

# **Recognised Standard 12**

**Place change mining operations in  
underground coal mines**

***Coal Mining Safety and Health Act 1999***

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## Recognised standards

This document is issued in accordance with Part 5 — Recognised standards and Section 37 (3) of the *Coal Mining Safety and Health Act 1999*.

### Part 5 – Recognised standards

#### 71 Purpose of recognised standards

A standard may be made for safety and health (a “recognised standard”) stating ways to achieve an acceptable level of risk to persons arising out of coal mining operations.

#### 72 Recognised standards

- (1) The Minister may make recognised standards.
- (2) The Minister must notify the making of a recognised standard by gazette notice.
- (3) The chief executive must keep a copy of each recognised standard and any document applied, adopted or incorporated by the recognised standard available for inspection, without charge, during normal business hours at each department office dealing with safety and health.
- (4) The chief executive, on payment by a person of a reasonable fee decided by the chief executive, must give a copy of a recognised standard to the person.

#### 73 Use of recognised standards in proceedings

A recognised standard is admissible in evidence in a proceeding if—

- (a) the proceeding relates to a contravention of a safety and health obligation imposed on a person under part 3; and
- (b) it is claimed that the person contravened the obligation by failing to achieve an acceptable level of risk; and
- (c) the recognised standard is about achieving an acceptable level of risk.

### Part 3 – Safety and health obligation

#### 37. How obligation can be discharged if regulation or recognised standard made

37(3) .... if a recognised standard states a way or ways of achieving an acceptable level of risk, a person discharges the person’s safety and health obligation in relation to the risk only by—

- (a) adopting and following a stated way; or
- (b) adopting and following another way that achieves a level of risk that is equal to or better than the acceptable level.”

Where a part of a recognised standard or other normative document referred to therein conflicts with the *Coal Mining Safety and Health Act 1999* or the *Coal Mining Safety and Health Regulation 2001*, the Act or Regulation takes precedence.

### This recognised standard is issued under the authority of the Minister for Natural Resources and Mines.

Recognised Standards may be updated from time-to-time. To ensure you have the latest versions, refer to the Department of Natural Resources and Mines website [www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au) or contact your local Inspector of Mines:

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# 1. Purpose

To establish a standard under the legislation to give direction and/or guidance to underground coal mines with respect to the minimum requirements for conducting the place change system of mining in Queensland. The standard will seek to ensure that operations are conducted with the level of risk as low as reasonably achievable and within acceptable limits.

## 2. Scope

This standard is for place change operations when used for the development of first workings operations in underground coal mines in Queensland.

## 3. Application framework

To establish the context for the implementation of Place Change mining operations the following matters as a minimum shall need to be considered to achieve an acceptable level of risk when conducting this method of mining: Move or remove the box below.

**Note: Recognised standards are not mandatory**

Recognised standards are not mandatory, but when followed provide a way of meeting safety and health obligations. A person may adopt another way of managing that risk, however in the event of an incident the person may be required to show that the method adopted was equivalent to the method in the recognised standard.

### 3.1 Design of the first workings

Before commencing the development of a place change system of mining consideration should be given to the stability of the mine workings before, during and after the mining process is undertaken.

Issues to be considered should include, but not limited to:

- i. Pillar dimensions need to be of an appropriate size for geotechnical requirements and sequence of operations. Get the input from a geotech engineer around the wording.
- ii. Roadway dimensions are designed giving consideration to the geotechnical requirements and equipment suitability.
- iii. The first pass height of roadway should be designed with respect to the ergonomics of the operating environment including hanging of cables, services, the provision of effective ventilation and equipment access.
- iv. When considering where place change operations will be undertaken there should be a thorough understanding of any impacts of second workings in that area or adjacent areas/overlying seams when developing the panel design (e.g. pillar sizes, strata support etc.).
- v. There must be consideration of the potential for inrush with respect to water, gas, or other materials that flows when wet and that may have a material impact to the health and safety of coal mine workers.
- vi. The geotechnical influence of multiple entry roads associated with Bord and Pillar operations. The sequencing and layout of roadway development (mains and gate road configurations).
- vii. If it is planned to introduce or use continuous haulage operations then the risks associated with this technology must be considered, giving particular focus to irregular pillar geometry and people and machinery interactions.

- viii. Barriers between panels relative to geotechnical interactions and the risk of the uncontrolled release or the influence of stored waters must also be considered where there is a reasonably foreseeable risk to the health and safety of coal mine workers.

