



FATAL HAZARD PROTOCOLS

OPERATIONS AND PROJECTS

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**COAL ASSETS
AUSTRALIA**

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GLENORE



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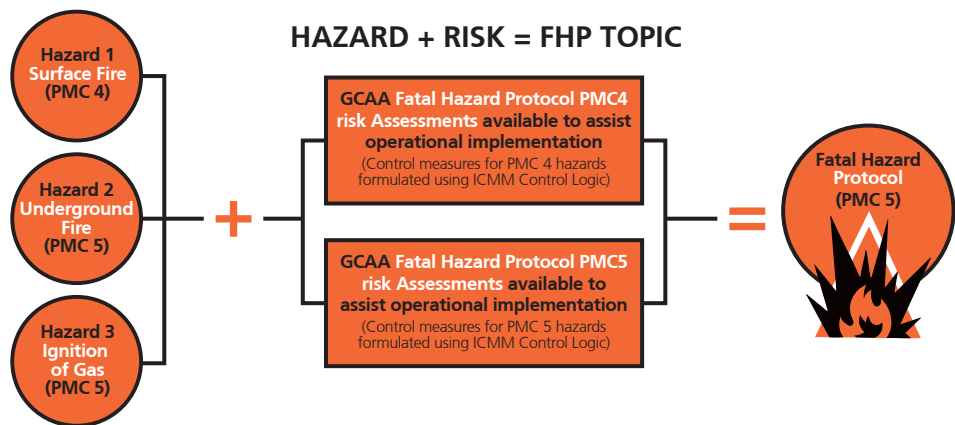
Glossary

BACKGROUND

A review of fatalities, high potential risk incidents (HPRIs) and serious incidents identified the need for an intervention program to improve our health and safety performance. This GCAA program is called *SafeCoal*, and one of its main initiatives is to focus on fatal hazards (Potential Maximum Consequence (PMC) Level 4 and 5).

The *SafeCoal* program includes, several hazard protocols and *SafeCoal* rules. The protocols, associated with *SafeCoal* are referred to as Fatal Hazard Protocols (FHPs)

The FHP's exist to establish a consistent approach to the management of Fatal Hazards across all our operations. The full scope and background is contained within, *GCAA Protocol HSEC- FHP Protocol Management Protocol M*.



Individual Protocol topics address both single and multiple fatal hazard/s. Singular Protocol topics include Major or Catastrophic risks based on the Potential Maximum Consequence (PMC).

Catastrophic hazards are managed through identified critical controls, these are detailed in each Protocol to show the connection between the risk, hazard and assessments. *GCAA Protocol HSEC- Catastrophic Hazard Management Protocol*.

A diagrammatic representation of the links between the Fatal Hazard topics and catastrophic hazards is included at the back of the document, "Connecting the Risks".

The Protocols may not represent all of the fatal hazards that may exist or be faced by our operations, other hazards and associated risks are being, or will be, addressed through existing risk management processes, in accordance with GCAA Standard *FIN – Risk Management*

FHP's must be implemented in line with other GCCA systems and relevant local legislation, standards, codes and additional external requirements as appropriate.

COMMITMENT TO SAFECOAL

SafeCoal is the production of coal with the certainty that there will be no fatalities or injuries to people working in or around our operations.

We are committed to a workplace free of fatalities and injuries.

We are absolutely committed to making *SafeCoal* a reality and this can only be achieved with the combined commitment of every member of our team and other relevant stakeholders.

It is the responsibility of every member of our team to identify risks associated with their work and ensure these are managed and controlled.

SafeCoal can only be as effective as the commitment we make to implementing these protocols whilst continuing to be vigilant regarding the health and safety of others and ourselves.

Ian Cribb

Chief Operating Officer



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STRATA FAILURE

RELEVANT SAFE^{COAL} RULES

- 4. Never enter no-go zones
- 6. Never attend work under the influence of alcohol or illicit drugs. Consumption on site is prohibited

- 8. Never enter under unsupported roof
- 10. Always consider health and safety implications when planning

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks related to a strata failure event in an underground and or surface environment.

Mandatory Requirements

1.1 General

- 1.1.1 Geotechnical/geological surveys and analysis of the conditions are likely to be encountered including the presence if any faults, dykes and other geological features are to be conducted.
- 1.1.2 A strata failure risk assessment is to be conducted and documented to identify and assess strata-related risks. A Strata Failure Management Plan is to be developed, implemented and maintained to eliminate, or control the risks.
- 1.1.3 The risk assessment is to, as a minimum, give consideration to the following matters:
 - a) Mine design, layout and plans
 - b) Strata failure modes
 - c) Existing and proposed support systems and design criteria
 - d) Exposure of personnel to strata failures; and potential windblast conditions/events
 - e) The local hydrogeological environment, including surface and ground water.
- 1.1.4 The Strata Failure Management Plan is to include the following minimum requirements:
 - a) Appropriate factors of safety in the mine and pillar design that take into account relevant geotechnical and / or geological factors
 - b) Inspection, monitoring and surveys including the type and frequency requirements
 - c) Assessment and mapping of changing geotechnical and/or geological conditions
 - d) Support rules or slope design and stability analysis
 - e) Trigger Action Response Plans (TARP) that define risk based response to manage or react to changes
 - f) Rules and/or controls to prohibit personnel from working under unsupported roof and rules to control access when required to work in close proximity to any slope stability hazard
 - g) Identification of training needs of relevant employees and contractors in relation to strata management and failure, and the provision of adequate training and assessment to verify competency
 - h) Assessment to confirm that mining has been conducted to design.

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- 1.1.5 Records are to be maintained of data and calculations used in the development of mine designs and Strata Failure Management Plans.
- 1.1.6 The Strata Failure Management Plan is to be reviewed annually by a third party expert and/or following the reporting and investigation of any significant strata failure event.

1.2 Underground

- 1.2.1 The Underground Strata Failure Management Plan is to include the following requirements:
 - a) Development of controls following the assessment of the stability of roadways and work areas
 - b) Development of support measures that provide stability including maximum roadway width and minimum dimensions of coal pillars
 - c) Maximum distance roadways can be advanced before support is installed
 - d) Additional support required when carrying out work in areas above normal operating height dimensions
 - e) Adequate controls to manage surface subsidence impacts relating to health and safety of employees, contractors and/or the general public
 - f) Installation of strata monitoring devices based on risk
 - g) Frequency and method of testing rock bolts, cables and other support elements for effectiveness
 - h) Inspections of strata conditions and strata support in:
 - ▶ Active and accessible workplaces
 - ▶ Shafts, declines, access ramps, airways, escape ways, etc
 - ▶ Other sections, e.g. workshops, fuelling areas, storage locations, crib rooms, and similar.

1.3 Surface

- 1.3.1 The Surface Strata Failure Management Plan is to include the following requirements:
 - a) Controls to manage the stability of highwalls, low walls, overburden dumps and benches
 - b) Controls to be established following the assessment of the stability of the ground and materials that are to be stored in stockpiles
 - c) Provision of controls (e.g) berms so than any falling material will not expose personnel or equipment to undue risk
 - d) Provision of adequate controls (e.g. berms) to prevent personnel and equipment being exposed to edge failure
 - e) Controls to manage the impacts of subsidence from augering and underground mining activities

- f) Controls to manage the stability of the walls or sides of an excavation or trench
- g) Management of railway cuttings which are the responsibility of the operation, including design, maintenance and inspection.

Further Considerations

1.4 General

- 1.4.1 Where applicable to the Operation, or a risk is identified, consider the use of the following equipment or processes:
 - a) Using real time strata movement detection systems for both underground and open cut mines e.g. radar for monitoring and trending highwall and low wall movements; longwall face pressures for detection of roof weighting events.

ASSOCIATED CATASTROPHIC RISKS



SURFACE STRATA



UNDERGROUND STRATA

CRITICAL CONTROLS

Strata Failure (surface)

- F1-1** Design slopes and mine to design
- F1-2** Identify, monitor and manage geotechnical changes
- F1-3** Evacuate and withdraw personnel
- F1-4** Maintain void water and groundwater levels at specified limits
- F1-5** Direct and store water away from geotechnical sensitive areas
- F1-6** Establish standoff / no-go / exclusion zones
- B1-12** Emergency response activated

Strata Failure (underground)

- C1-1** Design the pillars and mine the roadways as per the pillar design
- C1-2** Design the mine and drive roadways / excavations to the mine plan (includes single entries)
- C1-3** Design and install support plans for roof and ribs
- C1-4** Monitor and respond to strata movement and support deterioration
- C1-5** Remove and re-install support as per the plan
- C1-6** Design longwall face support plans and install as per the plan
- C1-7** Design longwall recovery process (strata support and sequence) and recover as per the plan
- C1-8** Re-evaluate failure mechanisms when redesigning the support and recovery process
- C1-9** Withdrawal of personnel to a place of safety
- C1-10** Exclusion zones identified and barriers installed

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FIRES AND EXPLOSION

RELEVANT SAFECOAL RULES

- 5. Never operate equipment unless authorised
- 7. Never modify safety devices without permission

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks related to unplanned or uncontrolled fire or explosion.

Mandatory Requirements

2.1 General

2.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with fires and explosions. This includes assessing the risks and implementing controls. As a minimum, the risk assessment is to give consideration to:

- a) Sources of ignition
- b) The presence of combustible material
- c) The presence of explosive gases and atmospheres
- d) The storage of incompatible substances.

