve emergency preparedness by exposing competitors to realistic emergency response scenarios. It also helps highlight the dedication of emergency rescue volunteers to the wider community. Teams are made up of a combination of volunteer emergency response members and full-time emergency service officers.

Each team was tested on a range of emergency and rescue disciplines including first aid, hazmat, road crash rescue, confined space, vertical rescue, fire fighting and team readiness.



IMPORTANCE OF REGULAR TRAINING

It is critical for sites to develop and maintain the skills and training needed to respond to real-life emergencies as these can occur at any time.

The Department of Mines and Petroleum strongly supports mine rescue competitions as one way for mine sites to assess or audit their emergency response capabilities. However, it is important that sites are committed to appropriate training throughout the year, not only in the lead up to a competition.

The Department encourages mining companies to commit to emergency preparedness throughout the year — not just when competitions are being held.

WHAT IS MERC?

The annual Mining Emergency Response Competition (MERC) commenced in 2011 and aims to improve the scope of learning through skills training and exposure to realistic scenarios performed under pressure.

MERC showcases the skills involved to ensure safe workplaces and communities around Australia in the case of an emergency. MERC also provides the opportunity for mining families and the general public to get an insight into how these teams work in real life emergency situations.

BHP Billiton Nickel West participating in the ERT readiness scenario

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COMPETING TEAMS

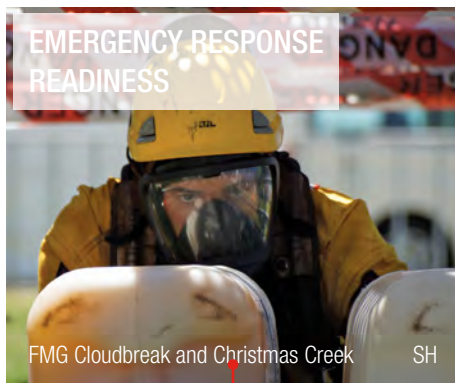
BHP Billiton Nickel West Northern Operations
 FMG Cloudbreak & Christmas Creek
 FMG Hedland
 FMG Solomon
 Karara Mining
 Newmont Boddington Gold
 Rio Tinto Argyle Diamonds
 Rio Tinto Iron Ore
 Synergy Muja Power Station

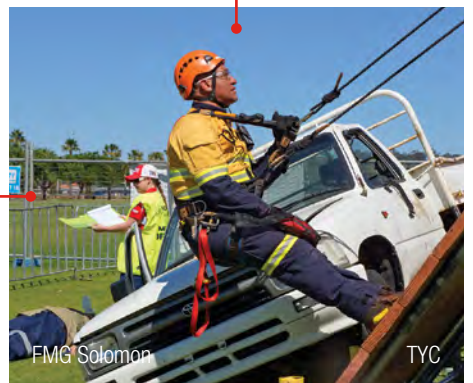
HONOUR BOARD

Overall first place	Synergy Muja Power Station
Overall second place	Rio Tinto Iron Ore
Overall third place	Rio Tinto Argyle Diamonds
Best captain	Justin Burns, Synergy Muja Power Station
Overall first aid	Synergy Muja Power Station
Outstanding medic	Lia Kristovskis, Rio Tinto Argyle Diamonds
Overall team safety	Synergy Muja Power Station
Overall breathing apparatus (BA) skills	BHP Nickel West
Road crash scenario	Rio Tinto Argyle Diamonds
Hazardous materials and BA scenario	Newmont Boddington Gold
Vertical rescue scenario	Rio Tinto Argyle Diamonds
Fire fighting scenario	Synergy Muja Power Station
Confined space scenario	Synergy Muja Power Station
First aid scenario	Rio Tinto Argyle Diamonds
Emergency response team readiness	FMG Cloudbreak and Christmas Creek
Outstanding volunteer	Mark Pannewig and Jude Crossley

FMG Cloudbreak and Christmas Creek team participating in the road crash scenario

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MINES SAFETY

The following court cases have been concluded since the last issue of *Resources Safety Matters* in February 2016.

COMPANY FINED FOR INJURY AT SHIP LOADING FACILITY IN 2011 [SENTENCED JUNE 2016]

The Pilbara Infrastructure Pty Ltd (TPI), a subsidiary of Fortescue Metals Group LTD, was fined \$50,000 in Perth Magistrates Court following an incident that seriously injured a worker at FMG's Anderson Point iron ore ship loading facility.

The company was charged under sections 21(2)(a)(i) and 21A(3) of the *Occupational Safety and Health Act 1984 (WA)*.

Bevan Coutts worked for maintenance company Inline Engineering Services Pty Ltd that had been contracted by TPI to carry out work during a three-day shutdown in July 2011.

Mr Coutts was working on a train unloader indexer, part of a machine used to automatically unload iron ore from ore cars and onto a conveyor belt, when he was caught by the indexer arm.

His left leg was immediately amputated below the knee and his right leg was crushed between the 14-tonne indexer arm and fixed steelwork.

Mr Coutts was later transferred to Royal Perth Hospital where his right leg was deemed unsalvageable and was amputated below the knee.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said investigations found the combination of the design of the indexer and the fact it had not been mechanically isolated contributed to the incident.

"The indexer had been electrically isolated during work prior to the shutdown, but mechanical isolation had not been done," Mr Chaplyn said.

"The risk of uncontrolled movement of the indexer had not been factored into the Job Hazard Assessment and the work

crew conducting maintenance presumed the indexer had been electrically and mechanically isolated."

The indexer arm was positioned on an angle which created a risk of uncontrolled movement.

"The safety of members of the Inline work crew was seriously jeopardised. The physical and psychological impact of this incident on the work crew and their families, particularly Mr Coutts, provide a tragic reminder of the importance of safety in our mining industry," Mr Chaplyn said.

Mr Chaplyn said the Department worked closely with WorkSafe during its investigation and in bringing charges against TPI.

"The close collaboration with WorkSafe has been critical throughout the investigation process and in identifying charges under the *Occupational Safety and Health Act 1984 (WA)*," he said.

SENTENCE FOR 2013 ARC FLASH INCIDENT PROMPTS SAFETY REMINDER [JULY 2016]

In July 2016, Crushing Services International Pty Ltd was fined \$60,000 following an arc flash incident at Atlas Iron's Wodgina iron ore project in the Pilbara.

On 9 November 2013, CSI electrician Daniel Blaess was replacing components within a switch room at the mine when an arc flash occurred.

The company pleaded guilty to exposing an employee to a hazard and was sentenced in South Hedland Magistrates Court.

In delivering her verdict, Magistrate Michelle Ridley said there was no safe work procedure enforced by the company, a lack of supervision, and insufficient isolation and maintenance.

"The accused submitted that it had a comprehensive safety management system and it provided the court with copies of the safety management plan it says was in place at the time of the incident," Magistrate Ridley said.

"However, merely having the management plan in place is irrelevant if it is not enforced by the employer on a day to day basis."

Magistrate Ridley said the offence and other breaches by the company suggested that “the policies and procedures were not enforced to the required standard, if at all” and was critical of the supervision provided by the company.

“The accused did not provide an electrical supervisor themselves and did not utilise other electrical supervisors who were on the site and employed by other companies,” she said.

“The lack of supervision necessarily results directly in poor work practices being adopted by less experienced employees and an overall failure to enforce the safety plans.”

Magistrate Ridley was also critical of the company’s isolation and maintenance of electrical equipment, and said the risk of death and injury “was reasonably foreseeable”.

“The injury to the victim could easily have been avoided altogether in this case,” she said.

Magistrate Ridley said that “the safety of employees in the workplace is and must always be a paramount consideration of all employers”.

“That is particularly so in industries which are inherently dangerous, such as electrical and mining industries,” she said.

Following the sentence, Mines Safety Director and State Mining Engineer Andrew Chaplyn reminded companies that it is “extremely important to ensure that there is sufficient and effective supervision for the installation, maintenance and testing of electrical equipment at mine sites”.

“Proper electrical supervision is critical in reducing electrical risks,” he said.

Mr Chaplyn said Mr Blaess suffered serious burns from the incident and could have been killed.

“This incident had the potential to kill and is a stark reminder of the importance of electrical safety across mining operations,” he said.

FATAL CRUSHING INCIDENT IN 2015 RESULTS IN FINE [SEPTEMBER 2016]

X O W Nominees Pty Ltd, which trades as Rod Mitchell's Transport and Exploration Services, was fined \$110,000 in Perth Magistrates Court in relation to an incident that fatally crushed an employee on 20 January 2015.

The fine was reduced by 25 per cent following an early guilty plea by the company.

Heavy duty mechanic Philip Kitching was carrying out maintenance work on a bulldozer at the Woodie Woodie manganese mine site in the East Pilbara when he was crushed by the bulldozer's belly plate.

An investigation by the Department of Mines and Petroleum found the dozer had modifications, damage and missing parts that contributed to the incident.

The dozer's belly plate was designed to be secured by a total of 13 bolts (six on the left-hand-side and seven on the right-hand-side).

When Mr Kitching started work on the dozer there were a total of five bolts securing the belly plate (three bolts on the left-hand-side and two bolts on the right-hand-side). Only one of those bolts was a standard original equipment manufacturer (OEM) specified bolt.

Two bolts were longer than the OEM specifications and another two were improvised, non-metric bolts that were too short.

A hinge plate, which ordinarily would offer protection from accidental release of the belly plate, was damaged and inoperable.

The underside of the dozer was heavily caked in mud and would have obscured the damage to the hinge, modifications and missing bolts from Mr Kitching while he worked on the dozer.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said the company had no record or report of the damage or modifications to the dozer.

"The company's own policies required employees to record and report any damage to plant or equipment," Mr Chaplyn said.

"A lack of adequate supervision and failure to conduct a formal risk assessment for the job also contributed to this incident.

"This incident should not have occurred and provides a tragic reminder of what can happen when safety is not given the priority it deserves."

COMPANY FINED FOR SERIOUS INJURY FROM UNDERGROUND ROCKFALL IN 2013 [OCTOBER 2016]

Evolution Mining, formerly La Mancha Resources, was fined \$95,000 following an incident that seriously injured a worker in 2013.

Benedict Wydra was working at the company's Frog's Leg gold mine on 20 March 2013 when he was struck by falling rocks.

Employed as a heavy duty fitter, Mr Wydra was working underground on a jumbo drill rig in an area where ground support was being installed.

The area directly above Mr Wydra was only partially supported and there was no indication of where full ground support finished.

Mr Wydra was caught underneath a rock fall that caused multiple crush injuries to both of his lower legs, including serious fractures to his right leg.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said the risk of rock fall and the requirement to only work under supported ground were well known in underground mining.

"Rock falls are a major hazard in underground mining and have the potential to be catastrophic," Mr Chaplyn said.

"In this particular incident, Mr Wydra suffered serious injuries and could easily have been killed."

Since the incident, the company has revised its policy and procedures for installing ground support and ensuring unsupported ground is clearly identified.

"The Department's investigation also identified that Mr Wydra was not adequately trained or given sufficient information to be able to identify whether or not it was safe to work in that section of the ore drive," Mr Chaplyn said.

"To the untrained eye, the ground appeared to be supported."

Mr Chaplyn said the incident was a reminder of the risks from rock fall and for all underground operations to ensure relevant policies and procedures are in place and that workers are appropriately trained.

The company entered a plea of guilty at the first opportunity and this was taken into account in the sentence handed down.

FATALITY FROM UNDERGROUND ROCKFALL IN 2015 RESULTS IN FINE [NOVEMBER 2016]

Nifty Copper (a subsidiary of Aditya Birla Minerals Ltd, formerly known as Birla Nifty) was fined \$60,000 in the Perth Magistrates Court in relation to an incident that killed an underground worker in 2015 at the company's Nifty Copper Mine in the Pilbara.

Adam Hardaker, who was a load-haul-dump (bogger) operator at the mine, was struck and killed by a 1,000 kg rock on 11 May 2015.

The 46-year-old was working underground to clear ore that had been blasted in the stope as a part of mining operations, a process also known as "bogging out".

Mr Hardaker had been using a hose to spray water onto the blasted rocks in order to remove blockages and encourage the flow of rocks for easier removal from the draw point.

This required him to be outside of his vehicle and placed him in an extremely vulnerable position in the event of a rock fall in the stope.

After failing to return to the surface at the end of his shift, Mr Hardaker was found deceased by his co-workers.

Following an investigation by the Department of Mines and Petroleum, the company admitted that its failure to implement a safe system of work, which exposed workers to rock fall hazards in the mine, ultimately led to Mr Hardaker's death.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said Mr Hardaker's death should not have happened.

"The company had a number of easily implementable safety measures which should have been used in the area where Mr Hardaker was working," Mr Chaplyn said.

"This included using one of the company's remote control bidders in the area, the construction of a safety bund and enforcing strict exclusion zones around the area until a safety bund was in place."

"The company's failure to implement safe systems of work directly led to Mr Hardaker being exposed to serious known safety risks and resulted in his death."

Following Mr Hardaker's death, the company updated its procedures to include strict exclusion zones until safety bunds were in place.

The company entered an early guilty plea which was taken into account by the court.

Following careful consideration, the Department decided not to appeal the fine given to Nifty Copper Pty Ltd.

FINE FOR 2012 BALL MILL INCIDENT THAT SERIOUSLY INJURED WORKER [DECEMBER 2016]

DKMSPP Pty Ltd, formerly operating as TME, was fined \$65,000 in Perth Magistrates Court following an incident that seriously injured a worker at Newmont's Boddington Gold Mine in 2012.

The company had been contracted to reline the ball mills used to process ore at the Boddington mine.

On 11 July 2012, Francois Mostert was working with the day shift crew to reline Ball Mill 3.

He was preparing to remove two unsecured liner plates from inside the ball mill when the top liner plate dislodged and fell onto him.

Mr Mostert was trapped underneath the liner plate, which weighed about 1,450 kg, and had to be rescued.

He was taken by ambulance to Boddington Hospital, before he was stabilised and flown to Royal Perth Hospital for further treatment.

Mr Mostert sustained extensive injuries, including compound leg fractures, fractured vertebra and crush injuries to his chest. He was discharged from hospital on 8 October 2012, almost three months after the incident.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said the incident could have been fatal.

"While a number of safe work procedures had been developed for work tasks related to relining the mill, none of them addressed the removal of stuck liner plates," Mr Chaplyn said.

"The unsecured liners had been identified as a hazard, but they were not included in any job safety analysis and there were no barriers keeping the work crew out of the line of fire if one of the unsecured liners fell."

Mr Chaplyn said the Department's investigation identified inadequate training and procedures as contributing to the incident.

"This incident has resulted in life-changing consequences, not just for Mr Mostert, but also for his family, friends and co-workers," Mr Chaplyn said.

"It serves as a reminder of why safety must always be our highest priority."

COMPANY FINED FOR TANK RUPTURE IN 2014 [JANUARY 2017]

First Quantum Minerals (FQM) Australia Nickel Pty Ltd was fined \$40,000 in Kalgoorlie Magistrates Court in relation to an incident on 14 December 2014 when a ruptured tank

spilled about two million litres of sulphuric acid slurry at the company's Ravensthorpe Nickel Operation.

The release of slurry destroyed infrastructure, including critical electrical equipment which cut the power supply to the entire site.

Three employees, who were working in a control room about 50 metres from the tank, were initially trapped by the wave of slurry. They eventually escaped without injury.

The tank which ruptured, tank 9, was one of a number of tanks used in the nickel extraction process, which constituted an atmospheric leach circuit.

In February 2010, FQM acquired the Ravensthorpe Nickel Operation and commenced the start-up process.

By May 2012, tanks in the circuit required repairs due to holes appearing in the outer steel shell. FQM adopted a repair method involving epoxy resin injection and welding patches to the outer shell.

On 30 September 2014, FQM identified a number of holes in the outer steel shell of tank 9 that required repair work.

At the time of the catastrophic rupture, holes in tank 9 had remained unrepaired for two-and-a-half months.

Acid slurry escaped the tank and flowed down the exterior of tank 9, corroding the outer steel shell and resulting in the catastrophic rupture of the tank.

Mines Safety Director and State Mining Engineer Andrew Chaplyn said the company was aware of the need for regular inspections and repairs of the tanks in its atmospheric leach circuit, and the risks if those repairs weren't done.

"Its failure to carry out an effective maintenance program led to the catastrophic failure of this tank," Mr Chaplyn said.

"The event had the potential to seriously injure or kill workers in the vicinity of the tank and was entirely preventable."

The company was charged with failing to provide a safe working environment and pleaded guilty in August 2016.

The court took into account the company's early guilty plea in handing down its sentence.

DANGEROUS GOODS

HIGH COST FOR ILLEGAL FIREWORKS

If not handled correctly, fireworks can cause serious damage to property, significant personal injury or death.

The Department of Mines and Petroleum issued a reminder following the deaths of two men, a number of significant injuries and 35 fires in the Eastern States – all the result of the improper use of fireworks during New Year's Eve celebrations.

Dangerous Goods Team Leader Erin James said it is illegal to possess and use fireworks in Western Australia without the appropriate licence.

"Since January 2012, over 150 people and companies have been charged with fireworks offences in Western Australia," Miss James said

"While there were no injuries involving fireworks reported during New Year's Eve celebrations in WA, there were three significant incidents where illegal fireworks and flares caused bushfires.

"These tragedies, paired with the recent extreme temperatures and fires, are warnings to leave the pyrotechnics to the professionals.

"If you are in possession of fireworks or know someone who is, please don't put yourself or your family at risk. Don't touch them – please call the police."

The Department's dangerous goods officers monitor fireworks events to ensure approved displays are conducted safely.

"These displays are set up and run by trained professionals who understand the associated risks and put appropriate controls in place," Miss James said.

Such events are established in conjunction with local councils, police, and fire and emergency services to ensure contingency plans are in place to protect the public.

During total fire bans, licensed operators must apply for an exemption from the Department of Fire and Emergency Services.

Information on storage, transport and handling of fireworks, as well as a list of approved fireworks events, can be found on the Department of Mines and Petroleum website.

Note: While the Department regulates fireworks displays, it does not manage the events. For information regarding specific events, please contact the event organiser.



SAFETY PERFORMANCE DATA RELEASED

Late last year, the Department of Mines and Petroleum released its *Safety Performance in the Western Australian Mineral Industry: Accident and Injury Statistics* report for the 2015-16 financial year.