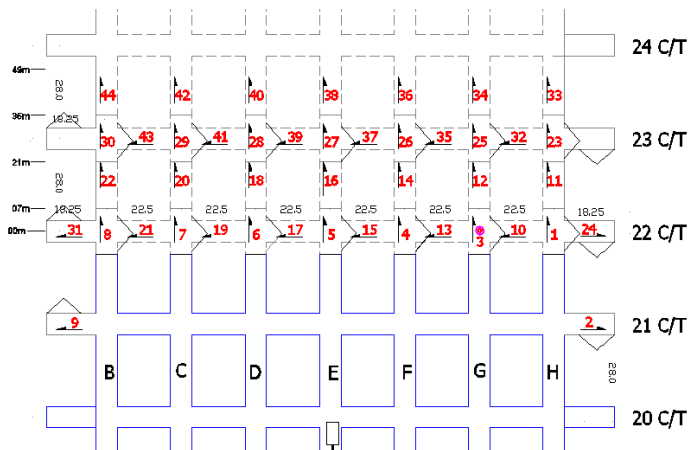
### **3.2 Type of continuous miner (single or double pass)**

- (a) The use of the type of continuous miner with respect to the design of the workings.
- (b) The use of combinations of these continuous miners and potential interactions.

### **3.3 Sequencing of operations**

When designing the sequence of operations for a place change mining system there should be a thorough understanding of the impacts of sequencing of mining activities on the health and safety of coal mine workers. This consideration should include but not limited to:

- a) The exposure to the return airstream from the production face to Coal Mine Workers and the impact this may have on these coal mine workers with respect to coal respirable dust, gas levels and the working environment from hot and humid exposure.
- b) The consideration of equipment interactions and people and machinery interactions in the immediate working areas and other areas of the production panel.
- c) The process for the Holing of roadways in multiple entry workings.
- d) The sequence of the Plunge cuts when using a double pass miner.
- e) The sequence of plunges and bolting operations across the panel to provide the optimal ventilation management of atmospheric conditions (dust, gas, heat, etc.) and services interaction issues (cables, water, etc.).
- f) Where flanking returns are being used for ventilation consideration must be given in the continuous miner cable management plan to the safety of persons involved in the handling of the cable during the cutting and loading cycles.
- g) When working on wheeling routes, these should be selected having consideration for the minimising of equipment and pedestrian interactions and cable management.
- h) The location of the Continuous Miner Operator with respect to their position in the mining process. The position of this operator in 'safe haven locations' in future sequences also needs consideration.
- i) When holing a cut thru, it is recommend that the cut-thru is holed out in a single pass to provide for the most effective means of ventilating the sequence and to keep as near as is possible to a common roof profile with the step in roof horizon limited ( where applicable).
- j) Place Change panels can be complex and as such it is strongly encouraged that where possible that standardisation is practiced. This is particularly relevant to activities such as plunge depths and cut-out arrangements. Operators have a greater capacity to understand the operation- and consequently be more comfortable with their surrounds when standard activities are being undertaken.



Example of a cutting sequence

### 3.4 Survey control

Place change mining provides for a high level of potential operational interaction and associated variances and the risk posed by these issues needs to be controlled. As such survey control of the working environment needs to be highly disciplined and conducted regularly.

- (a) The Registered Mine Surveyor should set a program to maintain survey control of the place change panel giving consideration to the frequency required for the accuracy and need for up to data survey control.
- (b) The Registered Mine Surveyor should also control the accuracy of the survey control thru the development of a robust survey control program for the place change panel which will form part of the overall survey control plan for the underground mine.

### 3.5 Equipment selection and suitability

Equipment that is selected should be fit or purpose to use in place change operations and it is urged that equipment that is selected for this use should not be merely 'left over machinery' from other mining activities. That is not to say there may be many times when such cross use of equipment does allow for fit for purpose equipment to be used. However place change machinery is in some cases 'use specific' and this must be considered when selecting the equipment for the place change process. The use of equipment will be dependent on many aspects however in general terms place change utilises the following equipment and considerations.

