

Guidance Note QGN18 Tipping near or over vertical edges in underground mining operations

Date

March 2025

Revision

2



Resources
Safety & Health
Queensland

Contents

1.0	INTRODUCTION	4
2.0	BACKGROUND	4
3.0	PURPOSE AND SCOPE	5
4.0	MANAGEMENT OF VERTICAL EDGES	5
5.0	BARRIERS	9
5.1	Engineered permanent stop logs	10
5.2	Engineered temporary stop logs	11
5.3	Waste stop logs	12
6.0	PUSHING OFF VERTICAL EDGES	12
7.0	PERSONAL ANCHOR POINTS	13
7.1	Fall arrest	13
7.2	Fall restraint	13
7.3	Risk assessment considerations	13
8.0	MONITORING AND REVIEW OF VERTICAL EDGES	15
9.0	RELEVANT LEGISLATION	16
9.1	Mining and Quarrying Safety and Health Act 1999	16
9.1.1	Risk management	16
9.2	Mining and Quarrying Safety and Health Regulation 2017	17
9.2.1	Risk management process	17
9.2.2	Facilities and processes	20
9.2.3	Training and assessment	20
9.2.4	Time and resources for carrying out tasks	21
9.2.5	Supervising workers	22
9.2.6	Mobile plant selection and design	22
9.2.7	Procedures and standard work instructions	23

Reference is made to the following legislation as applicable to a Mine or Quarry in Queensland:

- *Mining and Quarrying Safety and Health Act 1999*
- Mining and Quarrying Safety and Health Regulation 2017

This Guidance Note has been issued by the Mines Inspectorate of Resources Safety and Health Queensland (RSHQ). It is not a Guideline as defined in the *Mining and Quarrying Safety and Health Act 1999* (MQSHA) or a Recognised Standard as defined in the *Coal Mining Safety and Health Act 1999* (CMSHA). In some circumstances, compliance with this Guidance Note may not be sufficient to ensure compliance with the requirements in the legislation. Guidance Notes may be updated from time to time.

To ensure you have the latest version, check the RSHQ website: [Recognised standards, guidelines and guidance notes | Business Queensland](#) or contact your local [Inspector of Mines](#).

This publication has been compiled by Mineral Mines and Quarries Inspectorate of RSHQ

© State of Queensland, 2025

The Queensland Government supports and encourages the dissemination and exchange of its information. The copyright in this publication is licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.

Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms.



You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication. Note: Some content in this publication may have different licence terms as indicated.

For more information on this licence, visit <https://creativecommons.org/licenses/by/4.0/>.

The information contained herein is subject to change without notice. The Queensland Government shall not be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using this information.

1.0 Introduction

This guidance note has been issued by the Mineral Mines & Quarries Inspectorate of Resources Safety and Health Queensland. It is designed to assist underground mine operators, supervisors and management determine the safest options for tipping over vertical edges in underground mines where there is no permanent 'stop log' in place. The guidance note also provides information on the minimum expected requirement for underground anchor points for persons working in close proximity to vertical edges.

A guidance note is neither a guideline as defined in the *Mining and Quarrying Safety and Health Act 1999*, nor a Recognised Standard as defined in the *Coal Mining Safety and Health Act 1999*. In some circumstances, compliance with the guidance note may not be sufficient to ensure compliance with the requirements in the legislation.

Guidance notes may be updated from time to time. To ensure you have the latest version, either check the Business Queensland website at [Recognised standards, guidelines and guidance notes | Business Queensland](#) or contact your local inspector of mines.

2.0 Background

In May 2009, there was a fatal accident at a Queensland underground metalliferous mine in which a mineworker drove a LHD mucking unit into a stope while undertaking backfilling operations. An industry workshop was held in response to this incident.

At the vertical edge workshop, the Mines Inspectorate and industry worked together to identify hazards and resultant risks associated with tipping over vertical edges.

Workshop participants also discussed the use and placement of underground anchor points to determine the safest practical anchor points for personal arrest/fall restraint for persons working underground in close proximity to vertical edges.

Information gathered at this workshop has been included in this guidance note.