The annual report includes information on:

- fatal accidents
- serious injuries
- lost time injuries
- workers' compensation premiums
- injuries by commodities
- restricted work (disabling) injuries

associated with mining and exploration activities.

There were four fatal accidents in the Western Australian mineral industry during 2015-16. Of these three were on mining operations and one in a mining-related refinery. While there has been an overall decrease in the number of fatalities

per thousand workers over the last 20 years, the rate of improvement has slowed in recent years.

State Mining Engineer and Director Mines Safety, Andrew Chaplyn, said the data was a reminder that people are still being killed or injured while working in Western Australia's mining industry.

"While safety is improving compared to a decade ago, we cannot and should not accept the current number of injuries and fatalities," Mr Chaplyn said.

"Providing safe systems of work and applying appropriate risk management must be given the highest priority on mining operations. A momentary lapse in applying risk controls can be punished with life-changing consequences. Not just for the victim, but also for the victim's family, friends and co-workers.

"We must learn from these tragedies and do everything we can to avoid them being repeated."

To view the full report, visit the mining publications section at www.dmp.wa.gov.au/ResourcesSafety



HAZARD MANUAL TASKS – ARE WE DOING ENOUGH TO REDUCE INJURIES?

Hazardous manual tasks are recognised as a major occupational safety and health risk for the Western Australian mining industry. Injuries from performing hazardous manual tasks are collectively referred to as musculoskeletal disorders, and mostly take the form of sprains and strains.

They account for just over a third of all reported accidents in Western Australian mining workplaces over the last 11 years (Figure 1). The most frequently injured occupations continue to be those involving processing plants (20% in 2015-16), working as fitters (17%), and driving on the surface (11%).

To track the performance of the Department of Mines and Petroleum's campaign to raise awareness of this significant issue, injury data over the 11-year period has been analysed to determine changes over time.

In 2007-08, after a significant spike in the incidence of musculoskeletal injuries, the Department contracted an

ergonomist to help better understand hazardous manual tasks and their contribution to musculoskeletal disorders. The scoping study aimed to establish and identify, for the Western Australian mining industry:

- the extent of musculoskeletal injuries
- the cost of hazardous manual tasks
- priority areas for the regulator and industry.

In 2008-09, as a result of this study, the Department released information sheets aimed at raising awareness for manual tasks and the management of that risk. These focused on eliminating risk factors through a participative approach, rather than simply instructing people to “bend their knees when lifting”. The initial release was well received by industry, and a decline in the incidence rate (injuries per 1,000 employees) for musculoskeletal disorders was observed (Figure 2). To gain a deeper understanding of how and which body parts were being injured during manual tasks, industry was encouraged to actively report all incidents and focus on the risk factors.

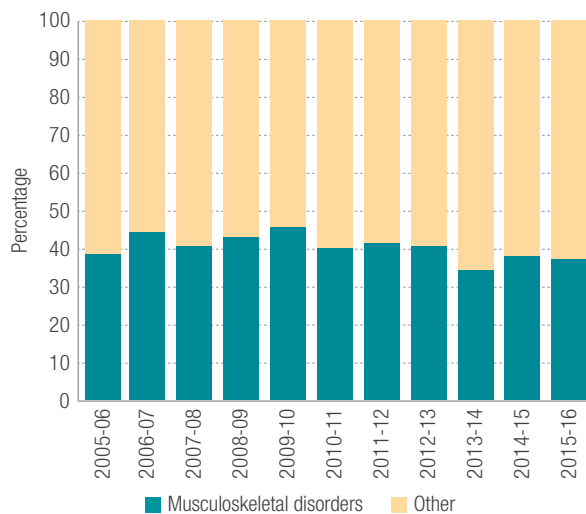


Figure 1 Total musculoskeletal disorders as a percentage of all injuries

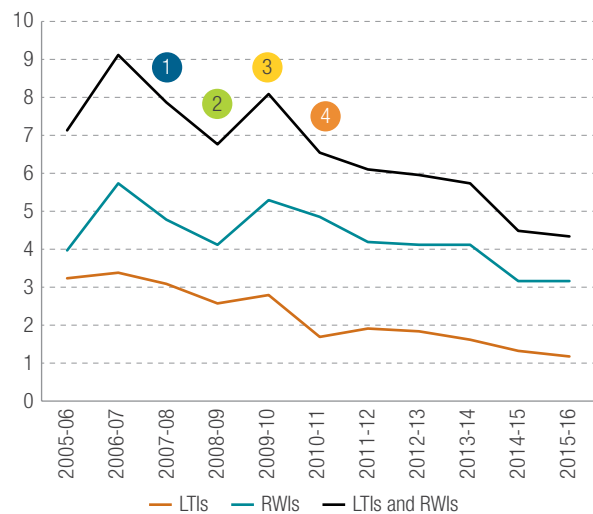
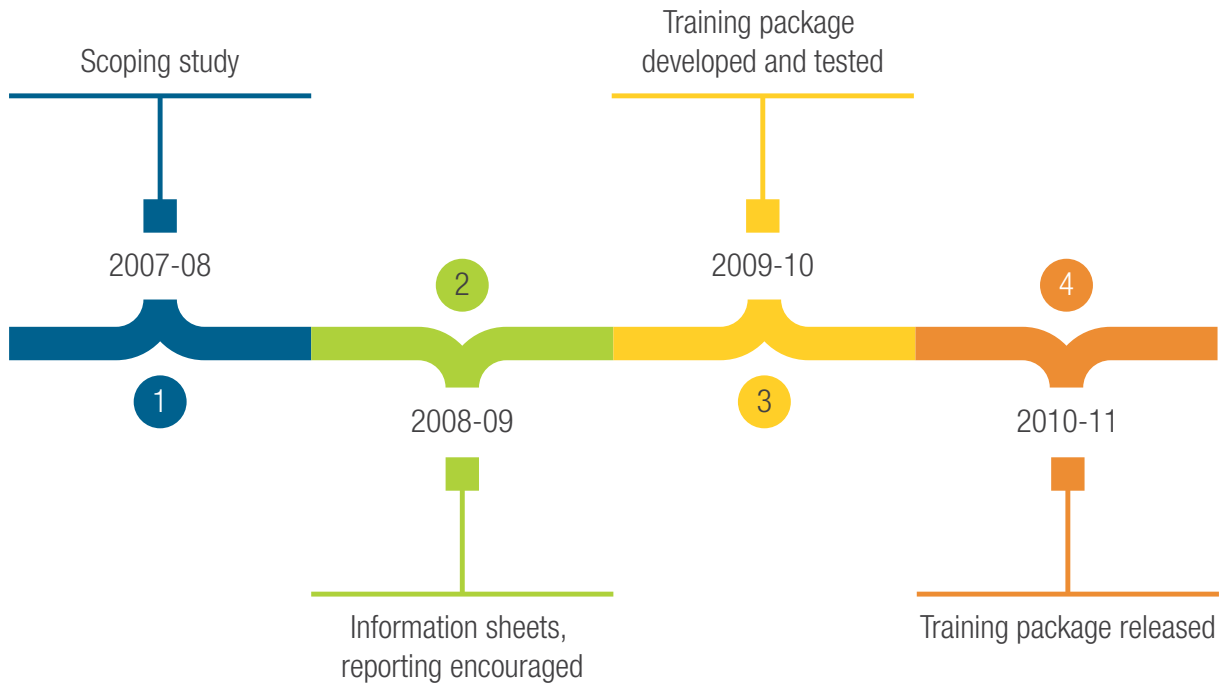


Figure 2 Musculoskeletal injuries per 1,000 employees
LTIs = Lost time injuries
RWIs = Restricted work injuries



Since then, the total number of musculoskeletal injuries, as well as the incidence rate, has reduced over time. Figure 2 also highlights the timing of departmental activities in relation to the downward trend, including the development and testing of a training package (2009-10) and its release (2010-11) during Mines Safety Roadshows.

Industry has developed a variety of initiatives to minimise the incidence and severity of back injuries. These efforts are reflected in the data, with a significant reduction in back injuries over time.

While the number of injuries may have changed over the 11-year period, the affected body parts have remained consistent, with backs and shoulders being the most commonly injured parts of the body while performing manual tasks (Figure 3).

The shoulder is complex. Its joints move in more directions than any other body part and are, therefore, prone to injury. The flattening trend of incidence rates relating to injured shoulders suggests that more could be done in this area.

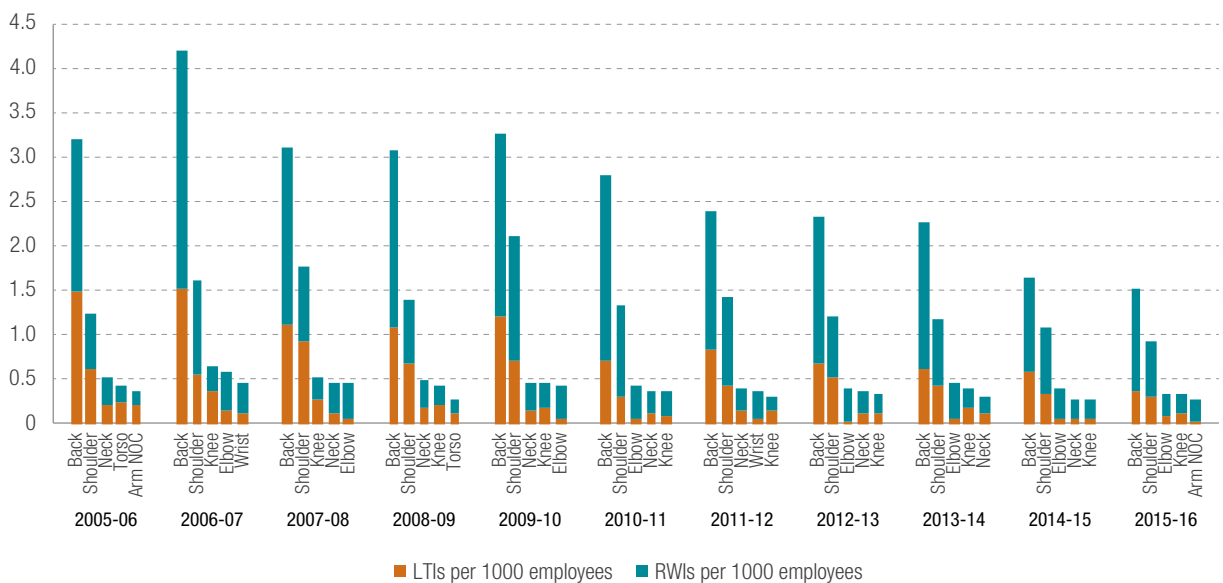
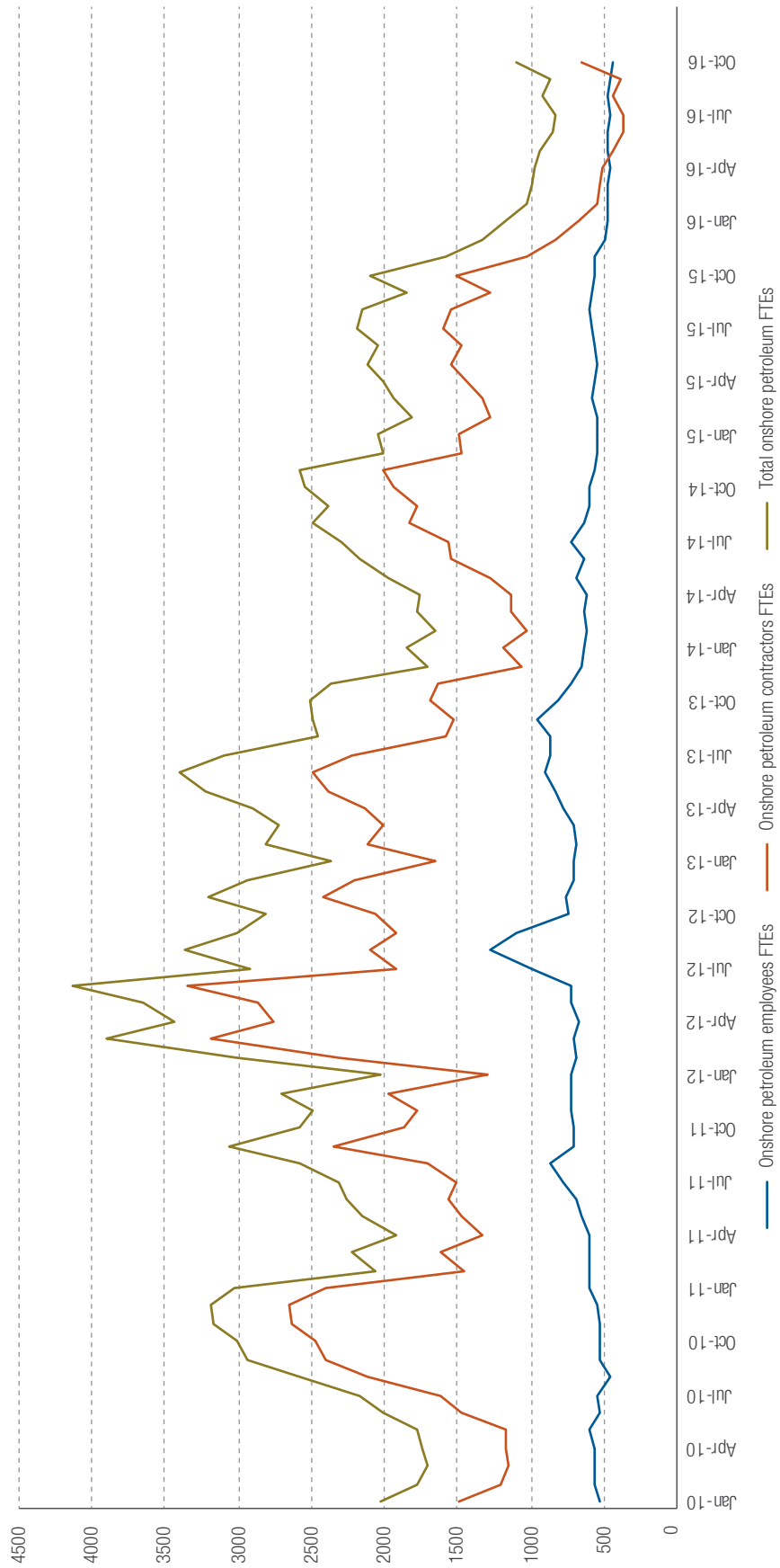


Figure 3 Manual handling musculoskeletal injuries per 1,000 employees for the five most frequently injured parts of the body

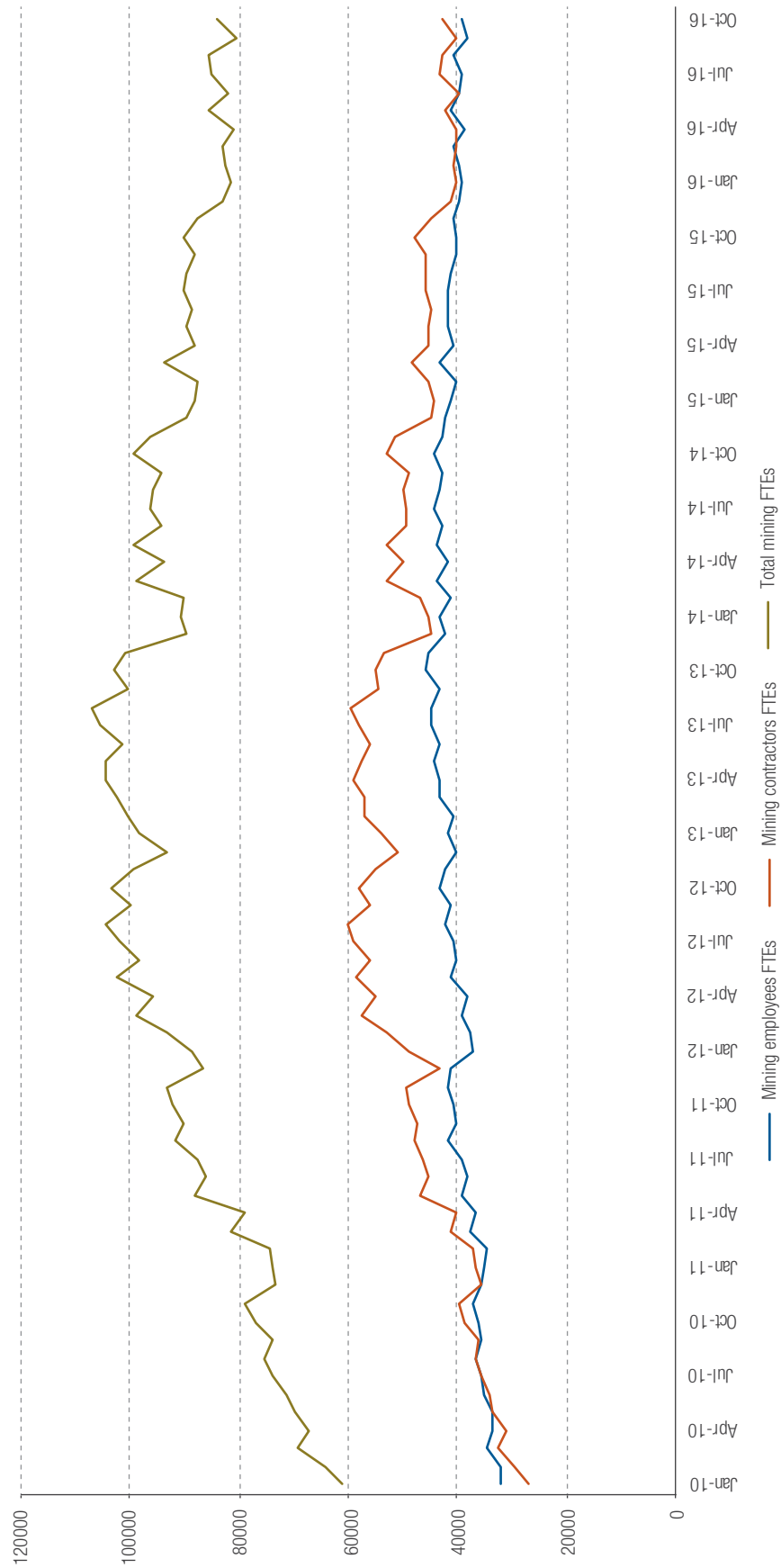
WA'S MONTHLY ONSHORE PETROLEUM WORKFORCE (OCTOBER 2016)