2.1.2 The Operation is to develop, implement and maintain a management plan for fire and explosions, based on the risk assessment. As a minimum, the management plan is to include specific requirements for:

- a) Fire and explosion prevention
- b) Fire and explosion control
- c) Firefighting equipment, including the availability of an adequate water supply

- d) Reference to other applicable related management plans such as spontaneous combustion and dust suppression
- e) Installation of fire and explosion detection, monitoring and suppression systems, commensurate with the fire and explosion related risk, in appropriate locations and on relevant items of plant and equipment; i.e. heat or smoke detectors, gas detection systems, gas, foam or water deluge systems, explosion suppression systems, hydrants and hoses and portable fire extinguishers
- f) Installation of systems including both periodic and continuous monitoring of the status of fire and explosion risk
- g) Inspection, testing, calibration and maintenance of fire and explosion detection and monitoring systems in compliance with site strategies and manufacturer's specifications
- h) The use of a permit system or other documented process whenever a fire or explosion detection, monitoring or suppression system is off line

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- i) Displaying up to date copies of the Fire Fighting Control Plans in prominent locations, such as control rooms, muster areas, crib rooms, supervisor stations and office areas. The plans are to include the location of fire equipment, hydrants and other mandatory items
 - j) Developing, implementing and maintaining a register of fire monitoring, detection, suppression, firefighting and emergency response and rescue equipment
 - k) The actions to be undertaken upon discovery of a fire or an explosion risk such as elevated gas levels.
- 2.1.3 Where hot work is to be completed outside of a designated hot work area, a hot work permit system is to be used (refer to *GCAA Permit HSEC – Hot Work (surface)*).
- 2.1.4 Where hot work is completed within a designated hot work area, a hot work permit is not required, except where an area is deemed hazardous (within 15 metres of flammable liquids, vapours, gases, combustible liquids, dusts or fibres, or other flammable or explosive substances are present including equipment with fuel in the tank or exposed hydraulic areas).
- 2.1.5 Where hot work is completed in a hazardous area, it is mandatory that a fire watcher be stationed in the area of the hot work to continuously monitor the job during the hot work, and for a minimum of two hours (and up to four hours, dependent upon the risk) after task completion. The role of the fire watcher is to continuously monitor for fire outbreak and this person is not to be given other duties or leave the location unless replaced. The fire watching time may be reduced to 30 minutes if a thermographic camera is used to detect presence of heat and verify that no ignition source remains. Cameras are to be properly calibrated, maintained and operated by a competent person.
- 2.1.6 Where an explosion risk is present, standards for the purchase, installation, commissioning, use and maintenance of equipment are to be developed, implemented and maintained.
- 2.1.7 Where there is a risk of spontaneous combustion, frictional ignition or high levels of flammable gas being present, issue-specific processes are to be developed,

implemented and maintained for each of the hazards.

- 2.1.8 Prior to the use of polymeric chemicals, risks associated with storage, handling and use are to be assessed. Consideration is to be given to limitation of application volumes, placement method and interaction with the chemicals.

2.2 Training and Competency

- 2.2.1 Identification and maintenance of training needs and competency requirements of relevant employees and contractors in relation to fire and explosion, inclusive of relevant procedures and permits. Provision of adequate training and assessment of competency.
- 2.2.2 Specific competency is to be assessed before working on explosion-protected equipment.

2.3 Underground

- 2.3.1 Where the risk of ignition of gases and coal dust exists in an underground coal mine, the Operation is to complete a documented technical assessment. Sources may include initiation by electrical arcing, lightning, frictional ignition, spontaneous combustion or fire. The assessment is to include sampling and laboratory testing and is to be completed for the seam gas content, frictional ignition potential and spontaneous combustion potential.
- 2.3.2 Where a flammable gas risk exists, the controls are to include:
- a) A real time system that monitors concentrations of gases in return airways and ventilation splits
 - b) A tube bundle system for monitoring gas concentrations in sealed or abandoned areas of the mine
 - c) Setting of threshold levels for the monitoring of gases
 - d) Appointment of competent persons to monitor and take action when an alarm is triggered
 - e) Maintaining a record of alarm events
 - f) A regime for monitoring gas levels in intake and return airways, sealed areas and work areas
 - g) Installation of flammable gas monitors on coal cutting machinery and either installed or carried on diesel vehicles operating in hazardous zones

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- h) Installation of ventilation structures, e.g. stoppings and seals, which are designed and constructed to a standard that is commensurate with the risk potential
 - i) The development, implementation and maintenance of a Ventilation Management Plan and appropriate procedures to provide adequate ventilation to remove, dilute and control explosive levels of mine gases
 - j) Equipment that is designed, approved, installed, used, inspected and maintained to operate safely within hazardous zones
 - k) The prohibition of smoking, smoking-related products, any non-approved tool or other device capable of creating a spark or flame, which is able to ignite flammable gas.
- 2.3.3 Where a coal dust risk exists, the controls are to include:
- a) The minimisation of coal dust generated from the cutting, transport and transfer of coal, through the use of water suppression and/or scrubber systems and appropriately designed equipment
 - b) The removal of accumulations of coal dust
 - c) Procedures and methods for the application of stone dust, or another explosion inhibitor, in quantities that will prevent the propagation of an explosion initiated at any location in the mine
 - d) Controlling the means by which the stone dust, or other explosion inhibitor, is to be applied to surfaces in close proximity to the working faces and intake and return roadways
 - e) Procedures and methods for the examination, sampling and testing of roadway dust. The methods for sampling are to incorporate a combination of spot and strip samples taken at set frequencies depending on location.
- 2.3.4 Where a frictional ignition risk exists, the controls are to include:
- a) Verifying the drums and picks fitted to cutting equipment are designed to eliminate or minimise the potential of a frictional ignition event
 - b) Using adequate water sprays for suppressing any sparking associated with cutting
 - c) A program that inspects and maintains water sprays, picks and cutting drums to an appropriate standard
 - d) Ventilation of the cutting area to remove or dilute any accumulation of flammable gases to below statutory limits
 - e) Appropriate gas fire extinguishing equipment maintained in close proximity to the face;
 - f) Cutting procedures that minimise the risk of frictional ignition, such as the intersection of gas drainage holes
 - g) Roof and rib bolting procedures that minimise the risk of frictional ignition, particularly over-spinning of bolts or heat generation in or near the roof and rib.
- 2.3.5 Where a spontaneous combustion risk exists, the controls are to include:
- a) A real time system that monitors concentrations of gases in return airways and ventilation splits
 - b) A tube bundle system for monitoring gas concentrations in sealed or abandoned areas of the mine
 - c) The analysis of bag samples using a gas chromatograph
 - d) Developing, implementing, and maintaining Trigger Action Response Plans (TARPs) for indicators of spontaneous combustion
 - e) Management of stowage around the mine
 - f) A procedure to manage spontaneous combustion in relevant areas of the mine, including sealing and inertisation.
- 2.3.6 Where a risk from lightning-initiated gas ignition exists, the Operation is to develop, implement and maintain a Lightning Management Plan, based on a lightning risk assessment. It is to involve a subject matter expert and include the following:
- a) The electrical resistivity of the strata at the operation
 - b) Assessment of any conductive boreholes that enter the workings including location and application
 - c) Installation of gaps in roof and rib mesh
 - d) Document all possible connection points
 - e) Require the completion of lightning mitigation studies on mine infrastructure such as conveyors, pipelines, communication cables and power cables that enter the mine via standard portals

- f) Remove all conductive cables, pipes and other structures from areas that will become sealed if these items are greater than 20 metres in length
- g) Processes to prohibit shotfiring during times of high lightning activity.

Further Considerations

2.4 General

- 2.4.1 Operations are to consider as part of their continual improvement and good practice initiatives:
 - a) Identification of aspects of machines or installations with the potential to cause a fire or explosion such as turbochargers, lack of segregation of heat and ignition sources from fuel sources, inadequate routing, protection or restraint of fuel lines and hydraulic hoses, damage etc.; if appropriate, carry out modifications to the equipment to minimise the risk.

Notes:

Where applicable, develop all permits to align with GCAA *Work Authorisation and Permit Management*. Refer to GCAA Protocol *HSEC - Work Authorisation and Permit System*.

ASSOCIATED CATASTROPHIC RISKS



UNDERGROUND FIRE IGNITION OF GAS

CRITICAL CONTROLS

Underground Fire

- E1-1 Face equipment protective devices
- E1-2 Electrical protection systems
- E1-3 Engine protective devices on underground diesel powered equipment
- E1-4 Fixed plant protection devices
- E1-5 Fire resistant and anti-static (FRAS) conveyor components
- E1-6 Removal / segregation of potential fuel sources from hot work area
- E1-7 Limited application volumes, placement and interaction of polymeric chemicals
- E1-8 Firefighting equipment is available, functional and used
- E1-9 Response to gas monitoring for products of combustion (fire)
- C1-9 Withdrawal of personnel to a place of safety
- A1-10 Self-escape infrastructure is available and functional and donned as required

Ignition of Gas

- A1-1 Design, install and operate the ventilation system and gas systems
- A1-2 Gas at acceptable levels prior to restoring power underground
- A1-3 Maintain gas concentrations outside of flammable and explosive limits
- A1-4 Inductive / conductive paths into underground workings containing gas are eliminated
- A1-5 Sharp picks and water sprays are operational
- A1-6 Methane detectors and monitors on equipment
- A1-7 Only explosion protected equipment used in hazardous zone / Explosion Risk Zone
- A1-8 Fan power interlock on main and auxiliary fans
- A1-9 Application of stonedust
- A1-10 Self-escape infrastructure is available / functional and donned as required
- E1-8 Fire fighting equipment is available, functional and used

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MOBILE EQUIPMENT

RELEVANT SAFEKOAL RULES

- 4. Never enter no-go zones
- 5. Never operate equipment unless authorised
- 6. Never attend work under the influence of alcohol or illicit drugs. Consumption on site is prohibited
- 7. Never modify safety devices without permission
- 9. Always follow positive radio communication requirements
- 11. Always comply with regulated traffic signage

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks related to mobile plant and equipment.