Since this guidance note's initial publication, a number of high potential incidents have occurred where a manually operated loader in the process installing a temporary stop log in preparation for stope backfilling operations, has travelled past the designated placement point and driven over, or in close proximity to an unprotected vertical edge (open stope). This guidance note was updated in January 2025 to provide guidance on the risks associated with this task.

3.0 Purpose and scope

Underground mining operations are commonly undertaken near voids, particularly when backfilling stopes and tipping into ore passes. In addition, mining operations can also operate equipment over filled voids. This guidance note provides information on the hazards associated with vertical edges to assist in controlling the resultant risks to an acceptable level and as low as reasonably achievable.

4.0 Management of vertical edges

The mine's safety and health management system should include the site's void management process, including monitoring and review of vertical edges.

Workers are exposed to the hazard of vertical edges in many aspects of underground mining as vertical edges are an integral part of the mining process.

Types of vertical edges may include:

- Mined void edges (stopes/benches/raise bored holes/winzes)
- Ore and mullock passes and finger raises.

Types of activities at vertical edges may include:

- Workers inspecting or working near to a vertical edge (such as charging holes, drilling and cleaning holes, bringing down hang-ups in passes, conducting surveys etc)
- Installation of anchor points, temporary or permanent stop logs etc
- Loaders and/or trucks tipping or ejecting material
- Supervisors conducting inspections
- Technical staff reviewing progress of stopes/raises etc.

An effective risk assessment must be completed to determine appropriate controls for the hazards associated with persons and/or equipment working/operating at or near a vertical edge. Each of these activities will have their own hazards and resultant risks specific to the circumstances. The control measures implemented must address and manage these hazards in an effective manner.

When choosing controls to implement, the hierarchy of controls must be considered. Higher order controls such as elimination, separation or engineering should be used in preference to lower order administrative controls such as procedures and training. However a combination of these controls will be necessary to ensure the risk to persons from going over a vertical edge while working at or near the vertical edge, or when tipping or pushing off, is at an acceptable level.

A pre-requisite to effective vertical edge management is the awareness of any vertical edge. The identification of all voids, including interaction of any levels into the void and any material including type and quantity used to fill the void, or to be/being extracted from the void, must be proactive and systematic, and be clearly communicated between management and the workforce.

There have been incidents where workers and mobile equipment have fallen into vertical openings as a result of material being inadvertently removed from backfilled stopes through the draw points and they were unaware of their location with respect to the overall void structure.

For example, incidents have occurred where workers thought they were at the base of a void when they were in fact at an intermediate level; or where material has been removed from lower parts of interconnected workings or from draw points and unexpected voids have appeared higher up, creating an unknown risk for the workers and equipment working at the level.

Vertical edge management should also include a consistent method to identify and mark permanent, temporary and waste stop logs.

A site inspection and risk assessment should always be conducted for any activity that is associated with a vertical edge. The following should be considered:

- Elimination of vertical edges through changes to the mining methodology
- The type of activity that is planned to occur near the vertical edge
- Minimising personnel exposure at the vertical edge
- Minimising the duration the vertical edge will be in use
- Mobile equipment:
 - Must be fit for purpose
 - Serviced and maintained so that it complies with original equipment manufacture standards as a minimum
 - Equipment pre-start checks should be conducted and identified defects corrected effectively i.e. service and emergency brake steering and brake tests.
- Engineering controls to remove workers from the vertical edge:
 - Remote controlled equipment (eliminating workers operating close to the edge)
 - Extensions on equipment (which does not require the operation of equipment working in close proximity to the edge e.g. push off bars) with additional controls e.g. installation of stope poles near the vertical edge
 - Reduced opening size to prevent falling into the excavation e.g. design additional opening for tipping into the stope such as a long hole winze to eliminate the need for going near a vertical edge
 - Design of openings so they are smaller than the size of the equipment working near them
 - Maintenance of openings, particularly pass wear at the collar or hidden below the collar
 - Ore pass rings or grizzlies (restricts the size of material that can be tipped and has the additional benefit of preventing machinery from going into the void).
- Stop logs/barriers:
 - Permanent stop logs (designed and tested as safe)
 - Temporary steel stop logs