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

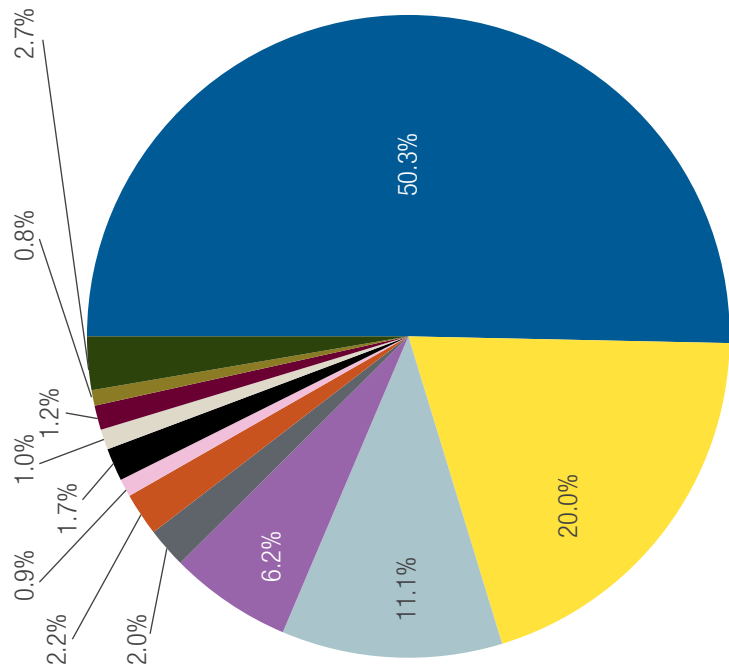


WA'S MONTHLY MINING WORKFORCE (OCTOBER 2016)

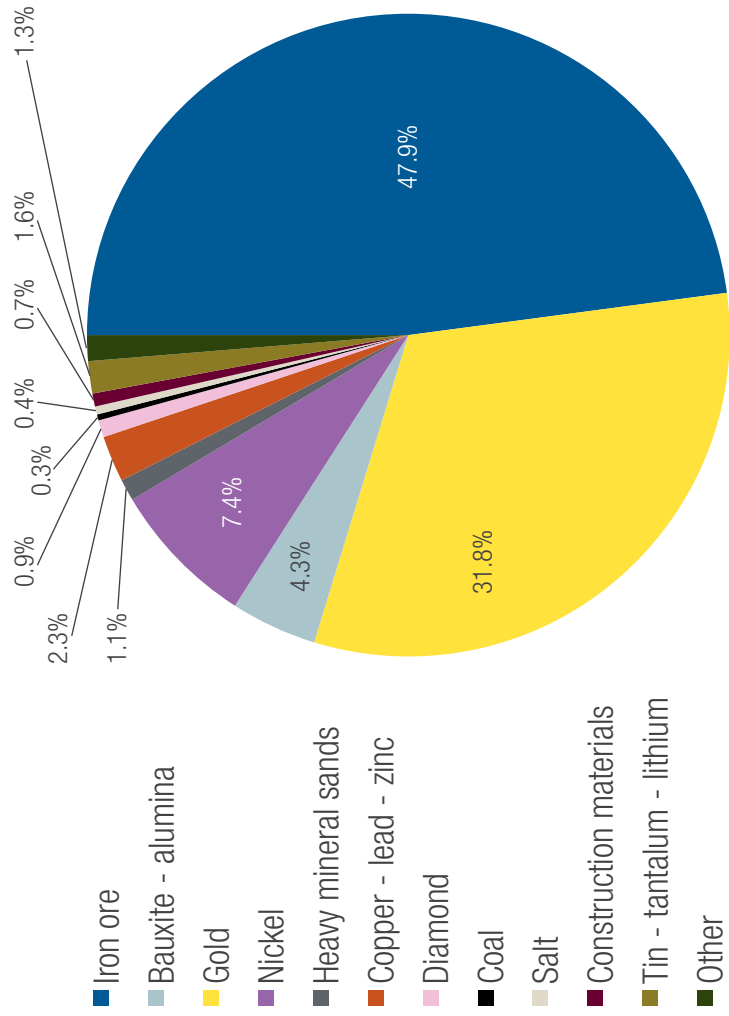
NOTE: From 1 July 2009, monthly mining workforce figures are plotted as full-time equivalent (FTE), where 1 FTE = 2,000 hours worked per year



WA'S MINING WORKFORCE – PERCENTAGE BY COMMODITY (OCTOBER 2016)



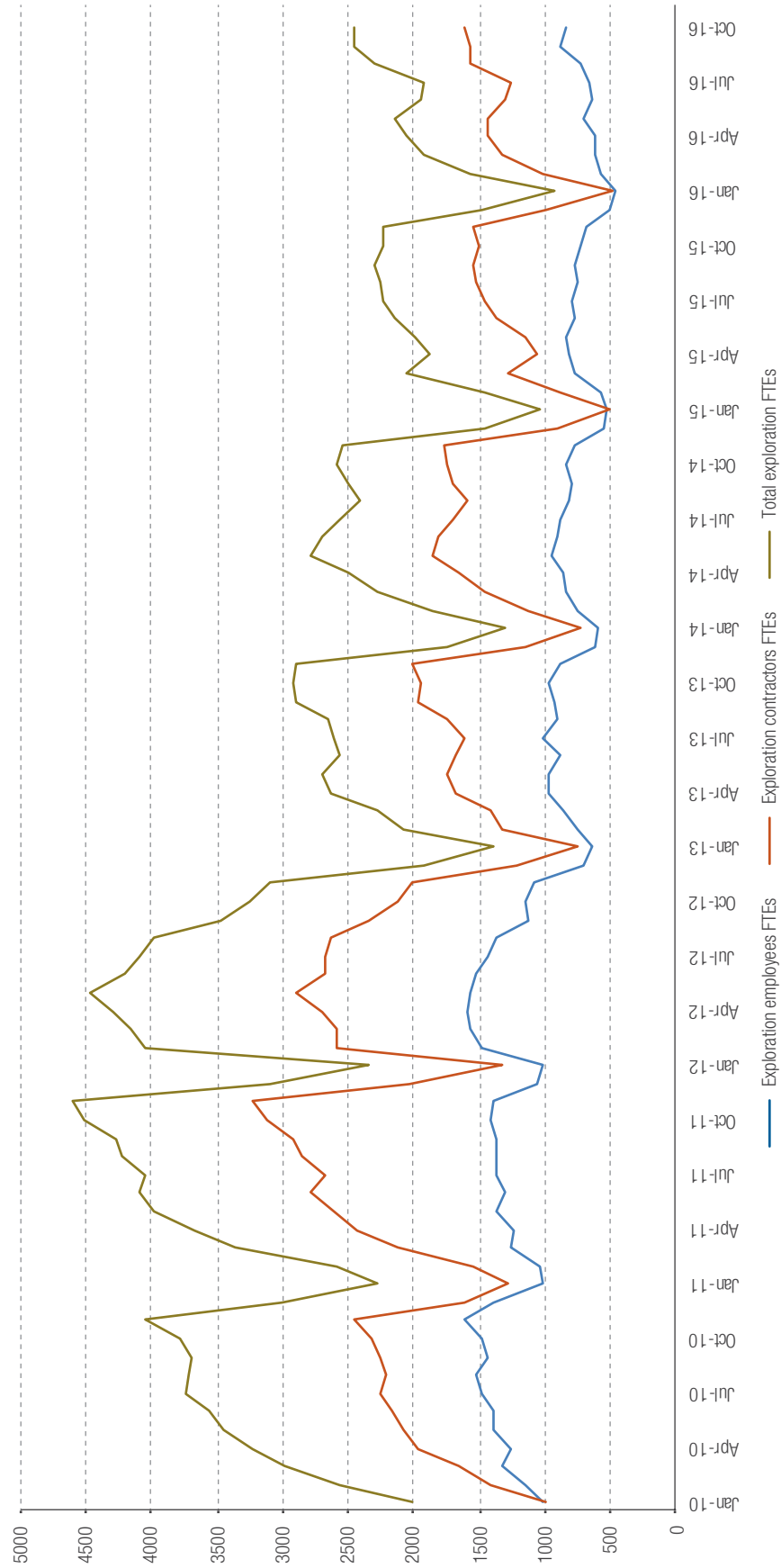
Mining employees FTEs



Mining contractors FTEs

WA'S MONTHLY MINERAL EXPLORATION WORKFORCE (OCTOBER 2016)

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



MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 237

FAILURE OF CRANE HEAD SHEAVE

ISSUED: 12 JANUARY 2016

Summary of incident

In July 2014, a mobile crane at a mine site was being used to unload a truck. After a daily pre-start inspection, the crane took the weight and lifted the load. As the crane started to slew, the nylon head sheave (rooster sheave) weighing about two kilograms, catastrophically failed. Part of the sheave fell around 10 metres to the ground, narrowly missing a rigger working in the exclusion zone below.

When the sheave was inspected later, it appeared to have been damaged prior to the lift.

The weight of the load was within the crane's safe limit. There was no side loading to the boom head sheave during the lift. The sheave was an original equipment manufacturer (OEM) supplied part.

Probable causes

Direct

- The damaged head sheave failed and fell from height during a lift.

Contributory

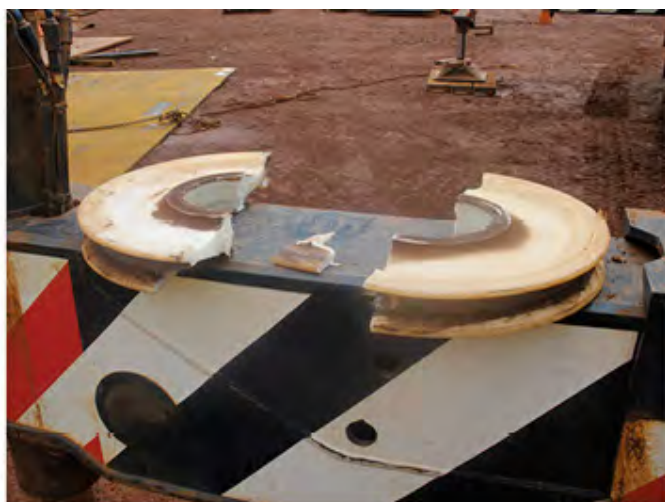
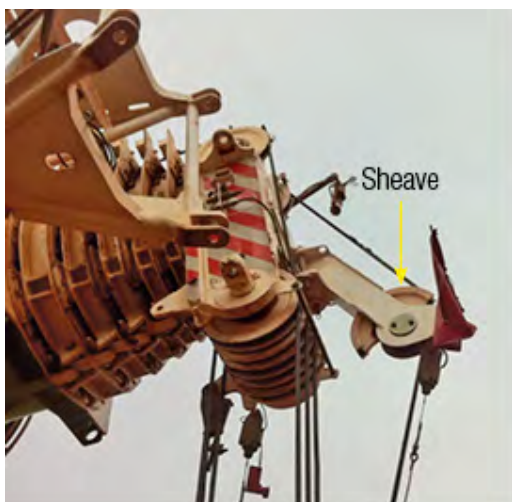
- Damage to the head sheave was not identified during the daily pre-start inspection of the crane by workers.

Actions required

The following actions are recommended to reduce the potential for damage and failure of head sheaves.

Design, manufacture, import or supply requirements

Persons who design, manufacture, import or supply classified plant for use at a mine must ensure that the plant is designed, constructed and tested in accordance (in the case of a crane or hoist) with AS 1418 [r. 6.33, Mines Safety and Inspection Regulations 1995].



Damage to nylon head sheave. Left: Half of the failed sheave for the auxiliary hook remained in place. Right: Sheave sections recovered after the incident.

Records and inspections

Competent persons who are in charge of mobile cranes should ensure:

- crane maintenance records are checked and cranes are inspected for defects before entering site
- crane inspection programs are reviewed and revised to include inspection and assessment of sheaves.

Operation and maintenance

- Check all sheaves for alignment, damage (e.g. cracking), wear, mobility and extreme soiling before starting a crane operation.

Note: Head sheaves cannot be adequately inspected when the boom is in operation.

- Operate cranes in accordance with the OEM's specifications, including avoiding side loading on
- sheaves.
- Maintain sheave blocks in accordance with the OEM's specifications.
- Double-blocking should not be practiced, including when moving or packing the crane. A spotter should be available to direct the crane operator where there is the potential for double-blocking.

Note: Double-blocking (sometimes known as two-blocking) happens when the hook block or headache ball makes contact with the head sheave(s) preventing further winding up of the hoist.

- A hoist-limit switch or hoist-limit alarm should be fitted to mobile cranes to stop the winch or to warn the operator before the hook block or headache ball makes contact with the head sheave(s).

Reporting incidents

Persons who operate, or are in charge of registered classified plant (e.g. cranes), must ensure that incidents where registered classified plant is damaged (or is suspected to be damaged) are notified in writing to the State Mining Engineer [r. 6.36 Mines Safety and Inspection Regulations 1995].

Further information

- Standards Australia, www.standards.org.au
 - AS1418.5 *Cranes, hoists and winches – Mobile cranes*
 - AS 2550.1 *Cranes, hoists and winches – Safe use – General requirements*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 238

MOBILE PLANT INTERACTION RESULTS IN CRUSH INJURIES

ISSUED: 12 FEBRUARY 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In December 2015, an integrated tool carrier (IT) was parked in an underground main level access, while three workers and a supervisor inspected a damaged man-basket. Two light vehicles (LVs) were parked in an adjacent stockpile. All the parked vehicles had illuminated, flashing beacons.

At the same time, a long-hole drill rig was slowly tramping (horseshoe first) out of the level to the next drill location. While the drill operator was looking for an area to turn the rig around (to tram engine-first), the horseshoe made contact with the IT's basket.

The supervisor – who was facing the basket, taking photographs at the front of the IT – was pinned between the basket and the long-hole drill rig's horseshoe and hydraulic hoses.

Colleagues provided first aid to the injured supervisor until the site ambulance arrived and brought him to the surface. He was transferred to the local hospital for assessment where he underwent surgery for crush injuries to his lower abdomen. Fortunately, his injuries were limited to severe bruising, which required internal stitches.

It appears there was no attempt to communicate with the drill rig operator before his vehicle made contact with the IT.

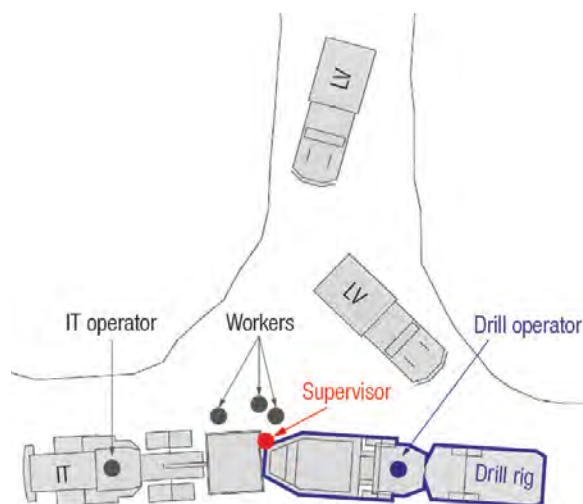
Probable causes

Direct

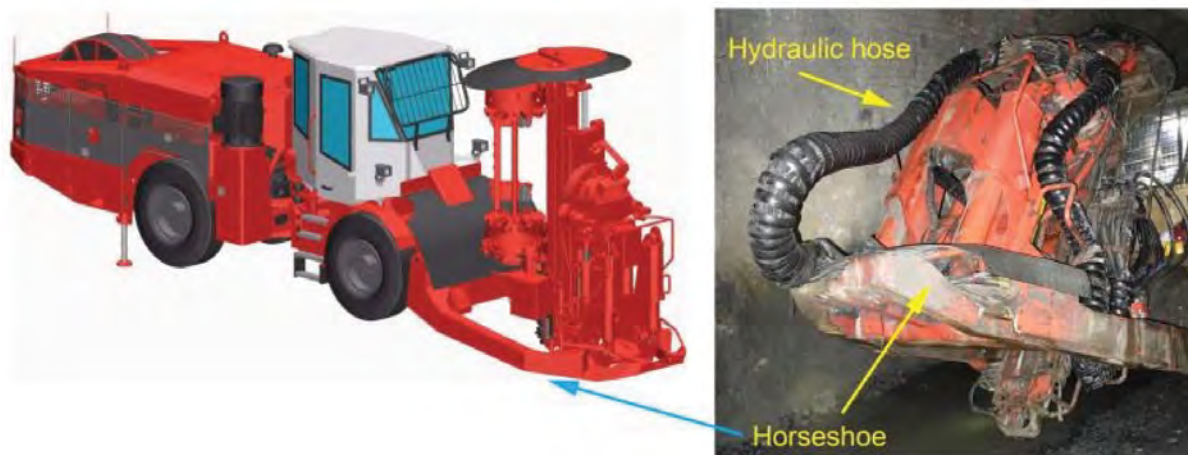
- The IT was stopped in a high traffic area of the main level access.
- The workers and supervisor were standing next to the IT.

Contributory

- Lack of effective communication between personnel.
- Failure to recognise and manage the risks associated with working around mobile equipment.
- The drill operator's field of view was reduced by tramping the long-hole drill rig horseshoe-first.
- The stockpile was obstructed by the parked LVs, preventing the long-hole drill rig from turning around.
- Failure to manage the risks associated with congestion and mobile plant egressing underground levels.



Plan view of incident scene. Supervisor was caught between the IT's basket and the horseshoe of the long-hole drill rig.



Long-hole drill rig showing the position of the horseshoe and hydraulic hoses.

Actions required

Mine operators are reminded of the importance of:

- implementing and promoting positive communication protocols to maintain situational awareness
- developing, implementing and reviewing appropriate traffic management systems within all workplaces
- ensuring mobile plant operators are aware of workers and other mobile plant in their vicinity and potential line-of-fire risks
- promoting continuous awareness of the hazards associated with working in proximity to mobile plant.

Further information

- Department of Mines and Petroleum, Guidance about traffic management, www.dmp.wa.gov.au/Safety/Guidance-about-traffic-6268.aspx

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 239

LOW-VOLTAGE ARC FLASH DURING SWITCHING OPERATION

ISSUED: 11 MARCH 2016

Summary of incident

In September 2014, an electrician was performing a low voltage (415 V AC) switching operation on a switchboard. While working through the switching program there were problems isolating an individual switch (rated for 4,000 A).

