



Mining & Quarrying
OCCUPATIONAL HEALTH &
SAFETY COMMITTEE

Principal Mining Hazard Management Guide

Promoting Work Health and Safety in the Workplace

The South Australian Mining and Quarrying Occupational Health and Safety Committee

Promoting Work Health and Safety in the Workplace

This workplace industry safety resource is developed and fully funded by the Mining and Quarrying Occupational Health and Safety Committee (MAQOHSC).

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Principal Mining Hazard Management Guide

This Guidance Material has been developed in accordance with Chapter 10, Part 2, Division 2, Principal Mining Hazard Management Plans (PMHMP) of the *Work Health and Safety Regulations 2012 (SA)*.

AIM

The aim of the Guidance Material is to provide mine and quarry operators with an understanding of the requirements of the *Work Health and Safety Regulations 2012 (SA)*, Chapter 10 Mines, in relation to Principal Mining Hazards (PMH).

1. Meaning of Principal Mining Hazard

Regulation 612 of the *Work Health and Safety Regulations 2012 (SA)*, defines a Principal Mining Hazard as, any activity, process, procedure, plant, structure, substance, situation or other circumstance relating to the carrying out of mining operations that has a reasonable potential to result in multiple deaths in a single incident or a series of recurring incidents, in relation to any of the following:

- a) Ground or strata failure;
- b) Inundation or inrush of any substance;
- c) Mine shafts and winding operations;
- d) Roads or other vehicle operating areas;
- e) Air quality or dust or other airborne contaminants;
- f) Fire or explosion;
- g) Gas outbursts;
- h) Spontaneous combustion; or
- i) A hazard identified by the mine operator of a mine under Regulation 34.

Regulation 34 of the *Work Health and Safety Regulations 2012 (SA)*, states that a duty holder, in managing risks to health and safety, must identify reasonably foreseeable hazards that could give rise to risks to health and safety.

2. Identification and Assessment of Principal Mining Hazards

Regulation 627 of the *Work Health and Safety Regulations 2012* (SA) states that a mine operator must:

1. Identify all principal mining hazards at the mine,
2. Conduct, in relation to each principal mining hazard identified, a risk assessment that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with the principal mining hazard, and
3. In conducting a risk assessment under sub-regulation (2), must—
 - a. Use investigation and analysis methods that are appropriate to the principal mining hazard being considered; and
 - b. Consider the principal mining hazard individually and also cumulatively with other hazards at the mine.

HOW

When commencing the process of identifying and assessing Principal Mining Hazards the mine operator must implement a safety role for workers (Regulation 675Q), to ensure that all personnel working at the mine / quarry are consulted (Regulation 675R), and have an opportunity to contribute in the identification and assessment of Principal Mining Hazards and development of Principal Mining Hazard Management Plans.

To commence the process of identifying potential Principal Mining Hazards the mine operator must:

- Consult with the Health and Safety Committee and elected Health and Safety Representatives.

Should there not be a Health and Safety Committee or elected Health and Safety Representatives the workforce could be consulted on Principal Mining Hazards via a toolbox meeting.

A review of the site risk register against the potential Principal Mining Hazards identified in Regulation 612 will provide a good starting point to identify Principal Mining Hazards.

Once all Principal Mining Hazards have been identified and documented, a process of risk assessing the hazards and identifying control measures will need to commence. It is important to make sure that the risks are prioritised with the highest risk to be addressed first.

As stated in Regulation 627, for each principal mining hazard identified, the mine operator must conduct a risk assessment that:

- a) Involves a comprehensive and systematic investigation and analysis of all aspects of the risk to health and safety associated with the principal mining hazard;
- b) Considers each principal mining hazard individually and cumulatively with other hazards at the mine; and
- c) Develops control measures.

When conducting a systematic investigation and analysis of the risks to health and safety and identifying control measures associated with a Principal Mining Hazard, it is good practice to review the following:

- Incident and investigation reports;
- Near Miss Reports;
- Safety Alerts from industry and regulatory bodies; and
- Codes of Practice and Guidelines.

Note: *When conducting the risk assessments, developing control measures and developing Principal Mining Hazard Management Plans, the mine operator must give regard to the matters set out in schedule 19 of the Work Health and Safety Regulations 2012 (SA) (see appendix A).*

3. Preparation of Principal Mining Hazard Management Plans

When preparing a Principal Mining Hazard Management Plan it must:

1. Include the management of all aspects of the risk controls in relevant to the principal mining hazard; and
2. Be set out and expressed in a way that is easily understandable and made readily accessible for workers who use the principal mining hazard management plan.