- Temporary steel stop logs and waste stop logs combined
 - Waste material stop logs.
- Use of suitable proximity detection equipment
- Use of edge warning devices. These warning devices must be consistent and specific to the task marks on the wall. They could include:
 - Laser trip switches
 - 'Candy Cane' poles
 - 'Streamer' tell tales on the backs
 - Flicker lights
 - Audible indicators
 - The use of paint marks on the wall should not be used as an effective indicator of edge proximity as there are often paint marks on mine walls for other purposes which can create confusion.
- Improved visibility:
 - Lights
 - Whitewashing
 - Signage – cleanliness and consistency of signage must be ensured.
- Check integrity and stability of the edge (such as undercutting) through:
 - Survey pick-ups (e.g. CALS survey)
 - Visual inspection from a point of safety
 - Undercutting 'tell tales'.
- Mechanism for inspecting and maintaining the integrity and effectiveness of the barrier
- Written procedures and standard work instructions
- Operation of equipment when approaching barrier
- Personnel anchor points
- Use of spotters
- Training and competency of personnel
- Communication of job activity and work areas (including detailed use of plans). Process when leaving an open void area:
 - Physical barricade and communication to warn personnel of the hazards (e.g. barricades and signs).
- Identification of location with respect to the void structure (e.g. clear identification of draw point versus intermediate level)
- Level of supervision to ensure effective implementation and maintenance of control measures:
 - Closely monitor operations to verify the effectiveness of the control measures.

- Process after the stopes have been backfilled:
 - take steps to ensure all stopes at the mine that have been backfilled, including roadways above backfilled areas, are structurally sound and where any voids and/or slumping is identified, implement controls to ensure risk to workers is managed to an acceptable level. This may include:
 - controls to prevent the loss of material from the bottom of the stope which may lead to the formation of a void
 - controls to prevent any inadvertent bogging or mucking of material from the bottom of the stope
 - controls to manage the risk to workers in the vicinity of, or travelling over, areas of the mine that may be affected by slumping in stopes.
- Audit and review the effectiveness of the mine's safety and health management system, as it relates to controlling hazards and risk to workers associated with working in the vicinity of backfilled stopes.
- Emergency response.

Activities around vertical edges should be limited to essential personnel only.

In addition, ground conditions regarding working near blasted areas should be considered, but are not included in the scope of this guidance note.

5.0 Barriers

Selection, construction and installation of the barrier type controls are important and should consider:

- Design of the barrier
- Fit for purpose nature of the barrier
- An assessment to determine the effectiveness of the barrier (based on size, power of the equipment and the materials used in the construction of the barrier)
- Mechanism for inspecting and maintaining the integrity and effectiveness of the barrier including potential ramping effects of material in front of the barrier.

Workers and mobile equipment can be exposed to the hazard of unprotected vertical edges during the process of installing permanent or temporary stop logs to enable tipping or pushing into vertical openings.

To mitigate this risk, an appropriate barrier should be installed prior to a vertical edge or void being created (i.e. firing of the crown pillar), to separate workers and mobile equipment from the hazard while performing this task. Appropriate barriers may include the following:

- Engineered machinery stop poles
- Engineered temporary stop logs
- Waste rock bunds (of appropriate size/volume).



Figure 1: Example of engineered machinery stop poles

5.1 Engineered permanent stop logs

Where it is necessary to create and maintain a vertical edge the best means of managing the risk is to establish a permanent engineered stop log. It must be of a 'fit for purpose' nature that would stop equipment under normal operating conditions inadvertently going over the edge.

The following points should be considered for permanent stop logs:

- Designed to appropriate engineering standard
- Installed to an appropriate engineering design
- Anchor point location considering ground integrity if pinned to the floor or wall
- Maintenance, inspection and testing regime with well-defined pass/fail criteria (including inspection of the edge and void, such as an ore pass)
- Nature and type of equipment that will access or come into contact with the stop log (considering management of change if new equipment is used on site)
- Potential ramping effect of material in front of the stop log
- Lighting and whitewashing of surrounds
- Signage and warning paraphernalia (streamers etc).