The worker attempted to operate the switch a number of times by pressing the open button on the front panel, but the switch failed to open. After opening the switch panel door, he removed the glove on his right hand (Category 4 arc-flash rated) to spray an aerosol lubricant on to the tripping mechanism to free it up.

With the panel door open and glove off, the worker then tried to operate the switch by activating the tripping mechanism with a two-metre wooden broomstick. At this point there was an explosion and an arc flash. The worker received second-degree burns to his right hand.

The switch was severely damaged and much of the evidence destroyed. However, the arc flash seems to have propagated from the cluster contacts (where the switch plugs into the switchboard).

It appears that the lubricant ignited, initiating the arc flash.

Note: It had become common practice to open the panel door when the switch failed to open, spray lubricant on the switch mechanism and activate the switch's mechanical trip function with an insulated object.



Damage to 4,000 A switch following incident

Probable causes

Direct

- The cluster contacts had a history of losing their spring tension and creating a hot joint.
- The aerosol lubricant was flammable when atomized and subject to a heat source.
- Work was performed outside of the safe work instruction and without performing a risk assessment for the change in the isolation process.

Contributory causes

- The switch had not been subject to a maintenance, test and repair program.

- The aerosol lubricant, labelled by the manufacturer as non-flammable and suitable for electrical equipment:
 - did not meet classification criteria for non-flammable aerosol
 - had an incorrect material safety data sheet (MSDS).
- The arc flash was not fully contained due to the open panel door on the switch enclosure.
- The electrical worker removed the glove (arc-flash rated) on his right hand.
- The arc-fault clearing time of the upstream over-current protection device was outside that prescribed in Clause 2.5.5.3 of AS/NZS 3000 *Electrical installations*.

Actions required

- The following actions are recommended to reduce the potential for low-voltage arc flash incidents.

Inspection, testing and maintenance

- Routinely inspect, test and maintain electrical switchgear in a safe condition, having regard for the original equipment manufacturer's specifications.
- Report all defects identified with electrical equipment to the electrical supervisor.
- Set protective devices to limit, as far as is practicable, the harmful effects of a switchboard internal arcing fault (by automatic disconnection).

Safe systems of work

- Provide safe work instructions that cover the specific work undertaken.
- Assess workers as competent in electrical isolation before undertaking electrical work.
- Monitor the effectiveness of, and compliance with, safe systems of work.
- Confirm that workers are wearing appropriate personal protective equipment (PPE).
- Consider remote switching of all protection circuit breakers, which removes the operator from the arc flash danger zone. Conduct a protection coordination study of electrical power systems.

Further information

- Standards Australia, www.standards.org.au
 - AS/NZS 3000 *Electrical installations* (known as the Australian/New Zealand Wiring Rules)
- Department of Commerce, EnergySafety
 - www.commerce.wa.gov.au/sites/default/files/atoms/files/cop_safe_low_volt_0.pdf
 - *Safe low voltage work practices by electricians – code of practice*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 240

HAUL TRUCK COLLIDES WITH GRADER ON ACTIVE DUMP

ISSUED: 13 APRIL 2016

Summary of incident

In July 2015, a grader was working in good conditions, near the entrance of an active waste dump, grading into oncoming traffic. As a haul truck drove up the pit ramp and turned off onto the dump's haul road, the truck's driver failed to see the operating grader.

In an effort to avoid a collision, the grader operator moved out of the anticipated path of the oncoming haul truck and stopped. However, the haul truck continued along the haul road, colliding with the left side of the grader.

The haul truck driver did not see the grader until after the collision. Fortunately, no one was injured.

Probable causes

Direct

- The driver of the haul truck did not see the grader.



Contributory causes

- The gradient of the pit ramp, the sharp corner at the dump entrance, the windrow height and a blind spot created by the cab's pillar and door frame limited the haul truck driver's visibility.
- There was no communication between personnel:
 - the grader operator did not use the two-way radio to inform haul truck drivers of the grading activity at the entrance to the dump's haul road
 - the proposed grading work was not discussed at the pre-start meeting.
- The grader was operating opposite to traffic flow, near the dump entrance, without physical controls in place (e.g. warning signs, temporary hazard controls).
- Workers and supervisors failed to recognise and manage the risks associated with mobile plant interaction (e.g. no risk assessment).
- Due to noise in the cab (i.e. radio and two-way radio), the haul truck driver did not hear the vehicle proximity alarm, which sounded for 9 seconds before the collision.
- The condition of the dump area was such that it required constant grading, increasing the interaction with haul trucks.



Actions required

Mine operators are reminded of the importance of developing safe systems of work that identify hazards and ensure effective risk controls are implemented for working on dump areas.

Traffic management

- Design road, intersections and dump areas to reduce the risk of mobile plant interaction.
- Design windrows for optimum visibility (e.g. at dump entrances).
- Separate haul truck and grading operations where practicable.
- Implement systems to help identify the location of mobile plant operating around haul trucks (e.g. warning signage, elevated flag indicators with high-visibility strips, revolving light, working with hazard lights on).

Safe systems of work

- Maintain effective positive communication between mobile plant operators.
- Managers and supervisors conduct adequate workplace inspections before and during work activities to identify hazards and risks (e.g. grading against the flow of traffic) and implement appropriate control measures.
- Develop effective controls and procedures to manage human error.
- Maintain and regularly test vehicle proximity systems.
- Monitor the effectiveness of, and compliance with, safe systems of work.
- Regularly inspect, audit and review the traffic management plan.

Training

- Personnel should understand the hazards and risks involved with mobile plant interaction.
- Train and assess mobile equipment operators as competent in safe systems of work before undertaking tasks.

Further information

- Department of Mines and Petroleum, Guidance about traffic management, www.dmp.wa.gov.au/Safety/Guidance-about-traffic-6268.aspx
- Department of Mines and Petroleum, Mines safety alerts, www.dmp.wa.gov.au/Safety/Mines-safety-alerts-13194.aspx
 - Significant Incident Report No. 238 *Mobile plant interaction results in crush injuries*
 - Significant Incident Report No. 214 *Haul truck collides with light vehicle in designated controlled area*
 - Significant Incident Report No. 152 *Haul truck and light vehicle collision*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 241

UNDERGROUND WORKER CRUSHED BETWEEN INTEGRATED TOOL CARRIER (IT) WORKBASKET AND ROOF OF EXCAVATION (BACKS)

ISSUED: 7 JUNE 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In March 2016, two servicemen were working in an integrated tool carrier (IT) work basket removing pipe services from the sidewall and backs of an extra-high excavation. At the time of the incident, the work basket had been raised close to the backs but extra lift was needed and the basket was tilted upwards. A worker who was leaning over the front of the basket received serious head injuries when crushed between the top rail of the basket and the backs.



IT work basket in position beneath the backs

Probable causes

Direct

- The worker was leaning over the front of the basket when the basket was tilted upwards.

Contributory

- Lack of effective communication between personnel.
- The injured person was new to the task and was undergoing training.
- Tilting of the work basket was not included in the training documentation.
- The operator directing the work basket was not aware of the position of the offsider when the direction was given to tilt the work basket.
- The operating procedure did not identify the potential for a crush hazard while conducting work from the basket.

Actions required

Mine operators are reminded of the importance of developing safe systems of work that identify hazards and ensure effective risk controls are implemented for working in IT or elevated work platform (EWP) work baskets. The following actions are recommended to prevent similar incidents.

Hazard identification and risk management

- When undertaking work at height using IT or EWP work baskets, identify and address the potential for workers to be crushed between the basket and adjacent structures. Work should be done without leaning over the edge of the work basket.
- Confirm that the equipment is fit-for-purpose — tilting the work basket for extra reach height introduces additional hazards from sloping floor surfaces.
- Consider installing height-limiting sensors or physical barriers to prevent crush nip points for personnel working in work baskets.

- Consider installing audible movement warning buzzers to work baskets.

Communication

- Implement and promote positive communication protocols between all personnel involved in the work to maintain situational awareness. This may include verbal and visible means of communications.
- Develop and implement standard signals for the control of IT and EWP work baskets.

Training

- Provide employees with adequate instruction, training, assessment and supervision to conduct work safely from IT and EWP work baskets.
- Include guidance on the signals for controlling work baskets in training packages.

Further information

- Department of Mines and Petroleum, www.dmp.wa.gov.au/ResourcesSafety
 - Significant Incident Report No. 217 *Underground worker crushed between charge-up basket and roof – fatal accident*
 - Significant Incident Report No. 151 *Crushed in a pinch point of fixed elevating work platform(EWP) – fatal accident*
 - Mines Safety Bulletin No. 116 *Use of mobile elevated work platforms (MEWPs) within or adjacent to structures with restricted access*
 - Mines Safety Bulletin No. 114 *Compliance requirements for multi-purpose mobile plant*
 - *Working at height in underground mines – guideline*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 242

TYRE FITTER'S FINGERS CRUSHED WHILE OPERATING HYDRAULIC BEAD BREAKER

ISSUED: 14 JUNE 2016

Summary of incident

In April 2016, a tyre fitter was positioning a hydraulic bead breaker in preparation for breaking an inner tyre bead on a water cart. The worker was holding the bead breaker in his right hand and the remote control pendant for the hydraulic power pack in his left hand. He attempted to gain extra length in the pendant control cable by flicking it over the power pack. This action activated the hydraulic power pack, by either knocking the pump toggle switch to the 'on' position or depressing the pump 'on' button of the pendant. The sliding section of the bead breaker was set in motion and crushed three fingers on his right hand, resulting in partial amputations.

Probable causes

Direct

- The hydraulic power pack was energised with the control valve lever in the 'advance' position while the equipment was being positioned for operation.
- The tyre fitter inserted his fingers into the sliding section of the hydraulic bead breaker, exposing them to moving parts when it activated.

Contributory

- The equipment design does not encourage the correct positioning of hands nor restrict access to moving parts.
- There is no guarding to prevent inadvertent contact with moving parts nor labelling on the equipment to warn of the nip or crush point.
- Work instructions did not outline the controls for all hazards associated with the task.



Re-enactments showing approximate hand grip on the bead breaker and position of power cable under the toggle switch

Actions required

The following actions are recommended to reduce the potential for injury while working with hydraulic equipment

- Identify hazards associated with the operation of equipment in conjunction with the recommendations of the original equipment manufacturer (OEM). Assess the risk of workers being exposed to those hazards and implement appropriate controls.
- Document all practical measures to reduce the exposure to an acceptable level in a standard work procedure.
- Confirm that the OEM's instructions for the safe use of equipment are available and followed.
- Assess workers as competent for the task before they operate plant and equipment.
- Ensure hydraulic equipment is not energised while being positioned for the task.
- Identify if more than one person is required to carry out the task safely.

Further information

- Resources Safety publications, www.dmp.wa.gov.au/Safety/Guidelines-16146.aspx
 - *Tyre safety for earth-moving machinery on Western Australian mining operations – guideline*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 243

DRILL FITTER CRUSHED BETWEEN DRILL HEAD AND ROD CENTRALISER ARM – FATAL ACCIDENT

ISSUED: 14 JULY 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

On the evening of 19 June 2016, a drill fitter working on a blast-hole drill rig died after being crushed between the drill rod centraliser arm and drill head.

Two fitters were re-installing a head-slide wear pad for a drill head, which had fallen out during operation. The rig was being used under power to align and fit two head-slide bolts into the bolt holes.

The fitter was accessing the drill head when the centraliser arm closed unexpectedly while he was standing on the hydraulically operated break-out tool (HOBO). He sustained fatal crush injuries to the chest and upper abdomen when caught between the drill rod centraliser arm and the drill head.

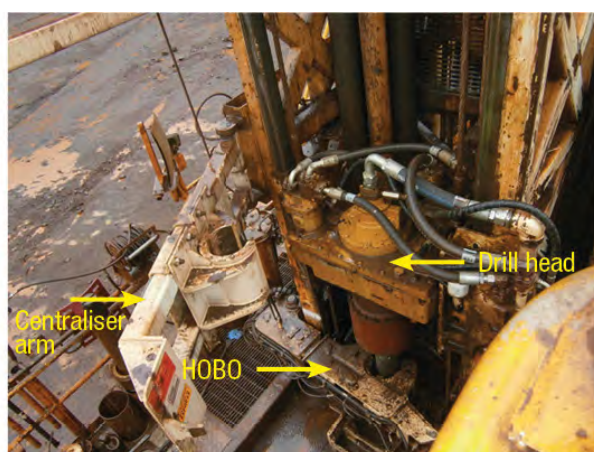
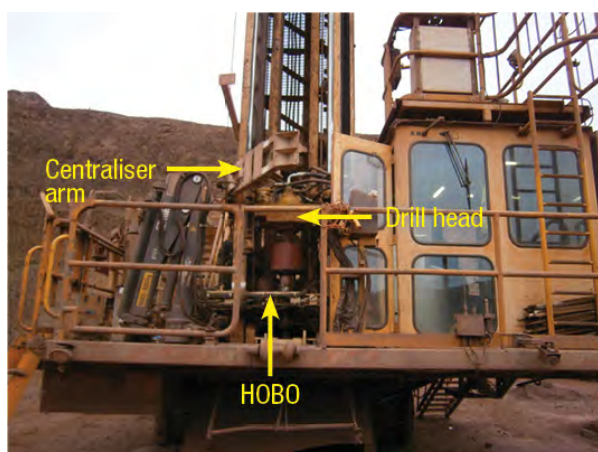
Probable causes

Direct

- The drill rod centraliser arm moved unexpectedly.
- The fitter was standing on the HOBO in a potential crush zone.

Contributory

- An effective isolation had not been carried out prior to conducting the work.
- The uncontrolled movement of the rod centraliser arm had been identified on pre-start forms in the past but had not been actioned in the maintenance system.
- No task-based risk assessment (e.g. JHA) was performed for the task.



Blast-hole drill rig. Left: Front view showing position of HOBO, drill head, centraliser arm and drill cab. Right: Top view showing potential crush zone between the drill rod centraliser arm and drill head.

Actions required

The following actions are recommended to reduce the potential for injury while maintaining mobile plant.

- Implement and enforce suitable isolation procedures.
- Confirm that workers conducting maintenance are adequately instructed, trained, assessed and supervised.
- Complete suitable task-based risk assessments, and assess and authorise prior to conducting work.
- Rectify defects or faults identified during equipment pre-start inspections within a suitable timeframe.

Further information

- Department of Mines and Petroleum, Guidelines, www.dmp.wa.gov.au/Safety/Guidelines-16146.aspx
 - *Isolation of hazardous energies associated with plant in Western Australian mining operations – guideline*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 244

FAILED GANTRY BRIDGE CRUSHES BOILERMAKER WORKING IN THICKENER TANK – FATAL ACCIDENT

ISSUED: 3 AUGUST 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

On 26 July 2016, a boilermaker working inside a thickener tank during a shutdown died when the gantry above him failed and collapsed, crushing and pinning him against the concrete floor.

The worker had been tasked with removing the thickener's rake shaft in the centre of the tank. The rake shaft was no longer in use and the rake arms had previously been removed. The rake shaft passed through the feedwell above, and was attached to the motor on the self-supporting gantry bridge that spanned the tank. The feedwell was attached to the underside of the gantry.



As he stood on the tank floor, cutting into the rake shaft, the gantry failed and collapsed, pinning him to the floor. Another worker in the tank who was assisting the boilermaker raised the alarm. Despite the efforts of the emergency services, the boilermaker died from his injuries.

Probable causes

Direct

- The gantry bridge had deteriorated substantially due to corrosion and was no longer self-supporting.
- The rake shaft, which was now providing primary support, failed while being cut.

Contributory

- The structural integrity of the tank had not been assessed by a competent person prior to work being carried out.
- The boilermaker was instructed to remove the rake shaft, which was not designed to provide primary support.

Actions required

The following actions are recommended to manage the structural integrity of plant and structures, and reduce the potential for structural failure and injury while undertaking construction work.



Left: Gantry bridge that failed and collapsed onto the thickener floor. Right: Corroded structural steel angle.

Inspection

- Using a risk-based approach to determine the timing of inspections and monitoring, a competent person should periodically assess all plant and structures on site to confirm structural integrity or advise of remedial measures.

Demolition and maintenance

Mining operators have responsibilities regarding construction work, including demolition and maintenance, of plant and structures under regulations 4.18 to 4.22 of the Mines Safety and Inspection Regulations 1995. This includes the appointment of a competent supervisor for such work and compliance with Australian Standard AS 2601 *The demolition of structures*.

Some recommended work practices are listed below.

- A competent person, with an understanding of job weights and load paths at all stages of the work, plans any job involving the cutting or removal of structural components.
- Maintain the structure, and its components, in a safe and stable condition at all work stages.
- Use temporary bracing, guy ropes, shoring or combinations of these for stability where necessary.

Undertaking work

- Stop work if there are unplanned movements or structural deflections during the job and inform the supervisor. A competent person should assess the situation and advise the measures to be taken to ensure there is no exposure to harm when completing the job.

Further information

- Standards Australia, www.standards.org.au
 - AS 2601 *The demolition of structures*
 - AS 5104 *General principles on reliability for structures*
- Department of Mines and Petroleum, www.dmp.wa.gov.au/ResourcesSafety
 - Mines Safety Bulletin No. 124 *Structural safety of buildings, plant and other structures*
 - Toolbox presentations from the *2015 Structural Integrity Forum*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 245

WORKER INJURED BY LOW-VOLTAGE SWITCHBOARD ARC FLASH

ISSUED: 17 AUGUST 2016

Summary of incident

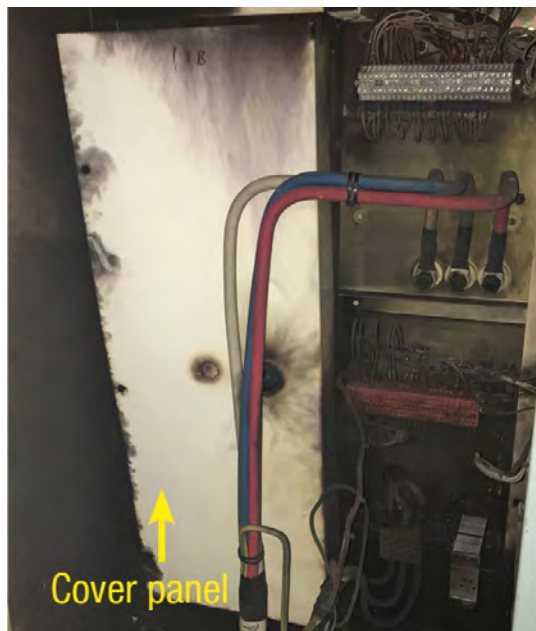
Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In June 2016, an electrician was performing wiring modifications to a low voltage (415 VAC) motor control centre (MCC). The power to the front compartment switchboard had been isolated and the busbars in the rear compartment remained energised.