Without limiting (1) and (2) above a Principal Mining Hazard Management Plan must:

- a) Describe the nature of the principal mining hazard to which the plan relates; and
- b) Describe how the principal mining hazard relates to other hazards at the mine; and
- c) Describe the analysis methods used in identifying the principal mining hazard to which the plan relates; and
- d) Include a record of the risk assessment conducted in relation to the principal mining hazard; and
- e) Describe the investigation and analysis methods used in determining the control measures to be implemented; and
- f) Describe all control measures to be implemented to manage risks to health and safety associated with the principal mining hazard; and
- g) Describe the arrangements in place for providing the information, training and instruction in relation to the principal mining hazard; and
- h) Refer to any design principles, engineering standards and technical standards relied on for control measures for the principal mining hazard.

Note: *Principal Mining Hazard Management Plans must form part of the existing Safety Management System (SMS) of a site or organisation. Some practical ways to integrate Principal Mining Hazard Management Plans into an existing Safety Management System are:*

- *Update the risk management procedure to include principal mining hazard management plans;*
- *Reference principal mining hazard management plans in other relevant procedures; and*

- *Reference relevant work instructions, policies and procedures in the principal mining hazard management plans.*

4. Review of Principal Mining Hazard Management Plans

Principal Mining Hazard Management Plans must be reviewed on a regular basis to ensure that risk control measures implemented as part of the Principal Mining Hazard Management Plan are current and effective. There is a requirement in the *Work Health and Safety Regulations 2012* (SA), (Regulations 38 and 618) that describe the requirement to review risk control measures.

However Principal Mining Hazard Management Plans must be reviewed in the event of any of the following:

- A notifiable or high potential incident associated with the principal mining hazard management plan;
- Awareness that a risk control measure is not effective in controlling the risk associated with the principal mining hazard management plan;
- A change in the workplace (physical change, process or procedure) that may change or introduce a new risk associated with the principal mining hazard management plan;
- A new hazard or risk is identified associated with the principal mining hazard management plan;
- Consultation with workers identifies that the risk control measures associated with the principal mining hazard management plan require review;
- A health and safety representative requests a review;
- An audit identifies that risk control measures are deficient in relation to the principal mining hazard management plan;
- Health monitoring results identify the need to move a worker due to a risk associated with the principal mining hazard management plan; or
- Legislative change.

Reviews of Principal Mining Hazard Management Plans and their associated control measures must be conducted in consultation with workers.

FURTHER ASSISTANCE

MAQOHSC Work Health and Safety Specialists are available to provide further advice and assistance on all Work Health and Safety matters.

MAQOHSC Work Health and Safety Specialists are able to be contacted via our website at www.maqohsc.sa.gov.au or email maqohsc@sa.gov.au.

ADDITIONAL INFORMATION

Work Health and Safety Legislation, Codes of Practice, fact sheets, Health and Safety Representatives (HSR) information and guides can be found at the following websites:

SafeWork SA – www.safework.sa.gov.au or call 1300 365 255

Safe Work Australia – www.safeworkaustralia.gov.au or call 1300 551 832

REFERENCES

Work Health and Safety Regulations 2012 (SA), Chapter 10, Mines

Work Health and Safety Regulations 2012 (SA), Regulations 38, 612, 618, 627

Work Health and Safety Regulations 2012 (SA), Schedule 19

Appendix A:

Schedule 19 - Principal Mining Hazard Management Plans - additional matters to be considered

1. Ground or strata instability

The following matters must be considered in developing the control measures to manage the risks of ground or strata instability:

- a) the local geological structure;
- b) the local hydrogeological environment, including surface and ground water;
- c) the geotechnical characteristics of the rocks and soil, including the effects of time, oxidation and water on rock support and stability;
- d) any natural or induced seismic activity;
- e) the location and loadings from existing or proposed mine infrastructure such as waste dumps, tailings storage, haul roads and mine facilities;
- f) any previously excavated or abandoned workings;
- g) the proposed and existing mining operations, including the nature and number of excavations, the number and size of permanent or temporary voids or openings, backfilling of mined areas and stopes, abutments, periodic weighting and windblast;
- h) the proposed blasting activities, including airblast.

2. Inundation and inrush

The following matters must be considered in developing the control measures to manage the risks of inundation and inrush:

- a) the potential sources of inundation, including extreme weather, overflow or failure of levies and dam structures, failure or blocking of flow channels (either regular, overflow or emergency);
- b) 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;
- c) the potential for the accumulation of water, gas or other substances or materials that could liquefy or flow into other workings or locations;
- d) the magnitude of all potential sources and maximum flow rates;
- e) the worst possible health and safety consequences of each potential source, including the accuracy of plans of other workings, variation in rock properties and geological weaknesses.