Mandatory Requirements

3.1 General

- 3.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with the interaction of heavy and light vehicles, including with pedestrians. The risks are to be assessed and controls implemented.
- 3.1.2 The Operation is to develop, implement and maintain a management plan for mobile plant and equipment, based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
 - a) Operational and environmental conditions under which the mobile plant and equipment may be used
 - b) Mobile plant and equipment being used within approved design parameters
 - c) The design and maintenance of roadways, including minimum dimensions and conditions
 - d) The maximum loads carried or towed by the mobile plant and equipment, with reference to weight, dimensions or other criteria
 - e) The maximum speeds at which the mobile plant and equipment may operate
 - f) Steps taken by mobile plant and equipment operators to demonstrate the mobile plant and equipment is safe for use, including brake testing, pre-shift inspection and defect reporting
 - g) Measures taken when people are transported in the mobile plant or equipment, including the segregation of people from loads, the provision of seating, the wearing of seatbelts, and the use of other operator restraint devices. Where seatbelts or other restraint devices are installed they are to be used
 - h) The operation of the mobile plant and equipment in areas where the condition of the roadways may adversely affect safety, e.g. wet roads, steep grades

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- i) The loading and unloading of the mobile plant and equipment, including the security and stability of the load and the precautions to be taken in the tipping of coal or stone
- j) The interaction of heavy and light mobile plant and equipment. An analysis is to be undertaken to determine where light vehicles and heavy mobile plant and equipment can be separated and implement appropriate controls, particularly around workshops and stockpiles
- k) Control measures to manage, and where possible eliminate the interaction of people with mobile plant and equipment whilst moving including mine work areas, travel roads, workshops and stockpile areas
- l) Mobile plant and equipment being left in a fundamentally stable condition if unattended. For example use of chocks, ditches, trenches, wheels turned towards the wall. This is also to be applied to vehicles that are broken down or undergoing maintenance
- m) The safe refuelling of the mobile plant and equipment
- n) Interaction of mobile plant and equipment with fixed structures, including overhead power lines, buildings, elevated component and bins
- o) Specific operational procedures involving certain items of mobile plant and equipment, e.g. haul trucks queuing at a loader, continuous miners, shuttle cars
- p) Road demarcation and signage
- q) The establishment of designated parking areas to enable light vehicles to be parked in a location and/or position that is separated from, and is clearly visible to, the operators of the heavy mobile plant and equipment
- r) The wearing of high visibility clothing by persons in operational areas
- s) The installation of Roll Over Protection System (ROPS) and Falling Object Protection System (FOPS) on vehicles where the requirement has been identified by risk assessment
- t) A stability survey to identify and assess the stability-related hazards and risks, e.g. LHD equipment using quick-detach systems (QDS), forklifts, scissor lifts and similar items of mobile plant and equipment. This is to be supported by training, signage and other control initiatives or strategies to control identified risks and to, highlight the limitations of the mobile plant and equipment.
- u) Procedures for workers to board or dismount mobile plant or equipment only when it is stationary
- v) The development, implementation and maintenance of an inspection and maintenance program for mobile plant and equipment
- w) Prohibiting the use of hand-held personal electronic devices (PEDs) and reading material when operating a vehicle
- x) Any person to operate a light vehicle must be over 21 years of age and deemed to be competent before being authorised. Drivers under 21 cannot be deemed competent but may drive under training and must be accompanied by a fully licenced, competent and authorised driver.

3.2 Training and Competency

- 3.2.1 Identification of training needs and competency requirements for relevant workers in relation to mobile plant and equipment, including refresher training and ongoing maintenance of competency.
- 3.2.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria, Original Equipment Manufacturer (OEM) requirements and site or regional protocols, procedures and permit systems.
- 3.2.3 Only trained, competent and authorised or appointed workers are to operate equipment.

3.3 Mobile Equipment – Surface

- 3.3.1 The Operation is to develop, implement and maintain a management plan for surface mobile plant and equipment, based on the risk assessment. The management plan is to include specific requirements for:
 - a) The design criteria for roadways that, as a minimum, include grade, curvature, line of sight, pavement shape, surface material, guideposts, safety berms or windrows, and signs and barriers
 - b) The width of primary haul roads that carry two way traffic to be at least three times the width of the widest vehicle regularly using the road
 - c) The provision in roadway design criteria for appropriate controls that prevent vehicles from falling or driving over edges

- d) The construction and maintenance of safety berms or windrows alongside the edges of roadways where there is a sudden change in terrain e.g. drop off, water body, or other hazard. The safety berms or windrows are to be constructed using suitable (solid) materials, and be of a height, density and profile so they are capable of acting as an effective barrier
- e) The establishment of robust edge protection along the top of highwalls or any other areas where there is a risk that a vehicle could drive over an unprotected edge
- f) A documented process for vehicles entering any area below a reject or coal bin that will enable safe access, loading and egress. The system is to prevent the cabin of the vehicle from entering the area under the bin, unless the bin gates are isolated or a Falling Object Protection System (FOPS) is installed over the cabin of the vehicle that can withstand and exceed potential consequences (i.e. maximum weight impact)
- g) Clear and unique identification of mobile plant and equipment in order to allow positive communication between operators
- h) The provision of two-way radios in mobile plant and equipment in operational areas; when workers are working on the ground at least one member of the work party is to be in possession of a two-way radio
- i) Establishing positive communication (caller and receiver are to identify the vehicles and clearly respond) before any vehicle or person enters an active work area, e.g. dragline, shovel or loader, or intends to overtake another vehicle, to verify that it is safe to do so
- j) Establishing rules for:
 - ▶ Safe operation of vehicles including the verification of competencies and operator authorisation
 - ▶ Safe travelling and parking distances
 - ▶ In-pit refuelling
 - ▶ Vehicle visibility, i.e. the provision of flashing lights, flags, reflective material
 - ▶ The safe movement of vehicles, including use of reversing alarms and horns to indicate vehicle operation, i.e. once prior to starting the vehicle, twice before forward movement, three times before reversing.
- k) The fitting of tilt switches, installation of laminated glass, provision for a means of egress or escape in the event of an emergency, and installation of oxygen generating self rescuers in dozers that operate on stockpiles where there is a risk of falling into a void
- l) Procedures for operating mobile plant and equipment near sources of electricity and during electrical storms
- m) Spacing guideposts on main haul roads at intervals relative to the distance required to be maintained between mobile plant and equipment. Colour reflectors should be used on each side of the guidepost.

3.4 Further Considerations – Surface

- 3.4.1 Operations are to consider as part of their continual improvement and good practice initiatives:
- a) Implementing one way vehicle movement in high traffic areas, or installing centre safety berms to eliminate, or at least minimise, the potential for unwanted vehicle interaction
 - b) Designing park up areas for one way traffic flow and segregated parking areas for heavy plant and equipment, light vehicles and pedestrians. Park up areas should consider the use of spoon drains, humps (between front and rear axles) or some other method to prevent uncontrolled movement of heavy vehicles
 - c) Consider the use of Collision Avoidance Systems e.g. Proximity Avoidance Technology (PAT), Proximity Detection Technology (PDT) and Collision Avoidance Technology (CAT) to assist with the control of vehicle interaction risks
 - d) Providing additional relevant training such as virtual reality (simulators) in safety aspects pertaining to the use of and interaction with mobile plant and equipment
 - e) Using Global Positioning System (GPS) zoning to alert operators of changes to the mining environment
 - f) Implementing technology to assist with the vigilance of operators e.g. Guardvant, mobile phone detection systems, in vehicle cameras etc
 - g) A means of monitoring speeds and providing real time feedback to operators and alarms to supervisors.

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3.5 Mobile Equipment – Underground

- 3.5.1 The Operation is to develop, implement and maintain a management plan for underground mobile plant and equipment, based on the risk assessment. The management plan is to include specific requirements for:
- a) When pedestrians cannot move to a position of safety in a roadway, a passing vehicle is to stop, the operator is to acknowledge the pedestrians presence and allow the pedestrian to walk past the vehicle before continuing
 - b) Establishment of no-go zones
 - c) Developing, implementing and maintaining access, egress and communication procedures for mobile plant and equipment
 - d) Preventing vehicles from entering or operating in explosive atmospheres (e.g. methane rich) using documented procedures
 - e) Workers only transported in seating that is designed and approved for the purpose
 - f) Installation of one way block lights for intersections and drifts where necessary to reduce or eliminate interaction risks
 - g) The safe movement of vehicles, including use of reversing alarms and/or horns to indicate vehicle operation or movement
 - h) Safe shunting and/or passing of vehicles.

Further Considerations – Underground

3.6 General

- 3.6.1 Operations are to consider as part of their continual improvement and good practice initiatives:
- a) The use of Collision Avoidance Systems e.g. Proximity Avoidance Technology (PAT), Proximity Detection Technology (PDT) and Collision Avoidance Technology (CAT) to assist with the control of vehicle interaction risks
 - b) Providing additional relevant training such as virtual reality (simulators) in safety aspects pertaining to the use of and interaction with mobile plant and equipment.

ASSOCIATED CATASTROPHIC RISKS



SURFACE VEHICLE INTERACTION

CRITICAL CONTROLS

Surface Vehicle Interaction

- B1-1** Only operate vehicles/equip with functional brakes, steering, tyres
- B1-2** Workers maintain vehicle clearances when travelling
- B1-3** Workers maintain clearances when accessing equipment
- B1-4** Operators stop / give way to others at intersections
- B1-5** Operators drive at speed to meet site conditions
- B1-6** Workers maintain adequate vigilance
- B1-7** Workers are fit for work
- B1-8** Roads and intersections are designed and constructed to site standards
- B1-9** Physical barriers are installed
- B1-10** Workers take evasive action
- B1-11** Seatbelts/Restraints are fitted and used
- B1-12** Emergency response activated

4



INAPPROPRIATE EMERGENCY RESPONSE

RELEVANT SAFECOAL RULES

4. Never enter no-go zones

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks associated with inappropriate response to an emergency situation.

Mandatory Requirements

4.1 General

- 4.1.1 The Operation is to complete a documented risk assessment to identify potential emergency situations. This includes assessing the risks and implementing controls.
- 4.1.2 The Operation is to develop, implement and maintain an Emergency Management Plan, based on the risk assessment in alignment with *GCAA Manual HSEC- Incident Management Manual - Part 1 - Incident Management*. As a minimum, the Emergency Management Plan is to include specific requirements for:
 - a) Response(s) to, and containment of, identified emergency situations
 - b) Processes to minimise further injury, damage, or loss to rescuers or others
 - c) Emergency response procedures, including first aid, medical treatment, fire fighting, and rescue
 - d) Provision of adequate emergency equipment, including escape and rescue apparatus (readily accessible and clearly signposted), and appropriate transport and response vehicles
 - e) Effective and robust communication devices and procedures for initial notification of personnel of an emergency situation, and for ongoing two-way communication during emergency situations
 - f) The safe evacuation from all workplaces or other occupied spaces
 - g) Controlling site access and restricting re-entry to the affected areas
 - h) Clearly defined procedures for the reporting of emergencies, and/or for initiating an emergency response
 - i) Duty cards that clearly identify each of the responsible persons duties, functions and reporting relationships, refer to *GCAA HSEC -Incident Management Manual - Part 2 – Duty Cards and Task Cards*
 - j) Communication with and involvement of external emergency agencies
 - k) Preparation for safe resumption of normal operations
 - l) Notification of internal and external stakeholders
 - m) Provision and maintenance of a suitably equipped emergency control centre where communication facilities, and other relevant information is available (including duty cards,

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INAPPROPRIATE EMERGENCY RESPONSE

emergency contact lists, mine plans including the location of emergency equipment and services etc.)