On removing the doors of the rear compartment to identify control cable core numbers, the electrician noticed that the busbar cover panel inside the compartment was not positioned correctly.

As the electrician touched the cover panel to check if it was secure, it moved and there was an arc flash and blast. He received minor flash burns to his right forearm and left hand. The worker was not wearing personal protective equipment (PPE) that was adequate for the energy released in the arc flash.

The subsequent investigation found that the cover panel had come in contact with fuse-holder bolts protruding from the energised busbars behind the cover panel.



Left: Arc flash damage to the rear compartment of switchboard. Right: Protruding fuse-holder bolts in busbars.

Probable causes

Direct

- The loose busbar cover panel was moved, making contact with the fuse-holder bolts protruding from the energised busbars.

Contributory

- The busbar cover panel was not secured.
- Moving the cover panel was not in the original scope of work.
- The busbars in the rear compartment were not isolated prior to moving the cover panel.
- The electrician was not wearing PPE that was adequate for the energy released in the arc flash.

Actions required

The following actions are recommended to reduce the potential for arc flash incidents.

Design and installation

- Design, install and maintain electrical installations and equipment in accordance with Australian Standard AS/NZS 3000 and other relevant standards, and complete to a trade finish.
- Maintain required clearances in a switchboard by rigidly fixing exposed energised and/or conductive parts.
- Conduct an arc flash energy assessment of all switchboards and MCCs, and attach arc flash hazard labels so workers are aware of the hazards and can use appropriate arc flash PPE.

Safe systems of work

- Develop, implement and review safe work procedures for conducting electrical maintenance tasks.
- Undertake a risk assessment prior to conducting electrical tasks (e.g. testing, fault-finding, commissioning, maintenance) and when the situation or scope of work changes.
- Isolate the power supply where possible before working near exposed conductive parts.
- Additional risk control measures may include reducing the protection tripping level and operating time, and installing temporary barricades or shields.
- Wear appropriate and adequate PPE where there is the potential for arc flash or inadvertent contact with energised parts.

Supervision, training and maintenance

- Provide sufficient and appropriate levels of supervision for electrical work.
- Train workers in electrical tasks as required and assess as competent before undertaking those tasks.
- Report defects or damage to electrical equipment to the manager or electrical supervisor.

Further information

- EnergySafety, www.commerce.wa.gov.au/publications
 - *Safe low voltage work practices by electricians – code of practice*
- Standards Australia, www.standards.org.au
 - AS/NZS 3000 *Electrical installations* (known as the Australian/New Zealand Wiring Rules)
- Department of Mines and Petroleum, Mines Safety Alerts, www.dmp.wa.gov.au/Safety/Mines-safety-alerts-13194.aspx
 - Mines Safety Significant Incident Report No. 239 *Low-voltage arc flash during switching operation*
 - Mines Safety Significant Incident Report No. 224 *Underground workers injured by arc flash and blast from motor control centre (MCC) cubicle*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 246

FALL FROM HEIGHT DURING HELICOPTER LIFTING OPERATIONS

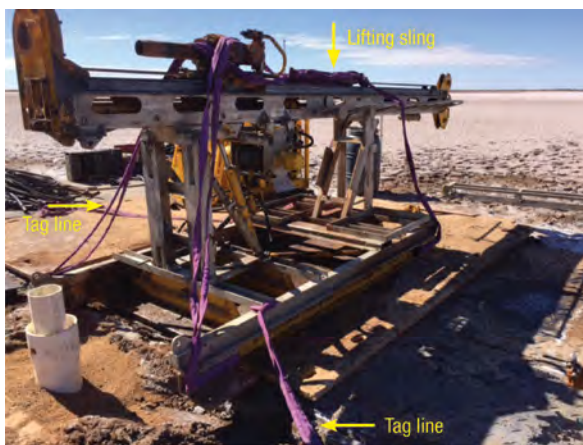
ISSUED: 18 AUGUST 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In May 2016, during a helicopter lifting operation to relocate a drill rig on a salt lake, two drill offsideers attached fibre loop slings to the corners of the drill rig base by looping them around the frame. Two fibre loop slings were then attached to opposite corners of the rig's base for use as tag lines by the drill offsideers.

As the helicopter lifted the rig, an offsideer's leg became entangled in a tag line. He was lifted some distance before the helicopter pilot became aware of the situation. When the pilot reduced altitude to bring the offsideer back to ground, he had untangled his leg and was holding on to the fibre loop sling



Drill rig showing four lifting slings looped around the rig's base and the two fibre loop sling used as tag lines attached to opposite corners

with his arms. The offsideer let go and fell 5 to 10 metres to the ground, injuring his back.

Probable causes

Direct

- The drill offsideer's leg became caught in the tag line as the helicopter was lifting the rig.

Contributory

- Fibre loop slings were used as tag lines.
- Neither drill offsideer held the appropriate high risk work licences for conducting dogging or rigging operations.
- The risk assessment failed to identify the potential hazards associated with the task

Actions required

Mining operations are reminded of the importance of safe systems of work and competency when undertaking helicopter lifting operations.

- Complete suitable task-based risk assessment (e.g. JHA, JSA) and have a supervisor assess as adequate prior to conducting work.
- Confirm that workers understand the task and hazards before commencing work.
- Confirm that the appropriate high risk work licences are held by persons conducting dogging and rigging operations, and that they have been assessed as competent.
- Use suitable tag lines when conducting lifting operations to avoid the possibility of entanglement with personnel or equipment.

Further information

- Department of Mines and Petroleum, What high risk work needs to be licensed?, www.dmp.wa.gov.au/Safety/What-high-risk-work-needs-to-be-6217.aspx
- Department of Mines and Petroleum, Information sheets, www.dmp.wa.gov.au/Safety/Information-sheets-and-16176.aspx
 - *Frequently asked questions on dogging and rigging – information sheet*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 247

DRILL FITTER CRUSHED BETWEEN DRILL HEAD AND ROD CENTRALISER ARM – FATAL ACCIDENT – UPDATE

ISSUED: 12 SEPTEMBER 2016

Summary of incident

Note: Information contained in Significant Incident Report 243, issued on 14 July 2016, provided an initial assessment of this fatal accident based on materials received, knowledge and understanding at the time of writing. This update reflects new evidence gathered during the Department of Mines and Petroleum's ongoing investigation.

On the evening of 19 June 2016, two fitters were working on the deck of a blast-hole drill rig to replace a head slide that had fallen out of its bracket earlier in the shift. The rig had not been powered down, nor was it isolated.

When the initial attempt to fit the head slide failed, the drill head was raised about a metre by the driller, who was sitting at the control panel in the rig's cabin. This was done so the drill pipe could be unthreaded using the deck wrench to take weight off the drill head, as well as providing a means of aligning the head-slide bolt holes with the head bracket.

As the drill fitter stood on the hydraulic break-out tool (HOBOT) to check the alignment of the head slide and bracket, the centraliser arm closed unexpectedly. On seeing the movement, his colleague standing near the cabin, activated the emergency stop but it was too late. The fitter had been crushed between the centraliser arm and the drill head and his injuries were fatal.

The subsequent investigation found that the head slide could not be fitted from the rig's deck due to a damaged bracket in the rotary head arrangement. When working from the deck, workers are not in the centraliser arm's 'line-of-fire', which is around two metres above deck level.

Static and dynamic testing was also conducted as part of the investigation. The static testing did not identify logic defects in

the hydraulic or programmable logic controller (PLC) circuits. Dynamic testing identified that it was possible for the driller's leg to contact exposed wiring and switches under the control panel, and cause an unplanned inward movement of the centraliser arm.

Note: The drill rig had been out of service for about two years and was recommissioned following refurbishment only weeks before the incident.

Probable causes

Direct

- The drill rod centraliser arm moved unexpectedly.
- The maintainer was standing on the HOBOT in a potential crush zone.

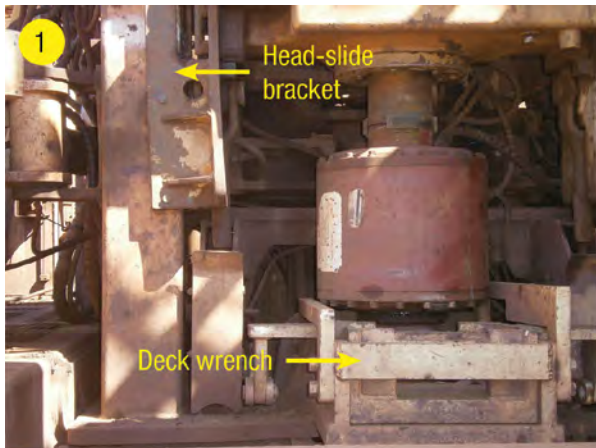
Contributory

- Isolation had not been carried out prior to conducting maintenance.
- The uncontrolled movement of the rod centraliser arm had been identified on pre-start forms the previous week, but had not been entered in the maintenance system.
- Damage to the head-slide bracket prevented the head slide being fitted from the deck.
- The drill head was raised to unthread the drill pipe, making it impractical to fit the head slide from the deck.
- As designed, the underside of the control panel was not covered. This would have prevented inadvertent contact.
- The damaged head-slide bracket was not identified during the recommissioning process.
- A written safe work procedure (SWP) had not been developed for replacing a head slide.

Note: The unwritten work practice relied on head slides being fitted from the deck. To achieve this, the blast hole was drilled to its full extent (i.e. depth is defined by drill rig configuration).

- No task-based risk assessment (e.g. job hazard analysis or JHA) was conducted for the modified task of replacing the head slide.

Mines Safety Significant Incident Report No. 247 continued



1. Bent head-slide bracket shown with drill head above the deck wrench 2. New head slide did not fit between head bracket and mast 3. Driller's cabin showing seat position and control panel 4. Exposed wires and switches on the underside of the control panel.

Actions required

The following actions are recommended to reduce the potential for injury while repairing, maintaining, commissioning or recommissioning plant.

- Implement and enforce suitable isolation procedures.
- Confirm that workers conducting maintenance and repair work are adequately instructed, trained, assessed and supervised.
- Consider developing SWPs for repetitive tasks that have the potential to expose workers to hazards.
- Complete suitable task-based risk assessments where SWPs are not provided, and when the conditions or the scope of work changes, and assess and authorise prior to conducting work.
- Rectify defects or faults identified during equipment pre-start inspections within an appropriate timeframe.

- Conduct a thorough inspection and assessment process when recommissioning plant to identify any machine and component defects to be included in a scope of works for refurbishment.
- Check for exposed wiring and potential switch contacts that could initiate unexpected machine movements.

Further information

- Department of Mines and Petroleum, Guidelines, www.dmp.wa.gov.au/Safety/Guidelines-16146.aspx
 - *Isolation of hazardous energies associated with plant in Western Australian mining operations – guideline*
- Department of Mines and Petroleum, Guidance about the isolation of hazardous energies
 - www.dmp.wa.gov.au/Safety/Guidance-about-the-isolation-of-6652.aspx

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 248

WORKER SERIOUSLY INJURED WHEN CAUGHT IN MOVING CONVEYOR

ISSUED: 12 SEPTEMBER 2016

Summary of incident

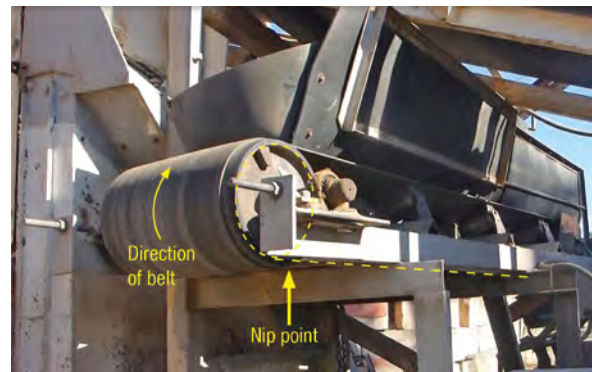
Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In June 2016, a boilermaker, working alone, was in the process of shutting down a crushing plant. A conveyor, positioned at head height, was part of the crushing circuit and adjacent to a screen deck.

The boilermaker observed a rock rotating in the nip point of the conveyor's tail-end pulley. Material from the screen deck had accumulated on the ground beside the conveyor next to the nip point. He stood on this material and reached between the belts with both hands, using a spanner in an attempt to knock out the rock. However, the moving conveyor had not been isolated.

Both his arms were drawn into the conveyor's nip point. Fortunately, he managed to free his arms when the tail-end pulley came to a stop and was able to seek emergency assistance. The boilermaker was hospitalised with a de-gloving injury, friction burns and multiple fractures to his hand, arms and back.

Note: The incident was reported to the Department of Mines and Petroleum 26 days after the event. The boilermaker was seriously injured and was immediately disabled by the accident from performing his duties.



Probable causes

Direct

- The conveyor was not guarded to prevent access to moving parts.
- The conveyor was not isolated before the attempt was made to remove the rock.

Contributory

- Materials from the nearby screen deck were not effectively controlled, resulting in a rock landing inside the belt.
- The build-up of material on the ground enabled easy access to the nip point of the conveyor.
- No isolation procedure had been developed for the conveyor.

Mines Safety Significant Incident Report No. 248 continued

Actions required

The following actions are recommended to reduce the potential for injury, or worse, while working with or around conveyors.

Control measures

- Provide adequate guarding to the dangerous parts of a conveyor.
- Implement and enforce suitable isolation procedures for plant and machinery. The procedures must include de-energising plant and the lock, tag and try method.
- Install sufficient and effective emergency stop devices or emergency stop lanyards on conveyors.
- Provide suitable controls for plant and machinery to manage material spillage.

Safe systems of work

- Undertake risk assessments on all plant and machinery in the workplace to identify, assess and control all hazards to which workers are likely to be exposed.
- Confirm that workers conducting cleaning, maintenance and repair work are adequately instructed, trained, assessed and supervised.
- Keep ground areas and platforms adjacent to plant free of spilled material through good housekeeping practices
- Implement practicable measures to minimise the time a person working alone remains unattended.

Reporting

- If an injury appears to be serious, the manager of the mine must notify the district inspector by the fastest practicable method of communication as soon as it is reasonably practicable to do so, and this must subsequently be confirmed in writing [s. 76, *Mines Safety and Inspection Act 1994*].

Further information

Injuries from incidents involving conveyors

Between 1 January 2011 and 8 September 2016, there have been 107 reported injuries at mine sites involving conveyors. 79 were serious injuries requiring workers to be away from work for more than two weeks. Of these serious injuries:

- 16 per cent were the result of contact with the moving parts of the conveyor
- 16 per cent were crush injuries
- 14 per cent resulted in fractures.

Guidance

Department of Mines and Petroleum, Mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx

- *Safeguarding of machinery and plant – code of practice*
- *Isolation of hazardous energies associated with plant in Western Australian mining operations – guideline*
- *Accident and incident reporting – guideline*
- Department of Mines and Petroleum, Guidance about working alone, www.dmp.wa.gov.au/Safety/Guidance-about-working-alone-6814.aspx
- Standards Australia, www.standards.org.au
 - AS 4024.3610 *Safety of machinery – Conveyors – General requirements*
 - AS 4024.3611 *Safety of machinery – Conveyors – Belt conveyors for bulk materials handling*

MINES SAFETY SIGNIFICANT INCIDENT REPORT NO. 249

DRILL OFFSIDER RUN OVER BY TRACKED VEHICLE

ISSUED: 11 OCTOBER 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on material received, knowledge and understanding at the time of writing.

In August 2016, a drill offsider was tramping a tracked vehicle on his own, returning to the shore of a salt lake to refuel. Both of the vehicle's control levers were strapped in position so the vehicle could move forward without the offsider continuously holding the controls.

As another tracked vehicle approached, the offsider alighted from his vehicle and walked over to talk to the two occupants. After a brief conversation, the offsider returned to his vehicle, which was still moving forward on its own.

He slipped and fell while trying to climb back into the cab. The vehicle ran over him, with one of the tracks passing along the

length of his body. A person from the other vehicle managed to stop the unmanned vehicle, which was clear of the offsider.

Fortunately, the ground was very soft and the offsider was pushed down into the ground by the vehicle's track. He had injuries to his head and face, and a fractured hand.

Probable causes

Direct

- The offsider bypassed the "return to neutral" safety function of the control levers and climbed off the vehicle while it was still moving.
- The offsider fell while trying to climb back into the cab and was unable to get out of the way of the moving vehicle.

Contributory

- The vehicle's control levers (enabling devices or dead-man control levers) were modified, allowing the vehicle to move by itself without a person continuously holding the controls.
- The vehicle's safe operating procedure (SOP) was not followed.
- The ladder to access the control cab had been removed for maintenance.



Left: Vehicle track marks and indentation where the offsider was pushed into the soft ground. Right: Straps used to hold both control levers in the forward moving position.

Mines Safety Significant Incident Report No. 249 continued



Cab of tracked vehicle. Note the straps used to hold control levers in place and the absence of the ladder (and position of brackets for ladder)

Actions required

These actions are recommended to reduce the potential for injury while working with mobile plant.

Modification of plant

- Modifications to mobile plant safety features must be addressed with the supplier and original equipment manufacturer, in reference to the relevant Australian Standard.

Safe work procedures

- Undertake a documented risk assessment of all mobile plant in the workplace to identify, assess and control all hazards to which workers are likely to be exposed.
- Provide adequate supervision, training and assessment of competency for workers on site who use mobile plant, including the application of SOPs.

Maintenance

- Implement an effective hazard reporting system for mobile plant so workers can report faults and defective items for rectification.
- Provide and maintain safe and easy access to mobile plant (e.g. for pre-start checks, operation, maintenance, refuelling and cleaning).
- Implement a mobile plant maintenance system, including periodic inspections by competent persons, to ensure plant are maintained in a safe condition.

Further information

- Department of Mines and Petroleum, How is risk managed during the life cycle of plant? www.dmp.wa.gov.au/Safety/How-is-risk-managed-during-the-7945.aspx

DANGEROUS GOODS SAFETY SIGNIFICANT INCIDENT REPORT NO. **01-16** AND PETROLEUM SAFETY SIGNIFICANT INCIDENT REPORT NO. **01/2016**

HYDROGEN-FIRED BOILER EXPLOSION

ISSUED: 3 MARCH 2016

Summary of incident

At a chemical manufacturing plant that produces hydrogen gas and other substances, a potential restriction in the feed line to a hydrogen-fired boiler was identified.