3. Mine shafts and winding operations

The following matters must be considered in developing the control measures to manage the risks associated with mine shafts and winding operations:

- a) the stability and integrity of the shaft;
- b) the potential for fires in underground operations, the shaft or winder areas;

- c) the potential for any unintended or uncontrolled movement of the conveyances within the shaft;
- d) the potential for a detached conveyance to fall down the shaft;
- e) the potential for fall of persons, equipment, materials or support structure into or within, the shaft;
- f) the potential for failure of, or damage to, health and safety related equipment and controls, including the following:
 - i. ropes bearing the weight of the shaft conveyance;
 - ii. controls and limiting devices to prevent overwind, overrun, over speed and the exceeding of other selected limits;
 - iii. equipment and controls to detect, prevent or cause the winder to stop in the event of slack rope, drum slip or tail rope malfunctions;
 - iv. braking systems including emergency brakes and systems for preventing free-fall of a conveyance;
 - v. warning systems for any emergency in the shaft;
 - vi. communication systems;
- g) the potential for injury to persons in a conveyance from material being carried in the conveyance or falling from another conveyance;
- h) the need to enable persons to escape from a stalled conveyance;
- i) the competency of the operator of the winder.

4. Roads and other vehicle operating areas

The following matters must be considered in developing the control measures to manage the risks associated with roads and other vehicle operating areas:

- a) mobile plant characteristics, including stopping distances, maneuverability, operating speeds, driver position, driver line of sight and remote control mobile plant;
- b) the effect on road conditions of expected environmental conditions during operating periods (including time of day, weather, temperature and visibility);
- c) the impact of road design and characteristics, including grade, camber, surface, radius of curves and intersections;
- d) the impact of mine design, including banks and steep drops adjacent to vehicle operating areas;
- e) the volume and speed of traffic and the potential for interactions between mobile plant with different operating characteristics, including heavy and light vehicles;
- f) the potential for interactions between mobile plant and pedestrians, including consideration of park up areas and driver access;
- g) the potential for interaction between mining mobile plant and public traffic;
- h) the potential for interaction between mobile plant and fixed structures, including overhead and underground power lines, tunnel walls and roofs.

5. Air quality, dust and other airborne contaminants

The following matters must be considered in developing the control measures to manage the risks associated with air quality, airborne dust and other airborne contaminants:

- a) the types of dust and other chemical and biological contaminants likely to be in the air from both natural sources, including naturally occurring asbestos, and introduced sources;

- b) the levels of oxygen, dust and other contaminants in the natural or supplied air of a mine;
- c) the temperature and humidity of the air;
- d) the length of exposure, having regard to extended shifts and reduced recovery periods.

6. Fire and explosion

The following matters must be considered in developing the control measures to manage the risks of fire and explosion:

- a) the potential sources of flammable, combustible and explosive substances and materials, both natural and introduced, including gas, dust, fuels, solvents and timber;
- b) the potential sources of ignition, fire or explosion, including plant, electricity, static electricity, spontaneous combustion, lightning, hot work and other work practices;
- c) the potential for propagation of fire or explosion to other parts of the mine.

7. Gas outbursts

The following matters must be considered in developing the control measures to manage the risks of gas outbursts:

- a) the potential for gas release into the working area of a mine from both natural and introduced sources in a concentration that could lead to fire, explosion or asphyxiation;
- b) the potential for accumulation of gases in working areas and abandoned areas of the mine;
- c) the nature of the gas that could be released;
- d) the gas levels in the material being mined;
- e) gas seam pressures.

8. Spontaneous combustion

The following matters must be considered in developing the control measures to manage the risks of spontaneous combustion:

- a) the potential for spontaneous combustion to occur in the material being mined, including by-
 - i. evaluating the history of the mine in relation to spontaneous combustion; and
 - ii. evaluating any adjacent or previous mining operations in the same seam; and
 - iii. the conduct of scientific testing;
- b) mine ventilation practices;
- c) the design of the mine;
- d) the impact of gases generated by spontaneous combustion on mine environmental conditions.