#### 3.5.1 Continuous miner

- i. Consideration should be given to the selection of wide head (single pass) or narrow cutter head (double pass) continuous miner.
- ii. The use remote control Continuous Miners – including a potential recovery process in the event the Continuous Miner is beyond the last line of support and requires access.
- iii. The use of on board scrubber systems for ventilation management at the working face.
- iv. If an on board scrubber is utilised the design of the on board scrubber relative to ability to vary exhaust outlet with respect to the panel layout and/or sequence or incoming ventilation quantities and velocities.
- iv. The capability for automation of the process to remove as much as is practical people from areas of increased risk.

The selection of the coal clearance method from the Continuous Miner is also an area of elevated risk and requires individual review. Matters to be considered are but not limited to:

### **3.5.2 Shuttlecars**

- i. The size of Shuttlecar with respect to the mining sequence.
- ii. The ability for the Shuttle car operator to establish and maintain an acceptable field of vision in the work area and while wheeling in the panel
- iii. The size of Shuttlecar with respect to roadway dimensions and clearances both on the straight and when turning.
- iv. The selection of the handing of the cars to avoid exposure to respirable dust and the maintaining of positive communication with the miner driver.

### **3.5.3 Diesel ram cars**

- i. The size of Ramcar with respect to the mining sequence.
- ii. The size of Ramcar with respect to roadway dimensions.
- iii. The ability for the Ramcar operator to establish and maintain an acceptable field of vision in the work area and while wheeling in the panel.
- iv. The selection of the handing of the cars to avoid exposure to respirable dust and maintaining positive communication with the miner driver.
- v. The ventilation system at the mine particularly with regard to heat and diesel particulate management.

### **3.5.4 Battery haulers**

- i. The size of Battery hauler with respect to the mining sequence.
- ii. The size of Battery hauler with respect to roadway dimensions.
- iii. The ability for the Battery Hauler to establish and maintain an acceptable field of vision in the work area and while wheeling in the panel.
- iv. The environment with respect to noise – the consideration of pedestrian interaction due to low noise of operation and wheeling through brattice curtains/butcher doors poses a reasonably foreseeable risk and requires addressing in selection and use of Battery Haulers.

### **3.5.5 The Roof Support methods used in the panel**

For example, multibolter, QDS, Air-track, hand held.

- i. Multibolters are considered best practice
- ii. Consideration for long tendoned support
- iii. QDS/Airtrack/Hand held bolting methods for use in abnormal or recovery processes.
- iv. Consideration of the orientation of hydraulic drill rigs in regard to ergonomics and minimise the over-extension of operators.

### **3.5.6 Continuous Haulage**

For example, Flexible Conveyor Train (FCT). The use of Continuous Haulage introduces a layer of complexity to the place change method, however does remove the risks associated with free wheeled coal haulage such as Shuttle cars or Ramcars. Where the use of continuous haulage systems are considered for use the risk of using this equipment, potential interactions and sequencing

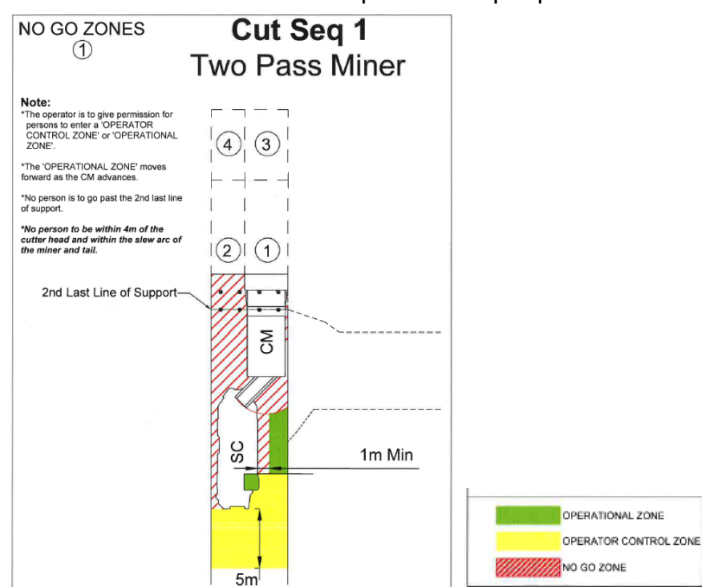


arrangements shall be assessed to ensure the risk in this is a low as reasonably achievable and within acceptable limits.