Specialist contractors were engaged to check for flow restrictions in the boiler feed line. The boiler was shut down and the feed line purged with nitrogen. After checking for residual hydrogen, the line was isolated prior to examination.

After completing the line examination, de-isolation commenced and hydrogen was introduced into the line.

Soon after the last isolation valve was opened, there was an explosion in the combustion chamber of the boiler, which ruptured its shell at the designed failure point.

The boiler and adjacent cooling tower pipework sustained significant damage but, fortunately, no one was injured.

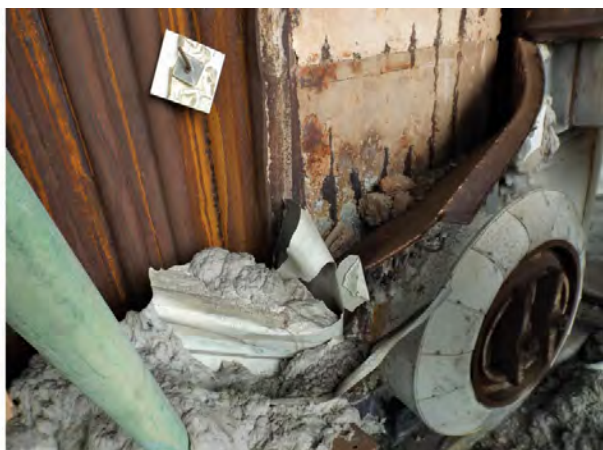
Probable causes

Direct

- At the time of the boiler explosion, the burner management system, which allows the safe control of the combustion process, was apparently not operating.
- Two safety valves in the hydrogen feed line, which forms part of the burner management system, had been manually overridden. These valves remained open during feed line checks and up to the explosion, despite other line isolations being in place.

Contributory

- Contractor management was inadequate. The operator placed too much reliance on the contractor's expertise.
- There was no formal handover from maintenance to operations.
- The critical importance of the burner management system was not fully recognised.
- There was no risk assessment or documented process regarding the manual opening of the two safety valves that formed part of the burner management system.



Left: Safety shut-off valves forming part of the burner management system. Right: Damage to boiler

Dangerous Goods Safety Significant Incident Report No. 01-16 and Petroleum Safety Significant Incident Report No. 01/2016 continued

- The job safety analysis (JSA) used by the contractor was generic.
- The permit issuer did not examine the JSA prepared by the contractor.
- The section of the work permit requiring the permit issuer to state if the equipment was available for use had not been completed prior to the introduction of hydrogen into the system.
- The permit issuer had not received formal training in the plant and equipment covered by the permit.

Actions required

This incident highlights the importance of ensuring that appropriate controls are in place to manage the risks posed by dangerous goods such as hydrogen. The following actions will assist in managing risks and meeting legislative requirements.

Note: The source of ignition of the hydrogen-air mixture was not established. Regardless, in the absence of suitable safety controls, ignition sources in the presence of fuel-air mixtures pose a significant explosion risk.

Engineering controls

- Where engineered safety-critical controls have been installed, there should be robust systems to safely manage the bypassing or modification of such controls.

Work permits and handover

- The permit issuer and holders need to adequately understand the plant and equipment covered by a permit.
- Handover documentation should be confirmed as complete before recommissioning plant and equipment.
- A formal start-up procedure or checklist will facilitate the safe recommissioning of plant and equipment.

Risk management

- Permit issuers should review any associated risk assessments, including those prepared by third parties. In particular, risk assessments need to adequately address hazards.

Training

- Anyone who may be involved with safety-critical controls need to be suitably trained and understand the importance of these controls to the safe operation of the plant and equipment.

Leadership and responsibilities

- Statutory safety obligations exist under the *Dangerous Goods Safety Act 2004* and associated regulations and need to be understood by facility operators, contractors and other relevant personnel before engaging in activities involving dangerous goods.
- Clear leadership and accountability need to be exercised, with assigned responsibilities being understood and discharged.

Further information

- United Kingdom Health and Safety Executive (UK HSE), www.hse.gov.uk/pubns/books/hsg250.htm
 - *Guidance on permit-to-work systems – A guide for the petroleum, chemical and allied industries*

DANGEROUS GOODS SAFETY SIGNIFICANT INCIDENT REPORT NO. **02-16**

FIRE WHILE DECANTING LP GAS

ISSUED: 4 MARCH 2016

Summary of incident

In July 2015, a fire started in the decanting area alongside a building during the filling of a 15 kg LP gas cylinder. The cylinder was being filled by decanting from a 210 kg cylinder.

Prior to filling the cylinder, the decanting operator had placed it on a plastic crate, connected the decanting nozzle to the cylinder valve, and fitted a cable tie on the decanting nozzle lever for 'hands-free' cylinder filling and moved several metres away.

When the cylinder was filled, the operator walked towards the decanting area to shut off the bleed valve of the cylinder being filled. As he reached over to shut off the valve, a fire started. The operator was not wearing personal protective equipment (PPE; e.g. gloves) at the time and received minor burns to his hands and face.

The fire escalated and the operator left the area. Eventually, the decanting cylinder's safety relief valve activated, resulting in a vertical flame about 8 metres high. The fire continued burning until there was no gas left. The building was partly damaged, as was the warehouse on site.

Earlier, the operator had successfully filled a number of 9 kg gas cylinders and another 15 kg cylinder prior to the fire. He was wearing gloves at the time.

Staff at the site and adjoining businesses were evacuated while Department of Fire and Emergency Services (DFES) officers brought the incident under control.

Static electricity was later identified as the ignition source for the fire.

Probable causes

Direct

- The decanting nozzle was cable-tied in the open position.
- A plastic crate, which is non-conductive, was used as a stand.



Left: Safety shut-off valves forming part of the burner management system. Right: Damage to boiler

Dangerous Goods Safety Significant Incident Report No. 02-16 continued

Contributory

- There was a lack of appropriate staff training on the safe filling of LP gas cylinders.
- The operator was not wearing PPE.

Actions required

Appendix J of the Australian Standard AS/NZS 1596 provides guidance on the correct procedures for filling LP gas cylinders by decanting. It also recommends appropriate personal protective equipment (PPE) for LP gas storage and handling.

Training

- Site operators should ensure that people involved in cylinder filling are trained, with regular refresher training.
Note: LP gas suppliers may be contacted to provide the necessary training.

Cylinder placement

- LP gas cylinders being filled should be earthed by placing them on the ground or a conductive metal stand to minimise the risk from static electricity.

Safe practices

- An LP gas decanting nozzle incorporates a safety device (or fail-safe mechanism) that cuts off the gas flow when the operator releases pressure on the lever. The nozzle must be hand held so that, if there is an incident during decanting, the operator can simply release the lever to stop the gas flow.
- Appropriate PPE, such as safety glasses and shoes, gloves, cotton long-sleeved shirt and long pants should be worn at all times when filling LP gas cylinders.

Further information

- Standards Australia, www.standards.org.au
 - AS/NZS 1596 *The storage and handling of LP Gas*
- Gas Energy Australia, https://www.youtube.com/watch?v=dATQPGm8_jw
In 2014, the LP gas industry released an online video, *How to safely decant LPG (Liquefied Petroleum Gas)*, on the appropriate decanting procedure.
- NSW Workcover, www.workcover.nsw.gov.au/__data/assets/pdf_file/0017/19133/Decanting-of-liquefied-petroleum-gas-LPG-into-cylinders.pdf
 - *Decanting of liquefied petroleum gas (LPG) into cylinders (September 2012)*
- Queensland Department of Natural Resources and Mines, <https://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search-tool/alerts-bulletins-search/alerts-bulletins/petroleum-gas/safe-lpg-decanting>
 - Petroleum and Gas Safety Alert no. 66, 2014: *Safe LPG decanting procedures and static electricity*

DANGEROUS GOODS SAFETY SIGNIFICANT INCIDENT REPORT NO. 03-16 AND PETROLEUM SAFETY SIGNIFICANT INCIDENT REPORT NO. 02/2016

SWITCHBOARD FIRE CAUSED BY ARC FLASH

ISSUED: 13 MAY 2016

Summary of incident

Note: The Department of Mines and Petroleum's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

During normal operations at a gas processing facility, an early smoke detection and alarm system was activated in a substation's switchroom. After workers confirmed the presence of fire, the electrical supply to the substation was manually isolated. The 6.6 kV upstream feeder protection (part of the power supply feeding the switchboard) did not activate.

Production was shut down and the emergency response team were unsuccessful in their attempts to manually fight the fire. The fire was finally extinguished when the switchroom was blanketed with an inert gas.

There had been a phase-to-phase arc fault on the line-side cables within a 185 kW 415 LV withdrawable motor starter in the switchboard's motor control centre (MCC). The fault escalated to the main bus on the same switchboard, almost completely destroying the 415 V MCC in the switchroom, damaging adjacent equipment.

The subsequent investigation found that the switchboard's MCC modules were heat damaged due to a high resistance connection to the main bus. These modules were used for both electrical and mechanical isolations over an extended timeframe. This is thought to have caused a high resistance connection which generated sufficient heat to escalate into an arc fault. The upstream 6.6 kV feeder protection failed due to a seized tripping mechanism in the contactor. The possibility for the latch roller to seize and fail was a known contactor vulnerability.



Damaged MCC modules

Probable causes

Direct

- The MCC modules were subject to a high resistance connection.

Contributory

- A maintenance regime to address the known vulnerability of the 6.6 kV contactor, was not established.
- Lack of substation building electrical supply isolation and pre-incident (switchboard fire) plans.
- Incorrect identification and prioritisation of MCC modules for refurbishment or replacement.
- Fire protection and suppression design and arrangements for the substation were inefficient.

Dangerous Goods Safety Significant Incident Report No. 03-16 and Petroleum Safety Significant Incident Report No. 02/2016 continued

Actions required

The following actions are recommended to ensure the appropriate measures and systems are in place to manage the risks posed by arc flash events and substation fires.

Engineering measures

- Identify, risk assess and prioritise electrical equipment for refurbishment or replacement as necessary. Implement mitigation plans to address any residual risk.
- Periodically risk assess and address any issue in relation to electrical protection settings.
- A power system protection scheme needs to incorporate:
 - local back-up protection; or
 - remote back-up protection.

AS 2067 outlines the requirements for protection, control and auxiliary systems.

Note: It may also be beneficial to consult the Protective relays applications guide, which is applicable to the age of the installation. For example, refer to the 1985 edition for circa 1980 installations.

Maintenance and operational measures

- Operate and maintain MCC modules in accordance with the original equipment manufacturer's (OEM's) specifications.
- Review the suitability of fire protection and suppression systems and change where necessary.

Administrative measures

- Conduct, complete and record all maintenance and testing strategies and requirements.
- Complete periodic, close visual inspections of module line-side cabling where withdrawable MCC modules are used for both mechanical and electrical isolation purposes.
- Keep and make available, clear and easily understood electrical isolation and switchboard plans for all substation buildings.

Further information

- Department of Mines and Petroleum, Asset integrity management systems
 - Evaluation of asset integrity management system (AIMS) – guide www.dmp.wa.gov.au/Safety/Guides-and-procedures-16202.aspx
 - Asset integrity management system (AIMS) evaluation checklist www.dmp.wa.gov.au/Safety/Templates-and-checklists-16206.aspx
- Standards Australia, www.standards.org.au
 - AS 2067 *Substations and high voltage installations exceeding 1 kV a.c.*
- GEC Management (editors), 1985. *Protective relays application guide.*

MINES SAFETY BULLETIN NO. 129

MANAGEMENT OF ASBESTOS-CONTAINING MATERIALS AT MINE SITES AND ACCOMMODATION

ISSUED: 14 MARCH 2016

Background

Asbestos-containing material (ACM) is any material or thing, that as part of its design, contains asbestos. Asbestos occurs naturally in some rocks and ore deposits and can therefore be encountered through mining processes (e.g. drilling, blasting, processing). However, this bulletin deals with the management of manufactured products that contain asbestos.

The term asbestos refers to six types of naturally occurring, fibrous, silicate minerals. Amosite (brown asbestos), chrysotile (white asbestos) and crocidolite (blue asbestos) were used in manufactured ACM products found in Australia. However, there are no known applications in this country for the other three forms of asbestos (actinolite, anthophyllite and tremolite) in manufactured ACM products.

ACMs were used extensively in Australian buildings, structures, plant, equipment and motor vehicles. Buildings and structures constructed or renovated between 1945 and the late 1980s may contain asbestos in areas such as ceilings, internal walls, roofs, eaves, external cladding, wet areas and vinyl floor tiles. Asbestos may also be present in brake pads, gaskets and seals, pipes and pipe lagging.

From 1985 the manufacture, importation and installation of products containing crocidolite and amosite was banned. This was followed in the late 1980s by the ban of their use in building products. On 31 December 2003, a national ban on all uses of chrysotile asbestos came into effect.

Summary of hazard

If not effectively managed, asbestos can pose a significant hazard on mine sites and in mine-site provided accommodation. Workers can be exposed to airborne asbestos fibres if ACMs are in a poor condition and/or disturbed. Asbestos poses a risk to health when fibres are inhaled. Most fibres are removed from the respiratory system by the body's natural defences (e.g. coughing). However, fibres that remain in the lungs may lead to asbestos-related diseases such as pleural disease, asbestosis, lung cancer and mesothelioma.

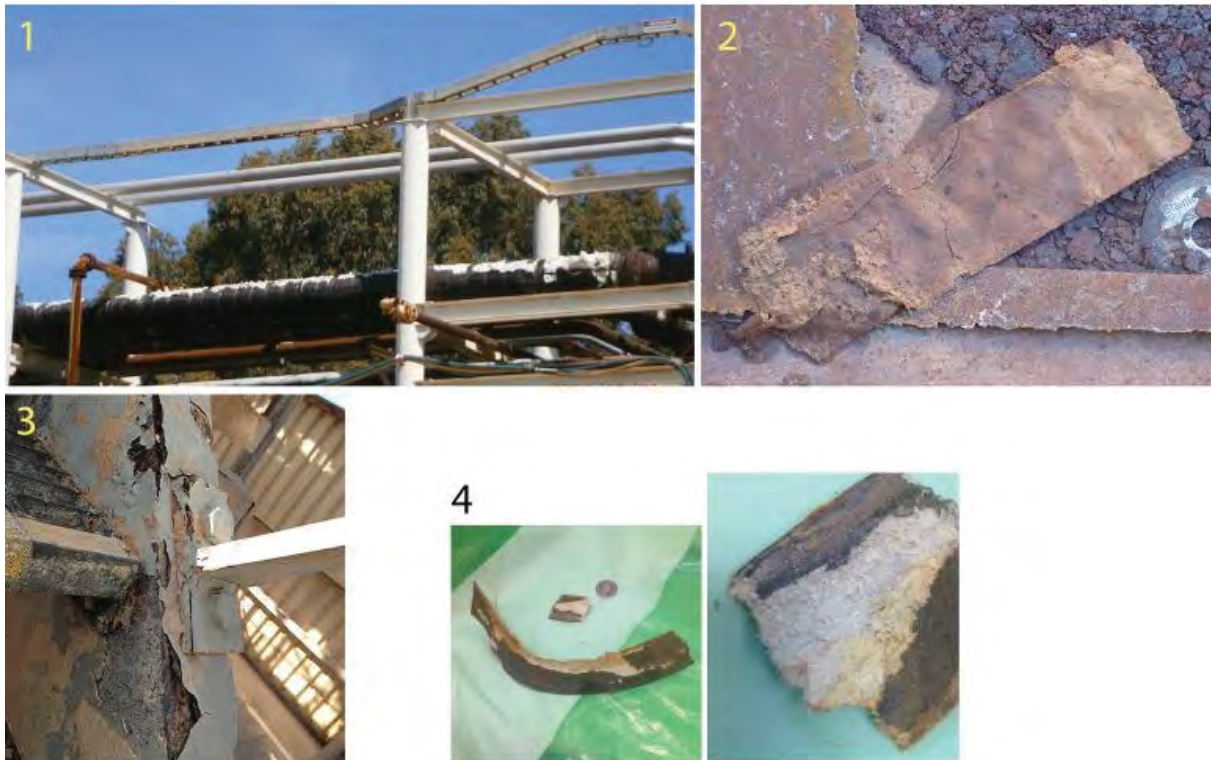
There have been several incidents on Western Australian mining operations where ACMs have only been discovered during the course of work activities, while workers were not wearing appropriate personal protective equipment (PPE). These include:

- pipes encased in black asphalt wrapping that contained asbestos were disturbed by construction equipment (including an elevated work platform and welding leads) during installation of a new pipeline
- asbestos tape, originally used to join steel plates, was disturbed by workers while replacing the roof of a thickener
- a gasket containing asbestos was removed from a filter pump by workers using an angle grinder during decommissioning works
- a coating containing asbestos (i.e. Coro-Kote) which had been painted on several walkways, was removed by a worker using a blow torch
- white, friable lagging containing asbestos was disturbed by workers maintaining a heat exchanger.

Contributory factors

- Disturbance of ACM by failure to:
 - identify asbestos hazards at the mining operation
 - prevent the potential release of airborne asbestos fibres
 - display appropriate signage and labelling warning of the asbestos hazard
 - remove ACM from site following advice from competent persons.
- Failure to use a respirator that was correctly fitted and of an appropriate type.

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Examples of manufactured ACM products. 1. Black asphalt wrapping containing chrysotile asbestos. 2. Asbestos tape used to join metal sheets in a thickener. 3. Damaged corrosion-inhibiting coating that contains asbestos. 4. Damaged gasket from filter made with asbestos.

Actions required

Mine operators are reminded of their duty to provide and maintain workplaces, plant and systems of work that do not expose workers to hazards.

The following actions are recommended to minimise, as far as is reasonably practicable, the hazards of ACM in the workplace.

Note: For more details refer to Safe Work Australia's How to manage and control asbestos in the workplace – code of practice.

ACM survey

- A competent person (e.g. occupational hygienist with asbestos experience, licensed asbestos assessor) should conduct a survey for asbestos or ACM in the workplace.
- A safe work procedure for collecting samples should be developed, implemented and used.

- Analyse known or potential samples of asbestos or ACM at a laboratory accredited by the National Association of Testing Authorities (NATA) who have accreditation for the relevant test method.

