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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

- 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



- 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.

2.4 Further Considerations

- 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.

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 Underground

- 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