- n) Identification, assessment and management of potential risks associated with vehicles being struck by lightning, coming in contact with high voltage electricity, and/or tyre fires. The risk management process, as a minimum, is to give consideration to:

- ▶ safe disembarkation from the vehicle without being electrocuted or impacted by tyre explosion
- ▶ establishment of an exclusion zone
- ▶ time restraints related to personnel entering the zone and
- ▶ fire fighting

- o) For underground mines, the identification of emergency escape routes (delineation and signposting), including the second means of egress and emergency response locations

- p) Recording the location and number of persons in the mine or at the facility

- q) Identification, maintenance and signposting of emergency muster points and processes to verify that all personnel have been accounted for

- r) Conducting annual simulated exercises to test the effectiveness of the Operation's emergency response and evacuation capabilities

- s) Provision for sealing underground mines, or part of the mine, whilst allowing for re-entry as appropriate

- t) Immediate medical evaluation following any injuries involving high pressure fluids or electric shock. For electric shock this is to include a 12 line ECG and a blood test where deemed necessary by the medical practitioner and

- u) Use of Compressed Air Breathing Apparatus (CABA) for escape from underground.

4.2 Training and Competency

- 4.2.1 Identification of training needs and competency requirements of relevant personnel in relation to emergency response, including refresher training and ongoing maintenance of competency.

- 4.2.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice and site or regional protocols, procedures and permit systems.

- 4.2.3 Provision of an adequate number of competent persons to provide an appropriate emergency response at all times.

Further Considerations

4.3 General

- 4.3.1 Operations are to consider as part of their continual improvement and good practice initiatives.

- a) Steel cutting rescue equipment (Jaws of Life), air lifting bags, and other specialist rescue equipment, for operating mines

Underground

- b) Using oxygen generating self rescuers as a minimum for self rescue
- c) Implementing electronic tagging and monitoring systems to determine the number and location of individuals in the mine, and to communicate directly in the case of an emergency
- d) Establishing a facial hair policy that facilitates effective facial seal of breathing apparatus (CABA)
- e) Consideration of breathing apparatus (CABA) that is inclusive of a device that enables hydration during use.

ASSOCIATED CATASTROPHIC RISKS



IGNITION OF GAS



SURFACE VEHICLE INTERACTION



UNDERGROUND STRATA



UNDERGROUND FIRE



SURFACE STRATA



TOXIC & IRRESPIRABLE ATMOSPHERES

CRITICAL CONTROLS

Ignition of Gas Underground

A1-10 Self-escape infrastructure available and functional

Surface Vehicle Interaction

B1-12 Emergency response activated

Underground Strata

C1-9 Withdrawal of personnel

Underground Fire

E1-8 Fire-fighting equipment is available, functional and used

Surface Strata

F1-3 Evacuate and withdraw personnel

Toxic Irrespirable Atmosphere

I1-1 Personnel comply with controlled access areas

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INRUSH AND OUTBURST

RELEVANT SAFECOAL RULES

7. Never modify safety devices without permission

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks associated with an inrush of water, gases or materials which flow when wet either in a surface or underground mine; and risks associated with an outburst event where there is dynamic ejection of material from an underground mine coal seam initiated by immediate release of energy, gas pressure.

Mandatory Requirements

5.1 Inrush

- 5.1.1 The Operation is to complete a documented risk assessment to identify potential inrush sources. Specific issue-based risk assessments are also to be completed for each potential inrush source (such as flow slide). This includes assessing risks and implementing controls with consideration to the accuracy of the mine plans, future mining operations, geological conditions, input into the overland flow events and potential changes.
- 5.1.2 Where a risk of inrush has been identified, the Operation is to develop, implement and maintain a management plan for inrush, based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
- a) A process to review and verify the accuracy of statutory plans, files, and records used to identify any potential inrush source. The process is to include all information (e.g. held by statutory authorities, supplied by neighbouring mines) and identify potential inrush sources throughout, adjacent to, and in the near vicinity of surface and underground mine workings. The process is to include as a minimum current, proposed, or disused mine workings, surface waters, stockpiles, tunnels and aquifers
 - b) Where identified in the risk assessment, a technical assessment by a competent person is to be conducted and documented to determine the nature and magnitude of potential inrush sources, and a record of assumptions made is to be contained within the management plan for inrush
 - c) Establishing inrush control zones (i.e. stand-off distances or solid barriers) between any mine workings and each of the potential inrush sources, and be clearly identified on a plan
 - d) Maintenance of a barrier (inrush control zone) when the potential inrush source cannot be eliminated. The barrier size must be determined through technical design and risk assessment and will have a minimum separation distance of 50 metres in all directions
 - e) Use of an escalated approval process (e.g. Permit to Mine) for any mining within the inrush control zone, which outlines the sequence of operation and any other controls to be applied
 - f) Escalated approval process is to include requirements for:
 - ▶ Pre-drilling in advance of the mining direction for an inrush control zone, so that mining can advance safely
 - ▶ Regular surveys and inspections

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- g) Informing all affected personnel of the specific hazards, risks and controls involved when working within an inrush control zone. Copies of relevant plans and permits are to be provided
 - h) Including relevant strata characteristics on applicable plans (mine plan and/or inrush control zone plan). This is to include the nature and thickness of the strata, faults, dykes or boreholes in the separating strata
 - i) Man-made barriers (e.g. seals, stoppings, dam walls, bulkheads) that are installed to contain an inrush source or event, are designed, constructed and maintained to an approved and recognised engineering standard
 - j) Monitoring potential inrush sources, including water pressure and gas content
 - k) Evaluation of the impact of an inrush event on seals, stoppings, and/or regulators
 - l) Trigger Action Response Plans (TARPs) that define risk based responses to manage or react to changes of inrush indicators
 - m) Surface to seam boreholes to be fully sealed and locations recorded on a plan
 - n) Surface operations near underground workings, to develop, implement, and maintain a process to assess the potential risk of inrush and implement appropriate controls
 - o) Surface operations to develop, implement and maintain a process to divert surface water flow away from open pit crests
 - p) In-seam drilling is to be recorded on the plan
 - q) Evaluation of underground and surface bins and other structures (such as levees, dams etc.) that could fill and create the risk of inrush
 - r) An annual review of the management plan for inrush and the associated Inrush Control Zone location plans, with additional review prior to the mine being extended into any new area.
- b) Pre-drilling to identify the gas type, concentration, pressures and desorption characteristics of the coal
 - c) In-seam drilling to be surveyed and recorded on the plan
 - d) Providing gas drainage to minimise the potential for an outburst related event
 - e) Developing TARPs that define risk based responses to manage or react to changes of outburst indicators
 - f) No mining in an outburst prone area without the approval under a Permit to Mine process
 - g) Gas concentration levels to be at a pre-determined acceptable level before a Permit to Mine can be issued
 - h) Appropriate rescue and evacuation equipment to be identified and readily available
 - i) Procedures that detail mining sequences, personnel levels and other health and safety precautions that are to be followed.

5.3 Training and Competency

- 5.3.1 Identification of training needs and competency requirements for relevant personnel in relation to inrush and/or outburst, including refresher training and ongoing maintenance of competency.
- 5.3.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria and site or regional protocols, procedures and permit systems.

ASSOCIATED CATASTROPHIC RISKS



INRUSH



UNDERGROUND OUTBURST

CRITICAL CONTROLS

Inrush

- G1-1** Identify potential inrush sources, connection paths & establish inrush control zones
- G1-2** Mine to design (underground)
- G1-3** Design shaft and excavate to design (underground)
- G1-4** Barrier Pillar Integrity
- G1-5** Bulkhead integrity
- G1-6** Critical Water infrastructure (dams, levees, diversions, spillways) is operated within its design limits
- G1-7** Weather conditions are monitored and responded to
- C1-9** Withdrawal of personnel
- F1-3** Evacuate and withdraw personnel
- A1-10** Self-escape infrastructure available and functional

Outburst

- H1-1** Outburst propensity assessment and the identification of Outburst Control Zones
- H1-2** Gas content below threshold values
- H1-3** Selection, authorisation and implementation of mining methods and operational controls
- H1-4** Personnel respond to outburst indicators /abnormalities

5.2 Outburst

- 5.2.1 The Operation is to complete a documented risk assessment to identify potential outburst sources. Issue-specific risk assessments are to be completed for each potential outburst source. The risk assessments are to include the accuracy of the mine plans, future mining operations, and geological conditions and changes.
- 5.2.2 Where a risk of outburst has been identified, the Operation is to develop, implement and maintain a management plan for outburst, based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
 - a) Identification of geological conditions and indicators of potential outburst

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6



EXPLOSIVES AND SHOTFIRING

RELEVANT SAFEKOAL RULES

4. Never enter no-go zones
5. Never operate equipment unless authorised
7. Never modify safety devices without permission

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents related to the use of explosives, detonators and shotfiring equipment.

Mandatory Requirements

6.1 General

- 6.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with the storage, issuing, transport, handling, loading, and use of explosives, detonators, and related equipment. This includes assessing the risks and implementing controls.
- 6.1.2 The Operation is to develop, implement and maintain a management plan for explosives and shotfiring, based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
 - a) Purchasing and providing only approved explosives, detonators and initiating equipment. This includes an appropriate type, manufactured to a recognised quality standard and permitted by a statutory body for use in a surface or underground mine
 - b) Developing and maintaining a Site Security Plan to prevent unauthorised access or use of explosives and detonators that are transported to and stored on site
 - c) Storing explosives and detonators separately in a safe and secure location, using a licensed and approved magazine and the licence to store and manufacture explosives is current
 - d) An inventory system for recording stock movements, including deliveries, issue and returns. Only authorised personnel are to issue or receive explosives and detonators
 - e) Provision of vehicles or other methods to transport explosives and detonators safely on site. Only authorised personnel are permitted to be in control of the vehicle used to transport explosives
 - f) Blast designs that minimise the risk of fly rock injury to personnel or damage to structures and property

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- g) Quality controls for drilling, loading, stemming and tie-up
- h) Risk controls for drilling, loading, stemming and tie-up)
Barricading and signposting loaded blasts to prevent unauthorised entry and to prevent inadvertent access by personnel, plant and equipment
- j) Regular analysis (as a minimum annually), testing and characterisation to identify the potential for hot ground and/or reactive materials within the working area. Where identified, procedures are to be developed, implemented and maintained for loading of explosives into hot or reactive ground (applicable to open cut coal operations)
- k) The use of multiple communication methods incorporating levels of redundancy to notify personnel of blasts.
- l) Establishment of exclusion zones and procedures for pre-blast inspection, clearance and sentry placement; for the safety of personnel, plant and equipment during blasting
- m) Assignment of responsibility for clearing the blast area to the shotfirer or another responsible person
- n) Preventing firing of any blast until the clearance is confirmed by the supervisor in charge of the blast
- o) Identification of blast firing locations prior to the blast, outside of the exclusion zone and recorded on the blast plan
- p) Developing, implementing and maintaining procedures for managing misfires and for recovering and disposing of undetonated explosives.