Figure 2: Example of engineered permanent stop log (concrete)

5.2 Engineered temporary stop logs

If it is not practical to establish a permanent stop log, due to the nature of the void or void cycle time, then a suitable temporary stop log should be established and maintained. The following points should be considered in the risk assessment for temporary stop logs:

- Designed to appropriate engineering standards
- Installed to an appropriate engineering design
- Appropriate maintenance, inspection and testing regime with well-defined pass/fail criteria
- Type, make and model of equipment that will access or come into contact with the stop log (considering management of change if new equipment is used on site)
- Anchor point location considering ground integrity if pinned to the floor or wall
- Backing board height, base plate length and suitable width for the machinery using it
- Potential ramping effect of material in front of the stop log
- Lighting and whitewashing of surrounds
- Signage and warning paraphernalia (streamers etc.)
- Temporary stop logs must first be anchored to the walls using appropriately rated anchor points, chains and hardware at a sufficient distance from the void edge, prior to being pushed into place near the vertical edge at the designated position.

Note: Anchor chains should be taut, but not under significant tension when the stop log is placed in the designated final position. Stop log movement indicator chains should be used to alert persons if the stop log moves from its designated position during tipping operations.



Figure 3: Example of engineered temporary stop log

5.3 Waste stop logs

A waste stop log (i.e. a stop log made from rock material) is considered a lower-level control than a correctly designed, installed and maintained permanent or temporary stop log. Waste stop logs should only be considered once the rill has been established and may be advanced as a rolling bund. A waste stop log may have less stopping capacity for equipment travelling towards it at speed.

The risk assessment involving a temporary waste stop log should consider the following:

- Height of stop log
- Quality of material used
- Variations in a worker's perception of the height of the stop log and the quality of material used
- Prone to erosion through inadvertent removal of material during use
- Prone to build-up over time which may cause a ramping effect
- Risks associated with cleaning build-up of material.

6.0 Pushing off vertical edges

Pushing off is a high-risk activity as workers and mobile equipment are placed in close proximity to an unprotected vertical edge while equipment is in a forward motion.

There are two common methods of pushing off in underground mineral mines. The first involves the use of a loader to push off material over the vertical edge and into the void. This method should only be undertaken with the loader remotely operated or using a 'rolling bund' once the rill in the void has been established.

The second involved the use of mobile plant (i.e. Integrated Tool Carrier) fitted with an engineered extension/push off bars to push off material over the vertical edge and into the void. This method should only be undertaken with the mobile equipment remotely operated or combined with the use of physical barrier between the equipment and vertical edge (i.e. stope poles).

Where possible, alternatives to pushing off should be implemented:

- Eliminate the need to push off (e.g. manually blowing off)
- Use remote controlled equipment (this approach eliminates the need for a spotter and keeps the operator away from the hazard of the vertical edge)
- Make changes to the mine design through stope design and firing practices that will eliminate the need for pushing off
- Use engineering extensions to further remove the operator from the edge.

7.0 Personal anchor points

Activities around vertical edges should be limited to essential personnel only.

Where it is essential that workers perform tasks in close proximity to a vertical edge, an appropriate means of fall restraint/arrest and anchoring must be determined.

All types of anchor points used underground should be engineer designed and tested as fit for purpose. The intent is not to have each anchor point tested, but that the design and installation process should be to a known standard with appropriate quality control and quality assurance processes. The standard should be reviewed regularly and have an appropriate factor of safety to account for error in installation and use.

There are two types of personal restraint: fall arrest and all restraint. A fall restraint system prevents workers from reaching a hazard, while a fall arrest system allows workers to reach a hazard and then protects them if they should fall.

7.1 Fall arrest

A fall arrest system provides maximum freedom of movement for workers to conduct their duties. It allows them to reach the point where a fall could occur, such as when charging holes close to an edge. In the event of a fall, the fall will be arrested. However, wherever possible, a person should not be placed in a situation where they could fall over an edge.