Site asbestos register

- Record the results of the workplace assessment survey in an asbestos register and include:
 - the date the asbestos or ACM was identified and its location
 - type and condition of the asbestos or ACM (e.g. friable or non-friable)
 - a photograph or drawings of the location.
- Make the register readily accessible to managers, supervisors, workers and health and safety representatives.
- Review the register at least every 5 years, including a visual inspection to determine any changes in the condition of the asbestos or ACM.

Asbestos management plan

- Develop an asbestos management plan that sets out how the asbestos or ACM will be managed, outlining how appropriate control measures will be implemented and maintained.
- The plan should be reviewed at least every 5 years and when the asbestos register is updated.

Note: Regulation 9.32A of the Mines Safety and Inspection Regulations 1995 prohibits the use of asbestos on mine sites. The term 'use' includes cleaning, maintaining, processing, producing and treating, but does not include removal and disposal of asbestos from a mine.

Training and competence

- Only permit an appropriately licenced asbestos removalists to remove ACM as prescribed by licencing conditions:
 - unrestricted licence (friable and non-friable)
 - restricted licence (>10 m² and non-friable).
- Train worker(s) in safe work procedures and systems of work before removal in instances where conditions do not require a licence (≤10 m² of non-friable ACM).
- Adequate health surveillance for workers must be carried out by employers where there is a risk of exposure to asbestos from ongoing licenced and unlicensed asbestos-related work (e.g. maintenance) [r 3.27 Mines Safety and Inspection Regulations 1995].

Preventing the disturbance of ACMs

- Make workers aware of asbestos hazards in their work environment through appropriate instruction, induction, training and supervision.
- Use appropriate signage and labelling to warn of the hazard.
- Refer to the asbestos register during risk assessments (e.g. JHAs) and prior to work that may disturb suspected asbestos or ACM.
- If there is uncertainty whether materials contain asbestos, either:
 - stop work and have a competent person take a sample
 - work under the assumption the product contains asbestos, with the appropriate competence and controls.

Responding to an asbestos incident

In the event asbestos is disturbed at a mine:

- report the incident to the Department as a potentially serious occurrence [s. 79 *Mines Safety and Inspection Act 1994*]
- restrict entry to the area through barricades, demarcation, and appropriate warning signage
- immediately implement and maintain suitable controls (e.g. wetting techniques) to minimise the spread of suspected asbestos fibres
- provide workers with adequate PPE, including at least a P2 respirator that complies with AS/NZS 1716 *Respiratory protective devices*
- effectively decontaminate the work environment to prevent the spread of asbestos fibres
- bag, contain, label and dispose of identified (or assumed) asbestos waste at an approved asbestos waste disposal facility
- investigate the incident and update the site's asbestos register and asbestos management plan and revise as necessary.

Further information

Codes of practice, standards and guides

- Safe Work Australia, www.safeworkaustralia.gov.au
 - *How to manage and control asbestos in the workplace – code of practice*
 - *How to safely remove asbestos – code of practice*
 - *Guidelines for health surveillance [NOHSC:7039 (1995)]*
 - *Code of Practice for the safe removal of asbestos (2nd Edition) [NOHSC:2002 (2005)]*
- Standards Australia, www.standards.org.au
 - AS 4964 *Method for the qualitative identification of asbestos in bulk samples*
 - AS/NZS 1715 *Selection, use and maintenance of respiratory protective equipment*
 - AS/NZS 1716 *Respiratory protective devices*
- Department of Mines and Petroleum, Safety guidance
 - Risk-based health surveillance and biological monitoring – guideline

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- Management of fibrous minerals in Western Australian mining operations – guideline www.dmp.wa.gov.au/Safety/Guidelines-16146.aspx
- Guidance about fibrous minerals hazards www.dmp.wa.gov.au/Safety/Guidance-about-fibrous-mineral-6877.aspx

Asbestos removal resources

- WorkSafe, Department of Commerce
 - Asbestos licencing, www.commerce.wa.gov.au/worksafe/asbestos-licence
 - Assessors, licence holders and training providers, www.commerce.wa.gov.au/worksafe/assessors-licence-holders-and-training-providers

MINES SAFETY BULLETIN NO. 130 AND DANGEROUS GOODS SAFETY BULLETIN NO 0116

GOLD-LEACHING REAGENT CONTAINING CYANIDE – INCORRECTLY LABELLED AND TRANSPORTED BY SUPPLIER

ISSUED: 10 MAY 2016

Background

An overseas-based company has been promoting a new product as a substitute for cyanide used in gold extraction. The company claims the reagent is environmentally friendly and can be safely transported by road, rail and sea. However, several mining companies receiving samples of the new reagent report that it contains between 17 to 27 wt % sodium cyanide (NaCN).

Summary of hazard

Samples of a reagent containing cyanide were transported in containers that were inappropriate for the hazardous nature of the contents. The containers and packaging were incorrectly labelled as non-hazardous and, with no indication that the packages contained a Division 6.1 toxic substance and dangerous good. This was in breach of the *Dangerous Goods Safety Act 2004*, *Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007* and the *Australian Dangerous Goods Code (Ed. 7.4)*.

Contributory factors

- The product information for the new leach reagent has been presented in a manner that disguises the fact it contains sodium cyanide.
- The material safety data sheet (MSDS) that accompanied the samples had conflicting information regarding the safe handling of the chemicals. In one section, for example, it requires the owner to abide by relevant hazardous chemical codes, whereas in others it states that the product requires no hazardous chemical labelling.



Product sample containing about 20 % wt sodium cyanide in original packaging

Actions required

- Exercise due diligence when dealing with companies claiming to have a substitute for sodium cyanide. Example product names are "EarthGold" and "Gold Dressing Agent".
- Exercise caution with MSDSs from companies with an unknown origin or reputation.
- Store and handle any product claiming to be a substitute for sodium cyanide as sodium cyanide until verified by a reputable testing agency. This includes labelling and storing the product as if it was a dangerous good, until proven otherwise.

Further information

- International Cyanide Management Institute, www.cyanidecode.org
 - *International cyanide management code for the manufacture, transport, and use of cyanide in the production of gold*
- National Transport Commission, www.ntc.gov.au/heavy-vehicles/safety/australian-dangerous-goods-code/
 - *Australian Dangerous Goods Code (Edition 7.4)*

MINES SAFETY BULLETIN NO. 132

RESTRAINING DEVICES ON SEATED- MODEL REACH TRUCKS

ISSUED: 14 JULY 2016

Background

A reach truck is a loading device that is used to arrange goods on pallets and insert pallets into tall shelving structures. A basic reach truck has an outriggering wheel mechanism on the front of the truck. Mounted to the outriggers are a set of telescoping forks that move up and down. The hydraulic forks allow an operator to pick up a load and reposition it over the outriggers. This not only provides an even balance of the load, but also makes it easier to manoeuvre the truck into narrow aisles between the storage shelves.

Summary of hazard

The Department of Mines and Petroleum has observed that a number of seated-model reach trucks used on Western Australian mines, were without a restraining device fitted (i.e. seat belt).

Use of reach trucks which do not have an approved seat belt fitted could potentially lead to serious injury or worse if the machine were to tip over, brake suddenly or strike an object.



Example of a seated-model reach truck

Contributory factors

- Some seated-model reach trucks are supplied to sites without a suitable seat belt being fitted to the operator's seat or the cockpit area.

Actions required

Seat belts for vehicles

Principal employers and mine managers are reminded under the Mines Safety and Inspection Regulations 1995 that the following is required.

- Each vehicle used at the mine is fitted with seat belts and seat belt anchorage points that conform with the Australian Design Rules [r. 4.16(1)(a)].
- If any seat position is added to a vehicle used at a mine, the seat is fitted with a seat belt and seat belt anchorage point that conforms with the Australian Design Rules [r. 4.16(1)(b)].
- If a seat is a suspension seat, the seat belt anchorage must be attached to the seat assembly and the seat belt fitted with the appropriate retractor [r.4.16(2)].
- A person must not, while occupying a seat position in a vehicle to which a seat belt has been fitted for that seat position, drive or travel in that vehicle at a mine unless the person is wearing that seat belt and the seat belt is properly adjusted and securely fastened [r. 4.16(3)].

Import requirements

Persons who import plant for use at a mine must ensure that they comply with regulation 6.9, Mines Safety and Inspection Regulations 1995, which requires:

- if the designer and manufacturer of plant are both outside the jurisdiction of the State, the importer of the plant must carry out the designer's duties, and the manufacturer's duties under regulations 6.3, 6.4, 6.7 and 6.8.

Further information

- Department of Infrastructure and Regional Development, https://infrastructure.gov.au/roads/motor/design/adr_online.aspx
 - *Third Edition Australian Design Rules*

MINES SAFETY BULLETIN NO. 133

UNLOADING OF POLY PIPE FROM VEHICLES OR TRAILERS

ISSUED: 30 NOVEMBER 2016

Background

There have been incidents on Western Australian mining operations involving the unloading of rolls of poly pipe from vehicles or trailers. These incidents have led to serious injuries and have had the potential for worse outcomes.

In June 2015, an underground operator became trapped beneath rolls of poly pipe that fell from a trailer during unloading. The operator was releasing tie-down straps securing the rolls, when the rolls of poly pipe toppled. He over balanced, fell from the truck tray to the ground, and was struck by the falling poly pipe receiving serious crush injuries.

In late-2014, there was a near-identical incident at another mine site. A freight truck driver entered five poly pipe rolls stacked on a trailer to release the two binding straps. When the rolls separated, the driver was dragged off the trailer by a roll of poly pipe and fell to the ground, receiving a compound leg fracture.

Summary of hazard

Hazards associated with unloading rolls of poly pipe are not being adequately assessed. These hazards include:

- instability of poly pipe rolls on release of load binders
- falls from height
- workers in the 'line-of-fire'
- stored energy – a roll of 110 mm poly-pipe weighs approximately 318 kg, when falling from a height, such as a trailer, the stored energy is significant.



Position of poly pipe after the incident. The forklift and hydraulic jacks were used to move the poly pipe to access the underground operator trapped beneath.

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Contributory factors

- Workers required to be on the truck tray and in close proximity to the load in order to release the load binders.
- There was no secondary restraint on the rolls of poly pipe after the release of the load binders.
- The loading and unloading procedure did not consider all of the hazards.
- A risk assessment, such as a job safety analysis (JSA) or similar, was not completed.
- Workers received only limited training in removing unstable loads from a trailer or flatbed truck.
- Site workers are unfamiliar with the task and associated hazards (e.g. in some instances transport company operators normally unload the poly pipe).

Actions required

The following actions are recommended to mining operations to assist in the development and implementation of safe systems of work for the transport, loading and unloading of poly pipe.

Engineering controls

- Consider the use of engineered structures (e.g. frames) to contain loads.

Risk assessment

- Review freight unloading procedures and adequacy of risk management controls.

Note: As part of the road transport chain, mining operators should review their responsibilities under the Road Traffic (Administration) Act 2008 and the Road Traffic (Vehicles) Act 2012.

- Conduct specific risk assessments (e.g. JSA) when job parameters change and where workers may not be familiar with the loading and unloading process.

Supervision

- Provide adequate supervision reflecting the knowledge, experience and training of workers as well as the nature of the task and associated hazards.

Training

- Confirm workers are aware of the hazards associated with the loading and unloading of freight.
- Train workers in the safe use of equipment for the loading and unloading of freight.

Further information

- Department of Mines and Petroleum, www.dmp.wa.gov.au/ResourcesSafety
 - Significant Incident Report No. 211 *Freight truck driver injured in fall from trailer*
 - Toolbox presentation *Why is falling from height a problem?*
- Main Roads, Chain of Responsibility
www.mainroads.wa.gov.au/UsingRoads/HeavyVehicles/Compliance/Pages/CoR.aspx

Note: This Mines Safety Bulletin was originally issued on 24 August 2016. It has been reissued to include reference to the 'Chain of Responsibility' provisions.

MINES SAFETY BULLETIN NO. 134

OVERLOADING OF BRIDGE AND GANTRY CRANES

ISSUED: 2 NOVEMBER 2016

Background

There have been several bridge and gantry crane incidents reported to the Department involving loading of a crane beyond its rated capacity. In two recent incidents, a crusher bowl (still partially attached to the supporting structure) was being lifted by a semi-gantry crane to allow the bowl to be rotated out of its support using hydraulic powered equipment.

In the first incident, there was a catastrophic failure of the hoisting rope.

In the second incident, the load limiting system (i.e. weight overload protection system) did not stop hoisting when the rated capacity of the crane was exceeded. The load display unit indicated that the hoisting load had reached around 140% of the rated capacity before the emergency stop was manually activated by the crane operator.

Summary of hazard

Operating any crane beyond its rated capacity has the potential to cause a catastrophic failure of the crane, its support structure or both due to associated loss of control of the load.

When control of the load is lost, workers on or near the crane may be exposed to harm.

Contributory factors

Work practices

- Inadequate assessment of the mass to be lifted prior to attempting the lift.
- Inability to determine the mass due to the load not being free for hoisting.

Design and construction

- Failure to disseminate adequate information on the load limiting system by designers, manufacturers, importers or suppliers of the crane.
- Inadequate design, construction and installation of the crane allowing load limiting systems to operate at environmental conditions above the manufacturer's recommended ratings (e.g. high operating temperatures).
- Inadequate fail-to-safe design and construction of the load limiting system (e.g. malfunction of load limiting device and associated electronic components could result in a loss of load control).
- Ineffective load display and warning devices when the load approaches or exceeds the rated capacity of the crane.

Commissioning and maintenance

- No calibration or incorrect calibration of load cells, load limiting and load display devices.
- Failure to perform functional testing of the load limiting device and its controls.
- Inadequate logging of service history data for preventative maintenance.

Actions required

The following actions are recommended for the safe operation of bridge and gantry cranes and to reduce the risk of harm to workers.

Work practices

- Use relevant guidance regarding lift planning (Australian Standards AS 2550.1 and AS 2550.3) – and perform a risk assessment for site-specific hazards not covered by these standards – to avoid loading a crane in an unsafe manner.
- Conduct a test lift when necessary, to ensure that the load is free, ready for hoisting, the winching system is operating correctly and the hoist brake can hold the load.

Mines Safety Bulletin No. 134 continued

Design and construction

- Designers, manufacturers, importers or suppliers of crane must provide adequate information regarding the specifications and testing of all safety devices, when the crane is supplied and subsequently whenever requested [section 14(1), *Mines Safety and Inspection Act 1994*].
- All safety devices, including the load limiting device and associated electrical components, should be rated for the environmental operating conditions to which they are likely to be exposed.
- The load limiting system should be fail-safe (e.g. the crane will stop hoisting or move in a way that will not cause overload or failure).
- Load display and warning devices should be fitted to the crane to indicate the actual loading and alert the operator when an overload condition is approached, reached or exceeded.

Commissioning

- Correctly calibrate and function test load cells, load limiting and load display devices.
- A classified plant inspector must confirm that all safety devices, including the load limiting system, have been correctly calibrated and functionally tested for their operation and test records have been signed.
- The load limiting device should be set to operate so that the safe working capacity of the crane is never exceeded.

Maintenance

- Review preventative maintenance systems for routine inspection, assessment and functional testing of all safety devices, including the load limiting system and load display device.
- Monitor and record actual service conditions, such as hours of operation and number of operating cycles (i.e. the design working period), that should trigger preventative maintenance.

Further information

- Standards Australia, www.standards.org.au
 - AS 1418.1 *Crane, hoists and winches – General requirements*
 - AS 1418.3 *Crane, hoists and winches – Bridge, gantry, portal (including container cranes) and jib cranes*
 - AS 2550.1 *Cranes, hoists and winches – Safe use – General requirements*
 - AS 2550.3 *Cranes, hoists and winches – Safe use – Bridge, gantry, portal (including container cranes), jib and monorail cranes*
 - AS 2549 *Cranes (including hoists and winches) – Glossary of terms*

MINES SAFETY BULLETIN NO. 135

SUPPORT CONDITIONS FOR PRESSURE VESSELS

ISSUED: 2 NOVEMBER 2016

Background

Under regulation 6.33 of Mines Safety and Inspection Regulations 1995 (MSIR), pressure vessels are required to be designed to Australian Standard AS 1210 *Pressure vessels*. This includes designing for all possible loading, as stated in section 3.2.3 of AS 1210, which includes horizontal forces such as wind, earthquake and external pipe loads.

To remain stable pressure vessel supports require resistance to uplift and sliding. It is unlikely that connecting pipework would have been designed to act as restraining members under these circumstances, unless it has been clearly stated on a design drawing.

The stability of pressure vessels also relies on a supporting structure which is designed by a competent person, applying the referenced standards in section 3.24.2 of AS 1210.

Inspectors have observed that the anchorage and vessel support information on some pressure vessel drawings is inadequate. There were also numerous instances where the support conditions for pressure vessels were not satisfactory.

Supports were observed:

- not anchored securely (no hold-down bolts)
- not anchored to a structural member
- with significant loss of material due to corrosion.

Some of these vessels had previously been inspected by a classified plant inspector. These inspections, recorded in the classified plant record book, noted no defects.

Potential defects of support condition cannot be remedied unless it is noted or recognised. Correct defect identification and subsequent remedial works will ensure conformity with the design intent and the ongoing integrity of the pressure vessels.

Summary of hazard

If pressure vessels are not anchored, or have inadequate support, horizontal forces can tip them over or cause uncontrolled movement. This can overstress the nozzle connections, pull flanges apart or result in other unexpected responses from the vessel, exposing personnel around the vessel to an increased risk of harm.

Contributory factors

- Support information is not documented in the pressure vessel design drawings.
- Poor condition of supports is not identified as a potential defect or hazard.
- Inspection personnel may not appreciate the scope of their responsibilities as required by the applicable Australian Standards.

Actions required

The following actions are recommended to duty holders to help prevent the uncontrolled movement of pressure vessels.