6.2 Training and Competency

- 6.2.1 Identification of training needs and competency requirements for relevant personnel in relation to explosives and shotfiring, including refresher training and ongoing maintenance of competency.
- 6.2.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice and site or regional protocols, procedures and permit systems.
- 6.2.3 Personnel involved in explosives handling and shotfiring are trained, competent and authorised or appointed.

- 6.2.4 Suitably qualified personnel are to be appointed to design blasts.

Further Considerations

6.3 General

- 6.3.1 Operations are to consider as part of their continual improvement and good practice initiatives:
 - a) Establishing an electronic database that retains the records associated with the blasts. For example, hole location and depth, loading charts, tie-up details, environmental conditions, photographs, videos, blast vibration, noise and dust measures.
 - b) Using technology or processes to assist with post blast atmospheric monitoring and direct exposures.
 - c) Use of sirens on the blast exclusion zone checking vehicles to provide an audible warning across the blasting area.



INADEQUATE ENERGY ISOLATION

RELEVANT SAFECOAL RULES

2. Always verify the isolation – test for dead

INTENT

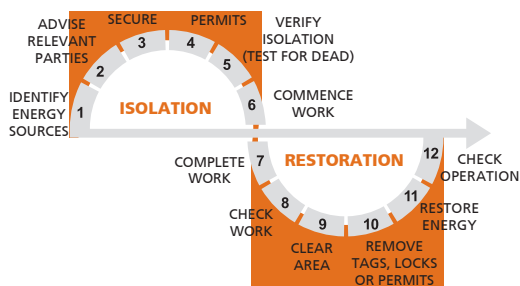
The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks associated with inadequate isolation of energy sources.

Mandatory Requirements

7.1 General

- 7.1.1 The Operation is to complete a documented risk assessment to identify the hazards related to interaction with energy sources. Examples include electricity, pressure, temperature and stored energy, such as springs or suspended loads. This includes assessing the risks and implementing controls.

Figure 7-1 – 12-step isolation process



- 7.1.2 The Operation is to develop, implement and maintain a procedure for isolation of

energy sources based on the risk assessment. As a minimum, the procedure is to include the use of the GCAA Permit System and specific requirements for:

- The 12-step process for isolations, refer to figure 7-1. Particular emphasis is to be placed on:
 - Identification and dissipation of relevant energy sources
 - Isolating and securing
 - Verification of the isolation, i.e. test for dead; and
 - Processes for re-commissioning or re-energising.
- Isolations and permits such as:
 - Individual isolations.
 - Group isolations - involving the use of Permits (refer to *GCAA Permit HSEC – Group Isolation*).
 - High Voltage isolations - involving the use of Permits, (refer to *GCAA Permit HSEC – High Voltage Access Permit*), except where risk assessment allows otherwise for non-overhead switching e.g. longwall, electric dump trucks.

- ▶ High pressure hydraulic isolations in underground mines (refer to *GCAA Underground Mine High Pressure Fluid Isolation Guideline* and *GCAA Underground Mine High Pressure Fluid Isolation Checklist*)
 - c) Use of locks in preference to danger and permit tags
 - d) Use of tags where locks cannot be used. Tags are to be limited to the following types:
 - ▶ Personal danger tags
 - ▶ Permit danger tags
 - ▶ Out of service tags
 - ▶ Commissioning tags
 - ▶ Information tags.
 - e) Provision of adequate isolation points on plant and equipment. When determining isolation locations, consider practicality, accessibility and clear identification
 - f) Isolation devices that are, wherever possible, lockable and clearly labelled and identifies the equipment that has or is to be isolated. The isolation device is to clearly indicate the "on" or "off" position
 - g) A risk-based and prioritised action plan developed to address positive isolation requirements for plant and equipment containing energy sources that cannot be locked out
 - h) Any person accessing high voltage conductors (greater than 1200 volts AC or 1500 volts ripple free DC) is to have a high voltage access permit in place that incorporates a second competent electrical isolation verifier. Exemptions of this requirement may exist in limited applications where specific engineered controls and isolation procedures are implemented e.g. withdrawing 3.3kV plugs on a longwall.
 - i) Minimising the exposure to live work, or where required, providing procedures to manage the risks associated with live testing or approved 'power on' maintenance activities
 - j) Procedures for removing isolation devices (locks and/or tags) by persons other than the isolator in the event that the isolator is unavailable to remove the lock and/or tag
 - k) Documented processes for the maintenance of isolation devices (including isolation points) and equipment
 - l) Procedures for isolations that are complex in nature
 - m) Documented processes for the use of stands, chocks, locking pins, clamps or other methods for securing objects from falling or moving.
- ### 7.2 Training and Competency
- #### 7.2.1
- A training and competency plan is to be developed, implemented and maintained including:
- a) Identifying training needs and competency requirements for relevant workers in relation to energy isolation, refresher training and ongoing maintenance of competency
 - b) Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria and site or regional protocols, procedures and permit systems
 - c) All relevant workers are to be familiarised in basic isolation, including identifying primary and secondary energy sources such as gravitational, stored, kinetic, pressure, hydraulic energy. Particular emphasis should be given to 'test for dead' verification
 - d) Workers are to be trained, competent and authorised in relevant isolation and emergency procedures, and in the use of related equipment, devices, personal protective equipment and other protective devices
 - e) Provision of specific training and assessment for Authorised Isolators and Permit Holders, including practical applications.
- ### Further considerations
- #### 7.3 General
- ##### 7.3.1
- Operations are to consider as part of their continual improvement and good practice initiatives:
- a) In frequently accessed plant, implement multiple barriers to prevent inadvertent access to live energy sources. This may take the form of electrical interlocking, mechanical interlocking, audible alarms, Live Line Indication, insulated conductors, secondary covers with appropriate signage etc.
 - b) For high risk isolations provide specific isolation procedures, ideally at the isolation point, including photographs or diagrams detailing the individual steps of the isolation.
- Notes:**
- Where applicable, develop all permits to align with *GCAA Work Authorisation and Permit Management*. Refer to *GCAA Protocol HSEC - Work Authorisation and Permit System*.

8



WORKING AT HEIGHT

RELEVANT SAFECOAL RULES

1. Never work above 2m without appropriate fall protection
5. Never operate equipment unless authorised

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents related to working at heights.

Mandatory Requirements

8.1 General

- 8.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with working at heights. This includes assessing the risks and implementing controls.
- 8.1.2 The Operation is to develop, implement and maintain a procedure for working at heights based on the risk assessment. The procedure is to include the use of the GCAA Permit *HSEC - Working at Heights* and specific requirements for:
 - a) Identifying activities classified as working at height in underground and surface areas
 - b) Preventing workers from working alone while at heights
 - c) Using fall restraint or arrest equipment attached to an anchorage point whenever workers are required to work at a height above two metres, when outside the protection of an installed (fixed) access platform with handrails
 - d) Providing a safe work environment through the installation of fixed access platforms where practicable. Alternative equipment, where necessary, includes the use of an elevated work platform, work basket, scissor lift or scaffolding
 - e) Provision and use of work platforms and scaffolds that have complete floors, guardrails and toe-boards, safe access and egress and have been inspected and tagged by a competent person, prior to accessing the work platform or scaffold
 - f) Designated workers who are trained, competent and authorised to operate an elevated work platform or scissor lift
 - g) A designated person in a work box suspended by a crane is to be trained, competent and authorised to do so, and remain in visual or radio contact with the person in control of the crane or the crane operator
 - h) Persons working in or on boom type elevated work platforms, or work baskets above two metres must wear safety harnesses with lanyards attached that are

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affixed to an approved anchorage point in the platform

- i) Processes to be developed, implemented, and maintained to prevent tools and equipment from falling
- j) Barricades to be erected below the work area to protect persons from falling objects
- k) Procedures to demonstrate the elevated work platforms, work baskets, scissor lifts and scaffolding are designed, constructed and certified to a recognised standard, and they are inspected, operated and maintained to verify compliance with these standards
- l) Where workers are required to detach and reattach at height, a dual lanyard system is to be used
- m) Safety harnesses, lanyards, fall arrest devices and accessories are to be appropriate to the type of work being conducted, meet the relevant recognised design standard and recorded in a register
- n) Fall arrest equipment is to be tested and certified for use, inspected by the user before use and destroyed following a fall or where inspection has shown evidence of excessive wear or mechanical malfunction
- o) A lanyard assembly is to be as short as practicable and the working slack length is to be less than two metres and fitted to limit the length of free fall to 0.6 metres
- p) Lanyards are to be fitted so that the wearer may not fall to a lower level without the fall being arrested. When estimating the total fall distance it should include the extension length of the shock absorber when fitted
- q) Lanyards are to include a shock absorber device when being used in a fall arrest system, unless it can be demonstrated that a force of 6kN will not be experienced by the harness attached point during the fall
- r) Lanyard anchorage points on apparatus should be above the head of the worker, and where practical are to be no lower than shoulder height. Where it is impractical to do so (e.g. on a flat roof), a risk assessment is to be conducted and documented, and alternate anchorage points selected
- s) Designated anchorage points and anchorage systems are to be certified and approved by a competent person to verify

that they are capable of withstanding a breaking force of 15kN, (single person anchor) or 21kN (two person anchor)

- t) Consideration of the means of rescue of persons who have fallen and are suspended. The appropriate rescue equipment and competent workers are to be readily available
- u) Factoring in the prevailing environmental conditions, e.g. wind and rain that could have an impact on a worker's ability to work at height safely; and re-inspection and re-certification of scaffolding following any windy or rainy conditions.

8.2 Use of ladders above two metres

- 8.2.1 A person may ascend or descend a ladder without fall protection, provided they are able to use both hands and legs, maintain three points of contact, they continue to face the ladder, and only take one rung at a time.
- 8.2.2 Extension ladders are to be tied off or footed, with an angle of one in four maintained and at least one metre of the ladder is to extend above the access or work area.
- 8.2.3 If a person is to work from a ladder, fall restraint or arrest devices are to be used, unless three points of contact can be maintained and the task does not involve overreaching.