7.2 Fall restraint

Fall restraint systems allow a person access to conduct their duties but prevent them from reaching a point where a fall could occur. Restraint systems are generally suitable if the person needs to work at the edge of a hazard.

7.3 Risk assessment considerations

The most effective means of ensuring an acceptable level of risk to persons working in close proximity to vertical edges underground is through comprehensive risk management strategies. This may include the use of 'fit for purpose' anchor points. It may be difficult to achieve certification to an Australian Standard for all anchor points in rock; however, the design and installation process in given rock types can be tested.

Additional information is available in the Australian Standard *AS/NZS 1891.4 Industrial fall-arrest systems and devices – Selection, use and maintenance* for the selection of an appropriate fall-arrest system.

The following points should be considered in risk assessments involving anchor points:

- No activity should be carried out where the risk of falling into an open void cannot be controlled
- Eliminating the need to access vertical edges by determining the activities requiring access and challenging if the activities are in fact required.
- Analysing the purpose of being in close proximity to the edge and determining anchor point required (fall arrest versus fall restraint systems)
- Edge integrity:
 - Determine whether the activity can be performed at a barrier or from a standoff distance
 - Determine if the condition of the edge could change, consider fall arrest if the edge gave way.
- Anchorage:
 - Type based on determined selection criteria; ensure the anchorage type and method is suitable for the task and fit for purpose
 - Use within its design limitations with compatible components (consider and review restraint requirements, e.g. >15kN of breaking force comply with *AS/NZS 1891.4*)
 - Maintenance of anchorage
 - The direction of the load applied, fixing anchors directly overhead or along strong bedding/joint planes may not be suitable
 - If an anchor point is fitted to a vehicle, it should be exclusively used for that purpose and should be engineer designed and installed. Bull bars and towing points on vehicles may not be appropriate as an anchor because they are used for other purposes.
- Testing requirements:
 - Load testing for a given rock type. It is advisable to test every anchor in a mining environment due to the variance in the fixing surface
 - Load testing on an appropriate regime (when permanent)
 - Attachments and components are tested and certified as fit for purpose
 - Competent persons conduct testing to ensure their fit for purpose nature.
- Appropriate competencies of workers using anchor points to ensure they are able to determine the correct attachments that are used within their design limitations
- Consider the breaking limit of the restraint equipment, particularly when working in an abrasive or sharp rock environment
- When working on fill, e.g. working within a backfilled ore pass, personnel should be wearing fall arrest equipment.

In some cases, such as an emergency situation, it may not always be possible to have an engineered anchor point. In these cases, all reasonably achievable controls should be implemented.

8.0 Monitoring and review of vertical edges

All processes associated with vertical edges must be reviewed regularly and continually improved. These processes should include a way of measuring, monitoring and evaluating void management.

The following points should be considered in the review of vertical edges:

- An audit of all voids to include:
 - Interaction of any levels into the void
 - Material including type and quantity used to fill the void
 - The amount of expected and actually extracted material from a void
 - Potential of undercutting.
- Review effectiveness of current engineering controls existing at vertical edges
- Written procedures and standard work instructions associated with working near vertical edges. No activity should be carried out where falling into an open void could be possible
- When working on fill e.g. working within a backfilled ore pass, personnel should be wearing fall arrest equipment
- Mine design practices to minimise working near void edges
- Refresher training of personnel involved in activities associated with working at or near vertical edges.

9.0 Relevant legislation

9.1 Mining and Quarrying Safety and Health Act 1999

9.1.1 Risk management

27 Risk management

(1) Risk is effectively managed when all persons individually and as part of their respective workgroups and organisations, take action to keep risk at an acceptable level.

(2) In particular, effective risk management is achieved when persons apply risk management procedures and practices that are appropriate for the nature of the risk, operation or task being performed.

(3) Risk management is the systematic application of policies, procedures and practices to—

- (a) identify, analyse, and assess risk; and
- (b) avoid or remove unacceptable risk; and
- (c) monitor levels of risk and the adverse consequences of retained residual risk; and
- (d) investigate and analyse the causes of serious accidents and high potential incidents with a view to preventing their recurrence; and
- (e) review the effectiveness of risk control measures, and take appropriate corrective and preventive action; and
- (f) mitigate the potential adverse effects arising from retained residual risk.