### 3.6 Procedures for No-Go zones

Control of people in and around Place Change mining activities has shown be an area of increased risk, when taken into comparison to other mining methods such as Longwall of Longwall gate road development. It is the responsibility of the Underground Mine Manager to implement and maintain No-Go zone procedures specific to Place Change mining operations in the Underground Coal Mine. As part of the development of the No-Go Zone Procedures consideration should be given to:

- (a) The use of Proximity detection on machinery involved in Place Change operations.
- (b) The wheeling path for Shuttle Car's with respect to the Continuous miner, Breaker/feeder, Pedestrians, other mobile equipment, cable positioning, and dust generation.
- (c) Where used Battery Haulers with respect to the Continuous miner, Breaker/feeder, Pedestrians, and other mobile equipment.
- (d) The use of the Continuous miner with respect to the plunge sequence and depths, break offs, and flitting operations.
- (e) Multibolter bolting and flitting operations with respect to sequencing with the Continuous miner and other headings being worked in the Place Change Panel
- (f) Other ancillary mobile equipment that is used within this work area.
- (g) The use of a Continuous haulage coal clearance system with respect to production and flitting operations.
- (h) The barricading of areas that persons are not permitted to enter during these operations and the process to ensure these areas that are clearly defined/demarcated and recorded.
- (i) It is recommended that demarcation standards be developed to clarify how various area are defined relative to restricted or limitation to access.
- (j) The requirements for persons to enter the panel and be able to determine the areas which they can access and which areas are off limits (Queensland Coal Mining Safety & Health Regulation 2001 Section 314 'Notice of entry to inspection district').
- (k) General control of people in an operating production panel - due to the rapid dynamics and variability within production cycles and planned sequences the limitation, restriction and control of the number of nonproduction people shall need to be considered.



*Example of the use of No Go Zones*

### 3.7 Strata control

The ability for an operator to enter under unsupported ground is elevated in place change operations when taken in comparison to Longwall and Cut and Bolt development activities. It is also very important to give consideration to the following additional areas of risk relative to strata treated activities.

- (a) Consideration of location of Continuous Miner operator and cable hand whilst operating – ensure sufficient roof is supported to ensure operators are under supported roof at all times.
- (b) Controls for not entering unsupported roof (no-road tape, barriers, cross sticks, reflective droppers, etc.).
- (c) Maximum plunge distance with respect to strata rating and observed conditions i.e. GSR.
- (d) Maximum plunge depth is related to ensuring the shuttle car operator remains under supported roof at all times.
- (e) Maximum number of unbolted places with respect mining sequence and strata rating i.e. GSR.
- (f) Requirement for rib support as a continuous or periodic requirement.
- (g) Strata support TARPS are required to effectively manage any variations to be implemented for strata support.
- (h) Development of minimum support rules.
- (i) Development of rules and procedures for the management of nonconformances with cutting depths or widths.
- (j) On the approach to known geological structures consideration of reducing or appropriately varying plunge depths shall be considered to maintain an acceptable level of risk.
- (k) Methods of geological anomaly confirmation.

### 3.8 Coal clearance system

To allow for safe and efficient removal of coal produced from the place change panel, this requires a coal clearance system that meets or exceeds the capacity of the mining equipment. When designing the coal clearance system, consideration must be given to.

- (a) The matched capabilities of the coal clearance system with respect to the sizing and load rate of feeder vs shuttle car/ram car/battery hauler.
- (b) Considerations for side and end loading with respect vehicle and pedestrian access to feeder and bootend areas.
- (c) Demarcation of low height feeders where access is not restricted by structures.
- (d) Consideration of the gas evolution from coal on the conveyor and potential limitations to loading.
- (e) Dust suppression on the coal clearance system- this being not merely the domain of a place change panel.

### 3.9 Cable management standards

A formal Panel cable and power reticulation standard/plan is required that shall consider the district feeder cables, district circuit breaker placement and include evaluation of:

- (a) management of single and multiple Shuttlecar cables.
- (b) fitting operations for the Continuous miner, Multibolter, and Breaker/feeder
- (c) Identification and minimising the requirement for Backspooling – The implementation of a Backspooling system shall need to consider to minimise the risk of cable damage e.g. by such means as by use of a captive shoe system.

### 3.10 Manual handling hazards

- (a) Cable management at the Continuous miner.
- (b) Cable management at the Multibolter where a higher frequency of cable movement is required compared to bolting with in place methods.
- (c) The consideration of ergonomics in equipment design and implementation of the mining sequence.
- (d) Reduction of the risk of repetitive strain injuries (job rotation etc.).
- (e) Identification of mechanical aids to reduce manual handling.
- (f) Bulk handling systems for strata support consumables and high turn-over materials.
- (g) Consideration of engineered aids for the placement and fixing of service cables and hoses at roof level.