8.3 Training and Competency

- 8.3.1 Identification of training needs and competency requirements of relevant workers in relation to working at heights, including refresher training and ongoing maintenance of competency.
- 8.3.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice and site or regional protocols, procedures and permit systems.
- 8.3.3 For those requiring to perform more advanced working at height techniques (e.g. tasks requiring rope access or rope rescue), they will be trained and competent to perform these tasks.

Further Considerations

8.4 General

- 8.4.1 Operations are to consider as part of their continual improvement and good practice initiatives:
 - a) Engineering the design of plant and equipment to eliminate the need for

WORKING AT HEIGHT

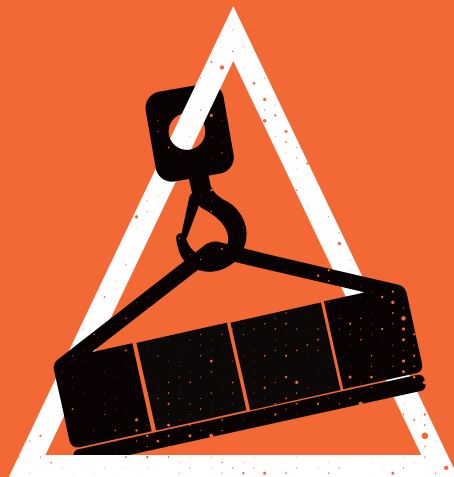
working at height during maintenance and construction, e.g. lighting towers or fixed lighting that lower the lights to the ground

- b) Self-propelled boom-type elevating work platforms fitted with:
 - ▶ A switch or warning that must be activated or accepted before the propel function is enabled when the boom is swung past 90 degrees; this is to prevent inadvertent movement of the EWP in the opposite direction to the propel control lever movements. An alarm only is not a satisfactory control
 - ▶ A form of secondary guarding or crush protection such as a protective guard structure over the operator or an automatic device to mitigate the severity of an operator crush injury; an example is an interlocked pressure-sensitive bar over the operating controls
- c) Exclusion zones and barriers should be implemented to prevent working near highwalls and benches becoming a working at heights activity
- d) Where practicable, permanent access restrictions for non-trafficable areas e.g. roofs, other structures with opening, signage and permanent barriers should be installed.

Notes:

Where applicable, all permits to align with GCAA Work Authorisation and Permit Management. Refer to GCAA Protocol HSEC - Work Authorisation and Permit System.





LIFTING AND CRANAGE

RELEVANT SAFEKOAL RULES

3. Never enter under suspended loads
4. Never enter no-go zones
5. Never operate equipment unless authorised

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents related to risks associated with lifting and crange activities.

Mandatory Requirements

9.1 General

- 9.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with lifting and crange. This includes assessing the risks and implementing controls.
- 9.1.2 The Operation is to develop, implement and maintain a procedure for lifting and crange, based on the risk assessment. As a minimum, the procedure is to include specific requirements for:
 - a) Using the GCAA Permit *HSEC - Complex Lift* for all lifts:
 - ▶ Using multiple cranes
 - ▶ Over facilities or buildings
 - ▶ Within 20 metres of power lines (including passing over power lines)
 - ▶ At more than 90 percent of the rated capacity of the crane or the lifting equipment involved
 - ▶ Involving personnel suspended in a work box
 - b) Determined by risk assessment to be complex in nature
 - b) Developing, implementing and maintaining a Lift Plan for complex lifts containing or referencing:
 - ▶ A documented risk assessment that is communicated to the work party
 - ▶ Lift data such as equipment weight, rigging weight, height of lift, equipment surface area and centre of gravity, etc.
 - ▶ Equipment data, such as manufacturer, model, size, boom length, jib length, load block, material size, etc.
 - ▶ Rigging data such as sling diameter, length, sling configuration, capacity, hook type, shackle size and capacity, etc.
 - ▶ Lift computations such as boom length, radius of lift, equipment capacity, size of outrigger footplates and wind speed, etc.
 - ▶ Identified risks associated with power lines, crane travelling route, ground stability and agreed communication methods

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- ▶ Evidence that the crane operators and riggers or doggers were involved in the development of the Lift Plan, or they were consulted before the Lift Plan was finalised.
- c) Preventing workers from entering an area under a suspended load
- d) Delineation, access restriction and appropriate signage for lift areas
- e) Maintaining a 20 metre operational clearance for a crane or lifting equipment from power lines, measured using the fully extended capabilities of the crane. A documented risk assessment is to be completed, and controls identified for crane operation within 20 metres
- f) The crane operator maintaining constant control and remaining at the crane controls whilst loads are suspended
- g) Use of tag lines where a load requires steadying or guidance and to eliminate the requirement for workers to enter the load zone
- h) Verification that a crane, any associated lifting equipment and the environment (e.g. ground condition, wind, rain) is fit for purpose prior to use
- i) Inspection and maintenance of lifting equipment on a routine basis and listing all items in a register. Shackles, lightweight slings and eye bolts rated under one tonne are excluded but require inspection before use
- j) Labelling or colour coding lifting equipment to indicate its rated capacity and to verify that it is within the inspection period
- k) Completion of a pre-use inspection of rigging equipment and lifting points to verify all components are fit for purpose, appropriately specified and, where required, certified and maintained
- l) Identification of the rated capacity and radius limits for the crane and associated lifting equipment prior to use. Loads are to be slung by a competent person and cranes are not to be operated at speeds that could de-stabilise the load in the event of a sudden stop
- m) Preventing the use of lifting equipment for towing. Where lifting equipment is used for towing, remove from any further lifting service
- n) Crane hooks to be fitted with a positive safety catch
- o) Restricting overhead crane travel via the fitting of safety limiters such as over-travel stops
- p) Verifying that fixed lifting devices and cranes conform to an appropriate engineering standard and are subjected to routine structural integrity testing
- q) Lifting of personnel only in an approved work box and using a suitably specified and approved crane
- r) Vehicle loading cranes not being able to rotate over an operator positioned at the controls.

9.2 Forklifts and Telehandlers

- 9.2.1 Forklifts and telehandlers are to be fitted with a reversing alarm, flashing light and a load cell or load limiting device.
- 9.2.2 If the forklift or telehandler is to be used to lift personnel, the appropriate attachments and procedures are to be available and used.
- 9.2.3 Forklifts and telehandlers are to be fitted with a seat belt that is worn by the operator when in use.
- 9.2.4 Areas of operation shall be delineated to:
 - a) Exclude operation in areas of uneven ground, adverse grades and poor road conditions that are not within the design capability of the equipment
 - b) Physically demarcate pedestrian and equipment operating zones in high traffic areas such as warehouses and workshops.

9.3 Training and Competency

- 9.3.1 Identification of training needs and competency requirements for relevant workers in relation to all aspects of lifting and crange, including refresher training and ongoing maintenance of competency.
- 9.3.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria and site or regional protocols, procedures and permit systems.
- 9.3.3 Crane operators, riggers and/or doggers are to be authorised to conduct lifting and crange work.
- 9.3.4 Forklifts and telehandlers are only to be operated by competent and authorised workers.

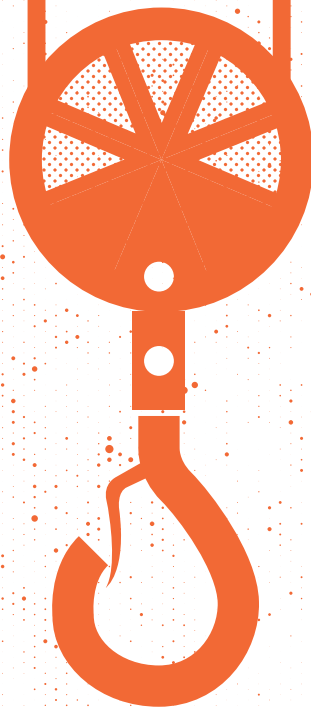
Further Considerations

9.4 General

- 9.4.1 Operations are to consider as part of their continual improvement and good practice initiatives:
- a) Fitting cranes and lifting equipment with a load cell in visual range of the operator and/or a load-limiting device
 - b) Providing designated lift points on equipment that is lifted on a regular basis
 - c) Identifying, registering and displaying the weight of components that are lifted on a regular basis
 - d) Provision of specialised lifting jigs, stands or cradles for lifting, storage and loading/unloading of components and equipment for transport
 - e) Eliminating lifting hooks that do not have positive safety catches fitted.

Notes:

Where applicable, develop all permits to align with GCAA *Work Authorisation and Permit Management*. Refer to GCAA Protocol HSEC - *Work Authorisation and Permit System*.



10



CONFINED SPACE AND NOXIOUS OR IRRESPIRABLE ATMOSPHERES

RELEVANT SAFEKOAL RULES

2. Always verify the isolation – test for dead
4. Never enter no-go zones
5. Never operate equipment unless authorised

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks associated with personnel entering or working in a confined space or a workplace where noxious or irrespirable atmosphere may exist.

Confined Space

Mandatory Requirements

10.1 General

- 10.1.1 The Operation is to complete and maintain a documented risk assessment to identify the hazards, assess the risks and implement the controls associated with confined space entry. Each confined space location will be uniquely identified and specific hazards and associated risks assessed and evaluated.
- 10.1.2 The Operation is to develop, implement, and maintain a procedure for confined space and noxious/irrespirable atmospheres, based on the risk assessment and Permit System (refer to GCAA Permit *HSEC – Confined Space Entry Permit*). As a minimum, the management system is to include specific requirements for:
 - a) Elimination of the confined space or entry into the confined space
 - b) Identification and signposting of confined spaces
 - c) A Confined Space Register

- d) Clearly defined conditions of entry. Including:

- ▶ A documented pre-entry risk assessment
- ▶ Isolation of energy sources
- ▶ Establishment and maintenance of oxygen levels required for the duration of the task
- ▶ Identification of contaminants, temperature extremes, concentrations of flammable substances, and any other hazards that may be harmful
- ▶ Continuous atmospheric monitoring of the space for the duration of the task using multi-gas continuous detection and alarming equipment
- ▶ Establishment of ventilation requirements, i.e. natural or forced
- ▶ Identification of the need for use of self-contained breathing apparatus
- ▶ The provision and use of safety harnesses and the attachment of life lines for recovery of persons in the event of rescue being required. Where the life line poses an additional risk, an

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alternative means of rescue must be established and available at the location

- ▶ Using the permit at the job location to manage the sign-in and sign-out of authorised personnel
 - ▶ Nomination and identification of competent stand-by persons who are to be present at the entry point for the duration of the work
 - ▶ Defined communication methods between the stand-by persons and personnel within the confined space
 - ▶ Identification of the appropriate specification for the equipment to be taken into or used within the confined space
 - ▶ Barricading and signposting requirements; and
 - ▶ An area/task specific Rescue Plan, provision and accessibility of suitable rescue equipment, plant and competent personnel.
- e) The provision, specification and maintenance of atmospheric monitoring equipment. This equipment is to be:
- ▶ Of an approved type
 - ▶ Listed on a register
 - ▶ Inspected, tested, calibrated and stored in accordance with the manufacturer's specifications.