9.2 Mining and Quarrying Safety and Health Regulation 2017

9.2.1 Risk management process

6 Hazard identification

(1) A person who has an obligation under the Act to manage risk at a mine must identify hazards in the person's own work and activities at the mine.

(2) The operator must ensure hazard identification for the mine's operations is done during the operations' planning and design.

(3) The site senior executive for a mine must ensure hazard identification for the mine's operations is done—

(a) when the operations start; and

(b) during the operations; and

(c) when the operations change in size, nature, complexity or another way; and

(d) for a hazard caused by a hazardous chemical or dangerous good—periodically at intervals not longer than 5 years.

(4) For hazards caused by hazardous chemicals or dangerous goods, the site senior executive for a mine must ensure the identification includes the following—

(a) hazardous chemicals or dangerous goods being processed or used for processing;

(b) hazardous chemicals or dangerous goods that are a product, by-product or waste product of operations;

(c) hazardous chemicals or dangerous goods occurring in—

(i) the natural environment; or

(ii) plant or facilities; or

(iii) energy sources.

7 Risk analysis

(1) A person who has an obligation under the Act to manage risk at a mine must analyse risk in the person's own work and activities to decide whether the risk is at an acceptable level.

(2) The person must have regard to the following in analysing the risk—

- (a) the results of hazard identification, risk monitoring and incident investigations carried out for the mine;
- (b) the work environment and work methods for the mine's operations;
- (c) the interaction of hazards present at the mine;
- (d) the effectiveness and reliability of hazard controls in use at the mine;
- (e) other reasonably available relevant information and data from, and practices in, other industries and mining operations.

8 Risk reduction

(1) A person who has an obligation under the Act to manage risk at a mine must, as far as reasonably practicable, apply hazard controls in the following order—

- (a) elimination of the hazard;
- (b) substitution with a lesser hazard;
- (c) separation of persons from the hazard;
- (d) engineering controls;

Examples—

1 using fans and ducting to remove dust

2 using guards on conveyors

- (e) administrative controls;

Examples—

1 a restriction on the time a worker is exposed to a hazard

2 a procedure or standard work instruction

- (f) personal protective equipment.

(2) The site senior executive for a mine must ensure hazard controls used to reduce risk in the mine's work and local environments are appropriate having regard to the following—

- (a) the interaction of hazards present in the environments;
- (b) the effectiveness and reliability of the controls;
- (c) other reasonably available relevant information and data from, and practices in, other industries and mining operations.

9 Risk monitoring

(1) A person who has an obligation under the Act to manage risk at a mine must monitor risk in the person's own work and activities at the mine.

(2) The site senior executive for a mine must ensure risk in the mine's work and local environments caused by the mine's operations is monitored—

- (a) when the operations start; and
- (b) at appropriate intervals or stages during operations at the mine; and
- (c) when the mine's risk management practices or procedures change significantly.

(3) Monitoring must include the following things—

- (a) the occurrence of incidents, injuries and ill health;
- (b) the level of hazards present in the mine's work environment;
- (c) for monitoring under subsection (2)—the level of hazards from the mine's operations present in the mine's local environment.

(4) If it is appropriate, having regard to the nature and level of a hazard present in the work environment, the monitoring must include 1 or more of the following things—

- (a) personal monitoring to decide a worker's level of exposure to the hazard;

Example—

monitoring a worker using a dosimeter or other instrument to

measure the worker's level of exposure to noise

(b) self-monitoring to detect effects of the hazard;

Example—

self-recognition of physical symptoms of heat stress or fatigue

(c) biological monitoring to decide a worker's level of exposure to the hazard;

Example—

biological monitoring to determine a worker's blood lead level

(d) health surveillance under schedule 2E.

9.2.2 Facilities and processes

43 Excavations

(1) If an excavation exists on a mine site, the site senior executive for the mine must ensure appropriate facilities are provided to minimise the risk to persons from falling into the excavation.