Design and build

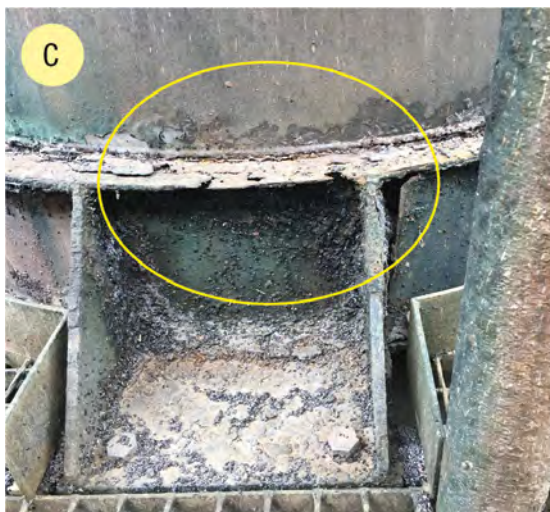
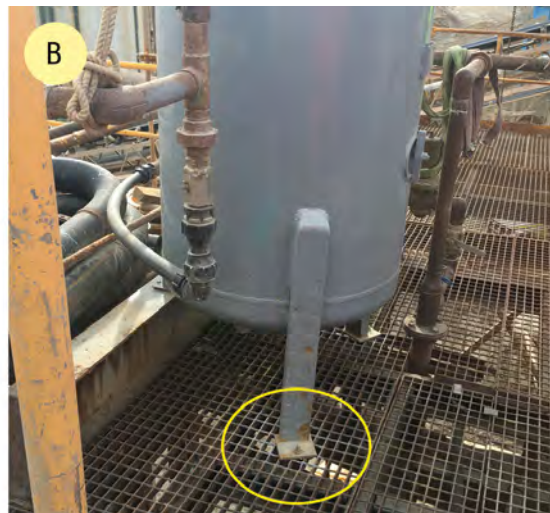
- Designers are reminded of their duty to provide design and installation information [r. 6.5 MSIR].
- Information on support conditions and anchorage detail of pressure vessels, as intended by the designer, should be presented in the drawings or installation procedure of the pressure vessel.
- Implement the designer's intent, including anchoring details, on site.

Maintenance and operation

- Employers are reminded of their general duties to maintain all plant [r. 6.2 MSIR].
- All pressure vessels are to be inspected, operated and maintained, using applicable parts of AS/NZS 3788 *Pressure equipment – in-service inspection* and AS 3873 *Pressure equipment – operation and maintenance* [r. 6.26 MSIR].

Note: Refer to section 4.4 of AS/NZS 3788 and section 3 of AS 3873 for inspection of the condition of supports.

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Pressure vessel supports. A. Unanchored vessel containing refrigerated argon gas. B. Air receiver leg anchored to grating only. C. Severe corrosion of a support bracket to an acid elution column (condition of shell unknown). D. Air receiver not bolted down and connection point corroding.

- Investigate and document defects, include probable causes and their effect on the fitness for service of the pressure equipment.

Note: Classified plant inspectors are to provide the findings of inspections in report form (section 2.3 of AS 3788) and supply to the report to the employer, so the employer's obligations under regulation 6.25 of the Mines Safety and Inspection Regulations 1995 can be met.

- A competent person must advise the employer which repairs are to be carried out to fix identified defects [r. 6.22 MSIR].

Further information

- Standards Australia, www.standards.org.au
 - AS 1210 Pressure vessels
 - AS/NZS 3788 Pressure equipment – in-service inspection
 - AS 3873 Pressure equipment – operation and maintenance

MINES SAFETY BULLETIN NO. 136

SAFE USE OF ANGLE GRINDERS

ISSUED: 3 NOVEMBER 2016

Background

An angle grinder is a common power tool used on mine sites for cutting, grinding, sanding and polishing. The portability and versatility of angle grinders means they can be used for a variety of tasks, each with its own hazards.

Summary of hazard

Contact with powered equipment with moving parts, such as angle grinders, can potentially lead to electric shock as well as abrasive, friction or cutting injuries.

Note: A recent incident from New South Wales illustrates the hazards involved in using these tools, when a person's hand was severed while working at home.

From 01 January to the 21 October 2016 the Department of Mines and Petroleum received 28 injury notifications for workers who were using either a four- or five-inch angle grinder.

In 32% of notifications the injury was a laceration. In one of these incidents, the worker was off work for 35 days, while in another incident, facial surgery was required.

In over 60% of all notifications an electric shock was received, either from the angle grinder directly, or alternatively, from the electrical lead, plug or generator.



Example of a hand-held angle grinder

The Department is concerned about the use and maintenance of these types of tools.

Contributory factors

Generally, an injury from an angle grinder can arise from:

- the angle grinder "kicking-back" while in operation
- poor work methods (e.g. one-handed operation) which result in a loss of control of the tool
- fluid (e.g. process liquors) coming into contact with the angle grinder while in use
- poor storage practices, resulting in the angle grinder's internals becoming damp
- electrical leads not being managed correctly
- undetected damage to the angle grinder, electrical leads or sockets prior to use
- not replacing or using the auxiliary handle when required.

Actions required

Safe systems of work and operator vigilance are critical when operating angle grinders. The following actions are recommended:

Management and supervisors

- Purchase and/or fit angle grinders with appropriate safety features (e.g. anti-kickback safety clutch, soft-start vibration-reducing handle, "dead-man" or paddle switch, noise-reduction grinding disc).
- Establish safe systems of work for tasks involving the use of angle grinders.
- Confirm workers are fully trained and competent to use an angle grinder, and are aware of the site's strategy for reducing the risk of hand-arm vibration syndrome.
- Provide adequate supervision for those required to use an angle grinder.

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Supervisors and workers

- Conduct a task-based risk assessment before commencing work and review it if work conditions change.
- Determine if an angle grinder is the appropriate tool for the task being undertaken, paying particular attention to the materials being worked upon.
- Confirm the angle grinder has the appropriate safety features and is in good working condition, including all electrical leads and connections.

Workers

- Follow the site's safe system of work for the task.
- Use the correct disc for the task (e.g. do not use a cutting disc for grinding) and confirm that any after-market products are safe to use with the specific make and model of angle grinder.
- Use the recommended safety equipment provided, including all appropriate guards and personal protective equipment.

Further information

- Department of Commerce, Angle grinders, www.commerce.wa.gov.au/worksafe/angle-grinders
- WorkSafe Victoria, *Safe use of angle grinders – guidance note*, www.worksafe.vic.gov.au/info
- Department of Mines and Petroleum, *Manual tasks in mining fact sheet No. 7: Hand-arm vibration*, www.dmp.wa.gov.au/Safety/Information-sheets-and-16176.aspx

MINES SAFETY BULLETIN NO. 137

HAZARDS ASSOCIATED WITH HELICOPTER LIFTING OPERATIONS

ISSUED: 18 NOVEMBER 2016

Background

Mine sites and exploration activities may require helicopters to conduct lifting operations. The use of helicopters for lifting and transporting equipment requires an understanding of the dynamic forces applied during the lift and the required working load-limits of the lifting system.

Summary of hazard

During helicopter lifting operations, additional dynamic forces are exerted on the slinging equipment during the flight. These forces may be due to:

- banking or manoeuvring of the helicopter
- changes in helicopter travel speed
- wind and weather conditions (e.g. turbulence)
- potential aerodynamic effects from the load.

These additional dynamic forces may cause damage or failure of the lifting equipment, which can potentially result in loss of control of the helicopter and/or the load.

Contributory factors

- Ground crew and helicopter pilot not taking into account the dynamic forces that may be encountered during the lifting operation (e.g. slinging the load for static lift operations only).

Actions required

Principal employers, mine managers and supervisors of helicopter lifting activities are reminded of their duty of care obligations under the *Mine Safety and Inspection Act 1994*. The following actions are recommended to reduce the potential for incidents during helicopter lifting operations.

Competency

- Verify persons involved in planning and performing helicopter lifting activities are trained and competent for their role. For example, consider the use of a specialised crew to conduct the lifting operations.
- Confirm the helicopter and helicopter pilot(s) meet the requirements of Part 61 of the Civil Aviation Safety Regulations 1998 and section 29.6 of the *Civil Aviation Orders Air service operations – Helicopter external sling load operations*.
- Verify that the rigging of the load is carried out by licenced and competent person(s).

Lifting operations

- Conduct a suitable risk assessment prior to commencing the task. For example, consider the use of suitable lift plans or lift studies for the task.
- Ensure the load does not exceed the dynamic and/or static design capacity of the helicopter and lifting equipment.
Note: Some helicopter manuals recommend for any cargo sling operations the sling equipment utilised must be capable of carrying three times the maximum anticipated load.
- Verify the integrity, stability and aerodynamic factors of the loads before lifting.
- Confirm that the pilot in control of the lifting operation has approved the size and weight of the loads to be hoisted, and the method by which they are attached to the helicopter.
- Verify equipment is fit-for-purpose, suitable for the operating conditions, and designed and manufactured to the required standards.
- Confirm all lifting equipment has been inspected by a licenced and competent person prior to use.
- Suitably brief all personnel involved in the operation before commencing the task.
- Establish and maintain suitable communications between the ground crew and the pilot.

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Further information

- Civil Aviation Safety Regulations 1998, Flight crew licensing – Part 61, www.casa.gov.au/standard-page/flight-crew-licensing-part-61
- Federal Register of Legislation, Legislative instruments, www.legislation.gov.au/Browse/Results/ByTitle/LegislativeInstruments/InForce/C/37/0/all
 - *Civil Aviation Order 29.6 – Air service operations – Helicopter external sling load operations*
- Department of Mines and Petroleum, What high risk work needs to be licensed? www.dmp.wa.gov.au/Safety/What-high-risk-work-needs-to-be-6217.aspx
- Department of Mines and Petroleum, Information sheets, www.dmp.wa.gov.au/Safety/Information-sheets-and-16176.aspx
 - *Frequently asked questions on dogging and rigging – information sheet*

MINES SAFETY BULLETIN NO. 138

ELECTRICAL ARC FLASH HAZARDS IN MINING

ISSUED: 7 DECEMBER 2016

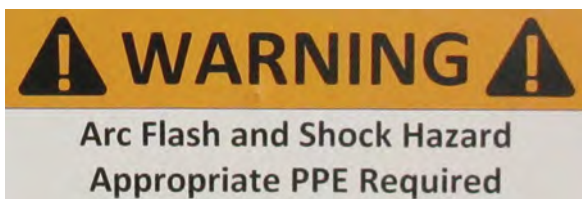
Background

Over the five years from 2011 to 2015, 13 workers on Western Australia mine operations received injuries from arc flash incidents that required medical attention and were placed on restricted duties or lost time.

In the last three years, Resources Safety has published seven Significant Incident Reports covering arc flash incidents. Across industry there appears to be a lack of awareness of arc flash hazards and the need to put controls in place.

Summary of hazard

An arc flash is a dangerous condition associated with the uncontrolled release of energy caused by an electric arc. The temperature of the arc can be as much as four times that of the sun's surface, and it can vaporise a copper conductor to several thousand times its solid volume in a fraction of a second. The resulting explosion, or arc blast, can seriously harm people and damage equipment.



Contributory factors

Arc flash injuries usually arise when work is being conducted close to energised equipment without effective controls. For example:

- workers not wearing appropriate and adequate personal protective equipment (PPE)
- electrical equipment and cables not tested for insulation resistance prior to energising
- risk assessment not undertaken for a change in the isolation process
- work performed outside of the safe work instruction or procedure
- switchgear not subject to an adequate maintenance, test and repair program
- electrical drawings not updated to reflect changes to the electrical installation
- protection settings not calculated and set correctly.

Actions required

So far as reasonably practicable, the potential for arc flash should be minimised by using the hierarchy of control as a guide (i.e. elimination, substitution, isolation, engineering, administration, PPE). The following actions are recommended to reduce the potential for arc flash incidents and the risk of harm to workers.

Design and installation

- Design, install, test and maintain electrical installations and equipment in accordance with the relevant standards.
- Where practicable, consider installing or retrofitting equipment such as remote switching and racking of circuit breakers, arc fault contained switchgear and/or arc flash detection systems.
- Ensure electrical drawings are updated and correctly reflect the current installation.
- Conduct a protection coordination study to provide the best possible fault clearance times to limit arc flash energy levels arising from a fault.
- Conduct an arc flash energy assessment of all switchboards and motor control centres (MCCs), and attach arc flash hazard labels so that workers are aware of the hazards and use appropriate arc flash PPE and work practices.

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Supervision and training

- Provide sufficient supervisors to ensure effective supervision of electrical work.
- Educate electrical workers, supervisors and engineers about arc flash hazards.
- Confirm the competence of workers before they undertake unfamiliar electrical tasks.
- Monitor the effectiveness of, and compliance with, safe systems of work and PPE.

Work practices

- Develop, implement and review safe work procedures for electrical maintenance tasks, especially if the tasks involve working near energised equipment (e.g. fault finding).
- Undertake a risk assessment prior to electrical tasks and every time the situation or scope of work changes.
- Routinely inspect, test and maintain electrical switchgear, having regard for the original equipment manufacturer's specifications.
- Report defects or damage to electrical equipment to the manager or electrical supervisor.
- Identify all electrical supplies associated with a work task, apply isolation to the correct item of plant, and test that the isolation is effective.
- Operate electrical equipment as intended by its design.
- Consider additional control measures when working close to energised equipment (e.g. reduce protection tripping levels and operating times, install temporary barricades or shields).
- Wear appropriate PPE where there is the potential for arc flash or inadvertent contact with energised parts.

Further information

- Department of Mines and Petroleum, Mines safety alerts, www.dmp.wa.gov.au/Safety/Mines-safety-alerts-13194.aspx

DANGEROUS GOODS SAFETY BULLETIN NO. 0216

LOAD RESTRAINT SYSTEMS FOR PACKAGED DANGEROUS GOODS

ISSUED: 3 AUGUST 2016

Background

When transporting packaged dangerous goods there is a requirement for the load to be restrained in a manner that will prevent any movement during transport that could change the orientation of the packages or cause them to be damaged. This can take the form of the primary load restraints which include, but are not limited to, fastening straps, sliding slatboards, adjustable brackets and chains.

In addition, secondary load restraints are required in the form of rigid sides or gates of sufficient height for the load. On the 14 November 2012, the Competent Authorities Panel gave an exemption (CA2012/185) for consignors, loaders, prime contractors and drivers to be able to use an approved load-restraint curtain system instead of rigid sides or gates.

Guidance on stowage and restraint can be found in the *Further information* section.



Summary of hazard

There has been an increase in the number of observed and reported instances of non-compliant load restraint of packaged dangerous goods on Western Australian roads. It has also been reported to the Department that incorrect information appears to be circulating regarding to the use of load-rated curtains.

Examples include:

- incorrect, absent or poorly applied load restraint
- use of non-approved load restraint systems.

Note: Only an approved load-restraint system will ensure an exemption from the requirement for rigid sides or gates on a vehicle when transporting packaged dangerous goods.

Insufficient or incorrect restraint has the potential to damage dangerous goods packaging, other goods and equipment. This can lead to spills, leaks, and the release of fumes and gases which could affect the driver, the public and potentially result in an incident.



Restrained load examples. Left: Correctly restrained load with primary and secondary restraint (behind gates). Right: Incorrectly restrained load – rigid sides of insufficient height for load (e.g. load protruding more than 30 per cent above the rigid sides) and no gates.

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Contributory factors

- Confusion regarding load restraint requirements for packaged dangerous goods.
- Drivers, loaders and supervisors are unaware of correct restraint procedures.

Actions required

Prime contractors are reminded of the requirements to restrain loads in accordance with regulation 128 Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007.

The following actions by prime contractors, consignors, loaders and drivers will ensure the appropriate stowage and restraint of packaged dangerous goods for safe transport.

Risk management

- Develop, implement and review restraint procedures for packaged dangerous goods.

Equipment

- Develop, implement and review load restraint systems.
- Assess suitability of restraint equipment (e.g. approved, rated, fit-for-purpose).
- Maintain and inspect restraint equipment on a regular basis.

Training

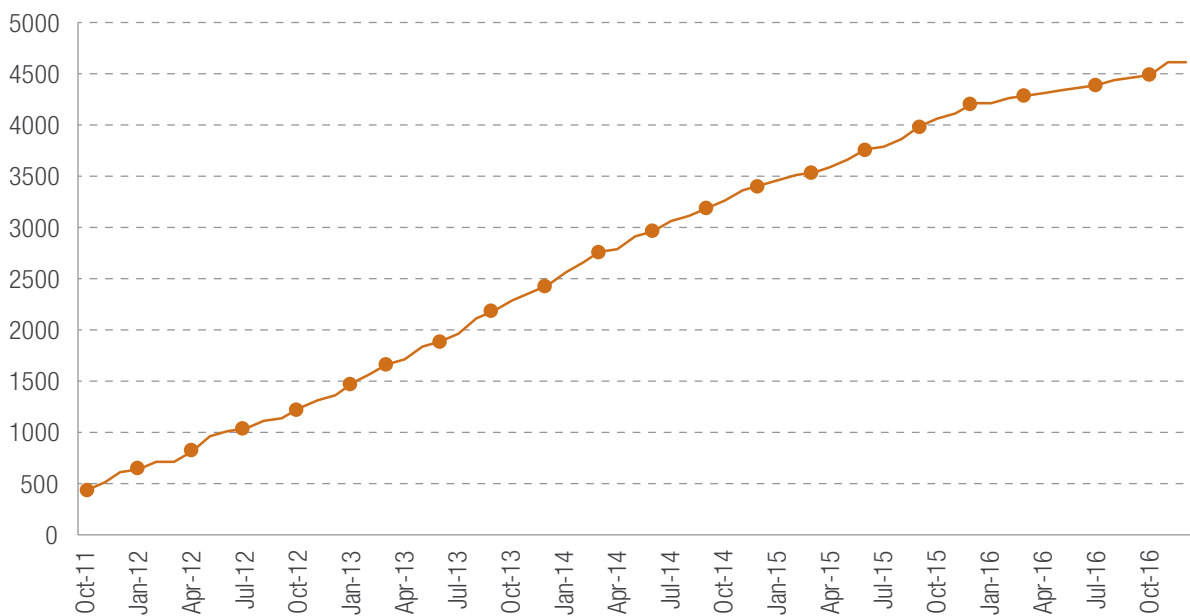
- Train supervisors, loaders and drivers in appropriate methods of load restraint, using a competent person with relevant industry background.

Further information

- National Transport Commission
 - *Australian Code for the Transport of Dangerous Goods by Road and Rail (Edition 7.4)*, www.ntc.gov.au/heavy-vehicles/safety/australian-dangerous-goods-code/
 - Load restraint guide, www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/
- Department of Infrastructure and Regional Development, The Competent Authorities Panel – National exemptions, approvals and determinations
https://infrastructure.gov.au/transport/australia/dangerous/competent_authorities.aspx



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