10.2 Training and Competency

- a) Only trained, competent and authorised personnel use atmospheric monitoring equipment
- b) The identification of training needs and competency requirements for relevant workers in relation to confined space, including refresher training and ongoing maintenance of competency
- c) Training needs are to be inclusive of relevant competency standards, legislation, codes of practice and site or regional protocols, procedures and permit systems
- d) Provision of adequate training and assessment of competency for personnel required to access areas that may contain noxious or irrespirable atmospheres
- e) Training and simulations in confined space rescue/recovery.

Noxious or Irrespirable Atmospheres

Mandatory Requirements

10.3 General

- 10.3.1 Routine access to operational areas is to be managed in accordance with the inspection program for the monitoring of the Operation or other risk area atmosphere.
- 10.3.2 Areas of the operations that have the potential for noxious or irrespirable atmospheres to be present are to be identified. This includes areas which are not already identified as confined spaces or part of the normal inspection program. A risk assessment is to be conducted and documented, and controls identified and implemented before entering any areas of the operations that have this potential.
- 10.3.3 If personnel are required to enter an area that has the potential to be a noxious or irrespirable atmosphere, the Operation is to undertake or develop the following:
 - a) A permit or documented procedure for access to or operation in this area
 - b) Provision and installation of barricading and signposting to prevent inadvertent access to these areas
 - c) A process to pre-determine atmospheric conditions prior to entry
 - d) Procedures that minimise the risk of exposure of personnel to the noxious or irrespirable atmosphere, e.g. ventilation requirements
 - e) Provision and utilisation of multi-gas continuous detection, monitoring and alarming equipment when accessing a potential noxious or irrespirable atmosphere
 - f) Withdrawal conditions such as TARPs for the presence of atmospheric contaminants
 - g) Provision of emergency equipment (including, suitable breathing apparatus and communication) for personnel who may be exposed to the noxious or irrespirable atmosphere
 - h) Specific rescue plans relevant to an area or task which includes the provision of and access to suitable rescue equipment and competent personnel.

10.4 Training and Competency

- 10.4.1 Identification of training needs and competency requirements for relevant workers in relation to noxious or irrespirable atmospheres, including

CONFINED SPACE AND NOXIOUS OR IRRESPIRABLE ATMOSPHERES

refresher training and ongoing maintenance of competency.

- 10.4.2 Training needs are to be inclusive of relevant relevant competency standards, legislation, codes of practice and site or regional protocols, procedures and permit systems.
- 10.4.3 Provision of adequate training and assessment of competency for personnel required to access areas that may contain noxious or irrespirable atmospheres.

Further Considerations

10.5 General

- 10.5.1 Operations are to consider as part of their continual improvement and good practice initiatives:
 - (a) Use of technology to detect potential heating or spontaneous combustion areas in surface operations that may result in irrespirable atmospheres.

Notes:

Where applicable, all permits align with GCAA Work Authorisation and Permit Management.

Refer to GCAA Protocol *HSEC - Work Authorisation and Permit System*.

ASSOCIATED CATASTROPHIC RISKS



TOXIC & IRRESPIRABLE ATMOSPHERES

CRITICAL CONTROLS

Noxious or Irrespirable Atmospheres – Underground

- I1-1 Personnel comply with controlled access areas
- I1-2 Personnel respond to gas monitoring
- I1-3 Maintain respirable atmospheres during ventilation changes in accessible areas
- A1-1 Design, install and operate the ventilation systems and gas drainage system
- A1-10 Self-escape infrastructure available and functional
- C1-9 Withdrawal of personnel

Noxious or Irrespirable Atmospheres – Surface

- I1-1 Personnel comply with controlled access areas
- I1-2 Personnel respond to gas monitoring
- F1-3 Evacuate and withdraw personnel



11



TYRE AND RIM MANAGEMENT

RELEVANT SAFEKOAL RULES

2. Always verify the isolation – test for dead
3. Never enter under suspended loads
4. Never enter no-go zones

5. Never operate equipment unless authorised
7. Never modify safety devices without permission

INTENT

The intent of this Protocol is to eliminate fatalities, injuries, and incidents when working with or near tyres, rims and wheel assemblies.

Mandatory Requirements

11.1 General

- 11.1.1 The Operation is to complete a documented risk assessment to identify all hazards associated with managing tyres, rims and wheel assemblies. This includes assessing the risks and implementing the controls.
- 11.1.2 The Operation is to develop, implement and maintain a management plan for tyres, rims and wheels based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
 - a) All identified risks when procuring, storing, lifting, fitting, removing, testing, repairing, maintaining and changing tyres and wheel assemblies where the rim diameter is 24 inches (61 centimetres) or greater
 - b) All identified risks when managing tyres and wheel assemblies where the rim diameter is less than 24 inches (61 centimetres)
 - c) Task specific procedures to address tyre and wheel deflation, disassembly, assembly and inflation risks. For multi-piece and split rim (divided rim) assemblies, this includes quality checks at hold points for safety critical steps
 - d) A documented maintenance regime for the periodic testing and inspection of tyres, rims and wheel assemblies
 - e) Rim base identification with a unique number for maintenance tracking of all rims with a diameter of 24 inches (61 centimetres) or greater, and for rims with a diameter of less than 24 inches (61 centimetres) identified for tracking in the risk assessment
 - f) Use of a tyre and rim-base register to record the history and maintenance of tyres and rim assemblies
 - g) Selection of tools and equipment to be fit for purpose. This includes condition checks and calibration before use of any tool used to control pressure or torque settings
 - h) Tyres and wheel assemblies with no recorded maintenance history, or no documented pre-work inspection, to be deflated to zero

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pressure and confirmed before releasing tension on the rim or wheel assembly fastenings

- i) The deflation of all tyres to zero pressure, and confirmation before releasing tension on the rim fastenings, when there is no formal procedure available. A risk assessment identifying specific safe handling pressures, is to support all formal procedures for the removal and handling of wheels and rim fastenings at any handling pressure greater than zero
- j) All split rim (divided rim) assemblies to deflate the tyre to zero pressure and confirm before removal
- k) All dual wheel assemblies to deflate both tyres to the specified safe handling pressure and confirm before releasing tension on the rim fastenings
- l) A process to demarcate a restricted work area when changing tyres and wheels to protect other workers not directly involved
- m) Formal procedures (or reference to) for managing no-go zones when deflating, removing, installing and inflating tyres. No person is to stand in the direct line of fire during tyre inflation
- n) Restraint of wheel assemblies with a rim diameter of less than 24 inches (61 centimetre) during inflation
- o) Continuous monitoring of tyres and wheel assemblies during inflation and deflation, from outside the no-go zone and in a safe, remote location
- p) Any tyre in operation with a rim diameter greater than 24 inches (61 centimetres), found to be either deflated to or running at less than 70 percent of the recommended cold inflation pressure, is to be deflated then the wheel assembly dismantled and inspected, before re-inflating the tyre. In a dual wheel assembly this is applicable to both wheels
- q) The safe handling and storing of tyres, rims and wheel assemblies considering condition, identification, separation and component matching
- r) Storing and refitting tyre and wheel assemblies where the rim diameter is less than 24 inches (61 centimetres), to allow handling at the cold inflation pressure only if the rim base, rim components and tyre meet the inspection and testing maintenance regime

- s) Preventing any hot work on wheels or any part of the equipment where heat transfer to any tyre is possible, while the rim assembly has a tyre mounted, whether deflated or not
- t) A process to enable the identification, storage, and selection of matching components (compatible) for use in multi-piece rim and wheel assemblies
- u) A process to prevent the assembly of multi-piece rim and wheel components unless they meet re-usability criteria
- v) Multi-piece rim and wheel assembly designs include the selection of bead seat bands that prevent inflation of the tyre if the wheel assembly locking ring is incorrectly seated.

11.2 Training and Competency

- 11.2.1 Identification of training needs and competency requirements for relevant workers in relation to tyre and rim management, including refresher training and ongoing maintenance of competency.
- 11.2.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria, Original Equipment Manufacturer (OEM) requirements and site or regional protocols, procedures and permit systems.

Further Considerations

11.3 General

- 11.3.1 Operations are to consider as part of their continual improvement and good practice initiatives:
 - a) Specialised tyre handling equipment for tyre, rim and wheel assembly management
 - b) Specialised tyre handling modules for underground tyre handling, to minimise the requirement for manual handling
 - c) Nitrogen for tyre inflation to reduce the risk of tyre fire and explosion
 - d) Wheel nut tension indicators
 - e) Remote tyre condition monitoring systems such as air pressure and temperature monitoring
 - f) Double gutter (quick change) rims for 57 inch (145 centimetres) diameter rims or greater, to reduce the need to unbolt rims in a rear dual-wheel assembly
 - g) Non-pneumatic tyres.

Notes

Refer to *GCAA Guideline FHP 11 Tyres and Rim* for additional information.

12



ELECTRICAL SAFETY

RELEVANT SAFECOAL RULES

- 2. Always verify the isolation – test for dead
- 7. Never modify safety devices without permission

INTENT

The intent of this Protocol is to eliminate or minimise potential fatalities, injuries and incidents arising from risks associated with contacting energised electrical conductors or exposure to faulty electrical systems that can cause secondary hazards such as arc blast, fire or ignition of explosive atmospheres.