Example of appropriate facilities—

a fence, barricade, bund wall or signage

(2) In this section—

excavation includes a shaft, stope, pass, winze, mine or quarry face, trench, costean and pit.

9.2.3 Training and assessment

93 Training

(1) The site senior executive for a mine must ensure each worker at the mine, and each operational ROC worker for the mine, is trained, if necessary, and periodically assessed, to ensure the worker has—

(a) adequate knowledge and understanding of the processes to be carried out, and the materials and plant to be used, for the worker's duties at the mine or for the mine; and

(b) adequate skill to carry out the processes, handle the materials and operate the plant; and

(c) adequate ability to access and understand the procedures and standard work instructions for the worker's duties.

(2) The training must be carried out in an appropriate way, including, for example, by formal training courses or informal on-the-job instruction.

(3) The assessment must be carried out in an appropriate way, including, for example, by examination, test or proof of relevant prior learning.

(4) The site senior executive for a mine must also ensure a person being trained or assessed does not carry out work at the mine unless the person is adequately supervised to prevent creating an unacceptable level of risk.

(5) Subsection (4) does not apply to work carried out by the person in an emergency.

9.2.4 Time and resources for carrying out tasks

95 Time and resources for carrying out tasks

(1) The site senior executive for a mine must ensure time is allocated, and the mine's resources are distributed, to enable each worker at the mine to carry out the worker's tasks without creating an unacceptable level of risk.

(2) Without limiting subsection (1), the site senior executive must ensure the worker is given the supervision, and help from other competent persons, necessary to achieve an acceptable level of risk.

(3) In this section—

resources includes the following things—

- (a) access and transport;
- (b) communication methods;
- (c) facilities, materials and plant;

Examples—

consumable items, spare parts and personal protective equipment

- (d) leadership, guidance and training;
- (e) procedures, including procedures for coordinating activities, and standard work instructions and other relevant information.

9.2.5 Supervising workers

96 Supervising workers

(1) Without limiting section 95(2), the site senior executive for a mine must ensure the mine's activities and workers are supervised to the extent necessary to ensure each worker—

- (a) is not likely to be exposed to conditions beyond the worker's capabilities; and
- (b) is not likely to be affected by the conditions in which the worker is working in a way that adversely affects the worker's fitness to perform critical tasks; and
- (c) has the resources necessary to carry out the worker's tasks without being exposed to an unacceptable level of risk; and
- (d) is working within the limits of the worker's fitness and competence; and
- (e) complies with the worker's safety and health obligations.

(2) The supervision must include communication, including direct contact, at appropriate intervals by the worker's supervisor.

9.2.6 Mobile plant selection and design

100 Selection and design

(1) A person who has an obligation under the Act to manage risk at a mine in relation to the selection and design of plant must ensure—

- (a) the plant—
 - (i) is fit for its intended use and use in its intended work environment, including, for example, a hazardous area; and
 - (ii) is ergonomically compatible with persons operating or maintaining the plant; and
 - (iii) has appropriate provision for safe access, egress and maintenance; and
- (b) if it is necessary for managing risk from the plant and it is reasonably practicable, the plant—
 - (i) fails to safety; and
 - (ii) does not fail catastrophically or by common mode or cascade failure; and

(iii) incorporates appropriate engineering controls to protect the plant operator and other persons; and

Example of engineering controls—

guards on moving parts, rollover protection, falling object protection, noise insulation or seatbelts

(iv) incorporates appropriate backup systems to ensure plant remains under control if its primary system fails; and

Example of a backup system—

a vehicle's parking brake to backup its service brake

(v) is designed so its condition and performance can be monitored and incipient failures detected.

9.2.7 Procedures and standard work instructions

114 Procedures and standard work instructions for particular operations

(1) This section applies to operations at a mine if, having regard to the nature and level of risk from the operations, it is necessary for managing the risk for the operations to be—

(a) uniform and consistent in their performance or results; or

(b) compatible with other operations at the mine.

(2) The site senior executive for the mine must ensure the mine has a written procedure or standard work instruction for carrying out the operations.