Appendix B:

ID	PMHMP - 02
Title	Surface Mobile Equipment
Management Strategy	<p>Due to the nature of operations at XYZ, Surface Mobile Equipment is utilised throughout the site. Surface Mobile Equipment is considered a principal mining hazard at XYZ, and a combination of risk control strategies are outlined in this Plan.</p> <p>Surface Mobile Equipment operations are managed as per relevant Surface Mobile Equipment Operational Procedures. <i>(listed in references section of this plan)</i></p>
Relationship to other hazards	<p>Relationship to other principal mining hazards include:</p> <ul style="list-style-type: none"> • Fatigue • Light Vehicle operation • Falls from height • Stored Energy <p>Additional hazard relationships and control measures shall be managed on a task-by-task basis, via the Risk Management Process (ie. Job Safety Analysis)</p>
Identification methods	<p>The hazards and risks associated with Surface Mobile Equipment that form part of this principal mining hazard management plan were identified in consultation with workers through the review of:</p> <ul style="list-style-type: none"> • Hazard and Near Miss Reports • Incidents and Investigation Reports • Risk Registers • Industry Safety Alerts • Audits • Professional consultation • Industry standards, Codes of Practice, Guidelines, knowledge and practices • Meetings with workers (Health and Safety Committee, Toolbox, Pre Start Information)
Communication, Consultation and Training	<p>This Principal Mining Hazard Management Plan has been developed and reviewed in consultation with workers on site.</p> <p>Identified principal mining hazards shall be communicated to workers via</p> <ul style="list-style-type: none"> • Training sessions; • Inductions; • Toolbox topics; and • Reiterated through sign boards, Pre Start Information meetings and other communication channels used on site. <p>A hard copy of the most current version of this plan shall be made readily accessible to workers who use this plan.</p>

Risks Identified	Likelihood	Consequence	Risk Rating	Controls	Responsibility
Interaction between light vehicle and Surface Mobile Equipment (Mine / Crusher / ROM / Haul Road)	2	5	7	<ul style="list-style-type: none"> • Separation of heavy vehicles and light vehicles where practicable • Heavy vehicles / light vehicles Go-line design • Dual Run of mine (ROM) design • Pit Permit system • Design of intersections to be adequate for good visibility (windrow height) • Production supervisor inspections • Mine / Run of mine (ROM) Traffic Management Plan • Intersection control (stop signs) • Training and competency of all vehicle operators • Vehicle maintenance schedules / pre-starts • Fitness for work policy • Fatigue Management policy • Change Management process on design changes • 50 / 30 Metre exclusion zone • Reversing cameras / Collision detection devices • Green lights for haul trucks and dump trucks 	
Person struck by unplanned movement of Surface Mobile Equipment (including start-up whilst performing maintenance work)	1	4	5	<ul style="list-style-type: none"> • 'Vehicle Footprint' exclusion zone, maintenance exclusion zones • Positive mobile plant isolation • Radio Communication process • V-Drains / wheels chocked • Surface Mobile Equipment horn sounding prior to start-up • Parking standard • Stable and even ground conditions • Ensure all operators are trained / competent • Personal protective equipment (PPE) (Hard hat) • Gloves 	
Risk of interaction due to limited visibility of dump truck				<ul style="list-style-type: none"> • Separation of heavy vehicles and light vehicles where practicable • Pit Permit system • Design of intersections to be adequate for good visibility 	

	2	4	6	<p>(windrow height)</p> <ul style="list-style-type: none"> • Mine / Run of mine (ROM) Traffic Management Plan • Intersection control (stop signs) • Training and competency of all vehicle operators • Vehicle maintenance schedules / pre-starts • Fitness for work policy • Fatigue Management policy • Change Management process on design changes • 50 / 30 Metre exclusion zone • Reversing cameras / Collision detection devices • Green lights for haul trucks and dump trucks 	
Risk of collision due to Surface Mobile Equipment operator not being trained/ competent	1	4	5	<ul style="list-style-type: none"> • Checking of competence for new personnel • Training and verification of competency system for operators 	

References	<ul style="list-style-type: none"> • Code of Practice for Mobile Equipment and Light Vehicle Safety • Site Traffic and Road Management Plan • Parking Standard • XYZ Risk Management Procedure <p>Procedures</p> <ul style="list-style-type: none"> • SOP.02 Unloading Side Tippers • SOP.03 Coupling Prime Movers • SOP. 04 Water Carting Operation • SOP.05 Grader Operations • SOP.06 Uncoupling Prime Movers • SOP.07 Haul Truck Operations • SOP.08 Front End Loader Operations • SOP.09 Refueling Vehicles and Equipment • SOP.10 Excavator Operations • SOP.11 Track Dozer Operations
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