Mandatory Requirement

12.1 General

- 12.1.1 The Operation is to complete a documented risk assessment to identify the hazards associated with electrical sources. This includes assessing the risks and implementing controls.
- 12.1.2 The Operation is to develop, implement and maintain a management plan for electrical safety based on the risk assessment. As a minimum, the management plan is to include specific requirements for:
 - a) Electrical installations, including wiring and earthing, being installed and maintained in compliance with relevant legislation, standards, codes of practice and other external requirements
 - b) Identification of appropriate personal protective equipment for electrical work, including arc flash protection
 - c) Installation of electrical protection devices on final distribution circuits where practicable (e.g. earth leakage protection on general purpose outlets no greater than 30 milliamps). Electrical protection settings are determined by competent and authorised persons.
 - d) Testing of electrical protection devices at pre-determined risk based intervals and results recorded and retained
 - e) Installation of suitably certified explosion protected electrical equipment on circuits in potentially explosive atmospheres
 - f) Hazard Reducing Devices fitted to electric welding equipment
 - g) Removal of electrical equipment from service if unfit for use or unsafe for its purpose
 - h) Documenting electrical distribution networks; this may include single line diagrams, system fault calculations, equipment details, electrical protection discrimination curves and cable ratings
 - i) Guarding, labelling, signposting and restriction of access by unauthorised personnel (except for emergency shut off mechanisms) to electrical panels,

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enclosures, control centres, substations and equipment

- j) Electrical isolations compliant with *GCAA Fatal Hazard Protocol 7 - Inadequate Energy Isolation*
- k) An assessment of site overhead, underground and buried power lines and implementation of a system to control the risks associated with working in close proximity.

12.2 Training and Competency

- 12.2.1 Identification of training needs and competency requirements for relevant workers in relation to electrical safety, including refresher training and ongoing maintenance of competency.
- 12.2.2 Training needs are to be inclusive of relevant competency standards, legislation, codes of practice, design criteria and site or regional protocols, procedures and permit systems.
- 12.2.3 Only trained, competent and authorised workers are to conduct electrical work.

Further Considerations

12.3 General

Nil.

Notes

*Where applicable, permits are to align with GCAA - *Work Authorisation and Permit Management* and GCAA Protocol HSEC - *Work Authorisation and Permit System**

GLOSSARY

Action Plan – A documented plan of actions to achieve a specific goal or goals which details responsible people and completion dates.

Anti Two-Block Device – An anti two-block device is an electrical sensing device that is installed on a crane. It prevents the lower load block or hook assembly from coming into contact with the upper load block or boom point sheave assembly and consists of a weighted ring around the hose line. The ring is suspended on a chain from a limit switch that is attached to the boom tip. If the hook assembly (sometimes referred to as a 'headache ball') touches the suspended weighted ring, the switch opens and an alarm sounds in the cab to warn the operator to stop hoisting.

Audit – Third or second party formal assessment of a process, system, activity or other element of the business against set criteria such as legal requirements, site procedures or these Protocols.

Basic Isolation – A simple isolation on a single isolation device that is easy to apply and involves a single energy source. (This may involve one or more personnel and may include multiple isolation of differing energies on the same equipment or feeding equipment.)

Broadbrush Risk Assessment/ Baseline Risk Assessment – See GCAA Standard *FIN - Risk Management*.

CAT – Collision Avoidance Technology.

Change Management – The process of clearly identifying, assessing and managing the planned and unplanned changes that occur within our activities, Operations and facilities.

Cold Inflation Pressure – The tyre inflation pressure set in accordance with both the tyre and rim manufacturer's recommendations.

Complex isolation – An isolation that is not basic.

Confined Space – A confined space means an enclosed or partially enclosed space that:

- ▶ Is not designed or intended primarily to be occupied by a person.
- ▶ Is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space.
- ▶ Is, or is likely to be a risk to health and safety from.
- ▶ An atmosphere that does not have a safe oxygen level, or
 - contaminants, including airborne gases,

vapours and dusts, that may cause injury from fire or explosion, or

- harmful concentrations of any airborne contaminants, or
- engulfment.

Designated Work Area – An area in which typical hot work tasks (such as welding, grinding, cutting, etc.) may be undertaken with confidence that:

- ▶ Adequate fire response controls are easily accessible in the area.
- ▶ Flammable or combustible items/fuels are well clear of the task (more than 15 meters).
- ▶ There is adequate ventilation, lighting, space and work surfaces to easily perform the hot work tasks without additional hazards being created.
- ▶ There is adequate shielding, floor/catch protection and PPE in the location for the safety of those performing hot work tasks and those in close vicinity to the tasks.
- ▶ It is free from water and damp conditions.
- ▶ Safe Working Procedures are in place.

Document Control – Formal process for managing documentation, i.e. version number, review date, owner, approver. Documents are to meet the intent and requirements of GCAA Standard *HSEC – Documents and Records*.

Excavations – Excavation is the removal of earth for non-mining activities such as the development of:

- ▶ Trenches
- ▶ Ditches
- ▶ Pits
- ▶ Shafts
- ▶ Wells
- ▶ Tunnels
- ▶ Pier holes.

Hazardous Zone – A hazardous zone in a coal mine typically means anywhere on the return ventilation side of a point 100 metres before a pillar where mining operations are taking place, all the way back to where the ventilation exhausts to surface and where there is a risk of a methane gas explosion. (Within such a zone all equipment is to be either flame-proof or intrinsically safe).

Hot Work – Hot work is any welding, thermal or oxy cutting, frictional cutting and grinding, heating or other fire or spark producing operation.

Inrush – Relates to the sudden flow of water or other substance which could result in drowning, asphyxiation, entrapment or physical impact. Potential inrush hazards need to be identified considering:

- ▶ The potential sources of inrush including current, disused or abandoned mine workings, along the same seam or across strata, surface water bodies, backfill operations, highly permeable aquifers, bore-holes, faults or other geological weaknesses.
- ▶ The potential for the accumulation of water, gas or other materials that could liquefy or flow into other workings or locations.
- ▶ The magnitude of all potential sources and maximum flow rates.
- ▶ The Maximum Probable Consequence scenarios for each potential source, especially including the accuracy of plans of other workings, variation in rock properties, geological weaknesses or similar unknowns.
- ▶ The potential sources of inundation (slower flow of water) including extreme weather, overflow or failure of levies and dam structures, failure or blocking of flow channels (either regular, overflow, or emergency), which have potential to accumulate/accelerate and escalate to an inrush event.

Issue Specific Risk Assessment – Risk assessment which identifies and assesses the risk related to a specific topic, i.e. strata, which is normally identified as a risk in the Baseline Risk Assessment or BBRA.

Dragline Bucket Jewellery – Miscellaneous items used to attach the dragline bucket to the hoist ropes.

Management Plan – Formal process for management of a particular activity, task or are of the business which articulates management activities and roles and responsibilities.

Work Basket – A work basket is an attachment that is attached to a piece of equipment, i.e. a crane.

Monitoring Program – Agreed program to regularly monitor and measure the effectiveness of specific aspects of controls, procedures and management plans.

Operational Areas – Any areas where production activities are undertaken.

Operations Engineering Management Plan – Formal process for management of engineering practices, in particular as it relates to design, install, commission, use, maintenance and decommissioning.

Outburst – Outburst is the sudden and violent ejection of coal, gas and rock from a coal face and surrounding strata in an underground coal mine.

PAT – Proximity Awareness Technology.

PDT – Proximity Detection Technology.

Positive Communication – Includes the active communication between both mobile equipment operators and confirmed responses.

Permit System – Formal system required for specific tasks or activities, i.e. working in confined space, whereby a permit has to be issued to an operator prior to commencing work.

Procedure – Documented process detailing the requirements for conducting an activity or task.

Rigger/Dogger – A Rigger is a person that specialises in the lifting or moving of extremely large or heavy objects, and a Dogger is a person who directs the operation of a crane.

Rim – Part of a wheel assembly, mounted to a vehicle using cleats and studs or nuts.

Rim Assembly – The assembly of wheel components, not including a tyre. A rim assembly typically comprise a rim base, flanges, bead seat band and lock ring.

Rim Base – The part of the rim assembly on which the tyre is mounted and supported.

Safe Handling Pressure – The nominal pressure, determined by risk assessment, for handling wheel assemblies during dismounting, mounting, storage and transport.

SAT – Safety Adherence Technology.

Self Assessments – Internal formal assessment of a process, system, activity or other element of the business against set criteria such as legal requirements, site procedures or these Protocols.

Slope Stability – Relates to the stability of material on a stockpile or dump.

Split Rims – Rims that bolt together and form the mating surface between the rim and the hub.

Surface Operations – Includes all surface areas relating to all activities (Open cut, Underground, CHPP or Port).

Suspended Load – A load which is being supported by a crane or other lifting device.

Training – Refers to the initial training to verify competence and subsequent refresher training to verify that the competencies have been retained.

Underground Operations – Includes all operations from the entrance to the drift or shaft.

Wheel Assemblies – Comprises a rim base, flanges, bead seat band, lock ring and a wheel disc or nave plate welded to the rim base. A wheel assembly is mounted to earth moving machinery by a wheel disc and fasteners.

CONNECTING THE RISKS



OUTBURST



INRUSH



SURFACE VEHICLE
INTERACTION



SURFACE
STRATA



UN



5. INRUSH AND
OUTBURST



3. MOBILE
EQUIPMENT



1. STRATA
FAILURE



IGNITION
OF GAS



SURFACE VEHICLE
INTERACTION



UNDERGROUND
STRATA

CATASTROPHIC HAZARDS (DEPICTED IN THE CIRCLES) AND FATAL HAZARDS (DEPICTED IN THE TRIANGLES) ARE CONNECTED TO A FATAL HAZARD PROTOCOL



4. INAPPROPRIATE
EMERGENCY RESPONSE

CATASTROPHIC HAZARDS NOT CONNECTED TO A FATAL HAZARD PROTOCOL



TAILINGS STORAGE
FACILITIES



AVIATION

FATAL HAZARD PROTOCOLS NOT CONNECTED TO A CATASTROPHIC HAZARD



6. EXPLOSIVES
AND SHOTFIRING

7. IM

SAFECOAL



UNDERGROUND
STRATA



IGNITION
OF GAS



UNDERGROUND
FIRE



TOXIC & IRRESPIRABLE
ATMOSPHERES



1. STRATA
FAILURE



2. FIRES AND
EXPLOSION



10. CONFINED SPACE AND
NOXIOUS OR IRRESPIRABLE
ATMOSPHERES



UNDERGROUND
STRATA



UNDERGROUND
FIRE



SURFACE
STRATA



TOXIC & IRRESPIRABLE
ATMOSPHERES



INAPPROPRIATE
AGENCY RESPONSE



7. INADEQUATE ENERGY
ISOLATION



8. WORKING
AT HEIGHT



9. LIFTING AND
CRANAGE



11. TYRE AND RIM
MANAGEMENT



12. ELECTRICAL
SAFETY



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