### 3.11 Communications

The use of multiple work places and variation in these due to the sequencing of Place Change operations needs to consider the following communication issues:

- (a) Physical – Access through multiple entries and potential personnel exposure by not being able to contact persons in unknown places due to the sequence timing.
- (b) Engineering – The use of a radio, text, aerial or node system and the maintenance of this whilst mining.
- (c) Communication of the Permit to Mine:
  - The Permit to Mine Process involves the relevant technical and operational staff who are required to ensure the content and controls are in a format which is easily understood by all persons engaged in these activities.
  - Communicated to the relevant crews at Tour start sessions and start of shift talks.
  - Posted on the main surface notice board.
  - Posted on the Panel Notice Board.

### 3.12 Recovery operations if CM trips in unbolted plunge

The SSE will develop a Safe Systems of work for Place Change mining including 'Recovery of Miner' procedures and standard practices. Such processes shall require the application of a risk assessment process relative to the hierarchy of control required to prevent an unwanted outcome when a Coal Mine Worker must access the Continuous Miner. For clarity in Place Change operations, there may

be times when it is required to access under, adjacent to or an area influenced by unsupported ground. In all such cases the ground (roof and/or rib) will be supported to allow for the work to be completed. In developing these access protocols the SSE will give consideration to:

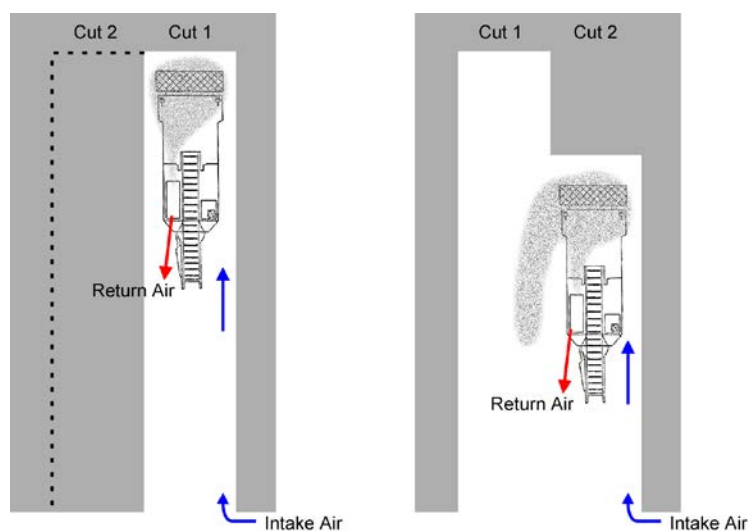
- the method of providing roof and rib support for recovery activities
- any required procedures for the use of recovery device e.g. (miner extraction device (MED))
- where fitted Umbilical cord capabilities for equipment
- procedures for the remote resetting of the power to the continuous miner.

### 3.13 Ventilation design considerations

Place change panel ventilation can be more complex than that associated with a normal two heading cut and bolt development panel, the ventilation requirement must be clearly understood thru design well before mining commences and the practices employed in the panel must also be rigorous. When considering ventilation design or the installed system consideration must be given to:

- the requirement for flanking returns or single sided returns
- the use of flood ventilation or auxiliary ventilation
- continuous miner on board scrubber systems
- a procedure is developed for the use of scrubber fans – Queensland Coal Mining Safety and Health Regulation 2001 Section 353, 3,(c) including:
  - the maximum ventilation required to the CM to allow controlled recirculation
  - prevention of generated dust flowing over the SC operator
  - line brattice no closer to the CM than is required to allow for controlled recirculation considering the capacity of the scrubber system
- discharge/exhaust pressure is not in conflict with intake ventilation where on board scrubber systems are not in use
- intersections and holing points to be holed out from intake to return to alleviate unacceptable respirable and inhalable dust exposures.

Below is an example of a cutting sequence ensures that the scrubber exhaust is against the solid rib line as much as practical. This enhances the controlled recirculation and eliminates the exposure of respirable dust to the shuttle car operator.



*Correct cutting sequence*

*Incorrect cutting sequence*

### 3.14 Maintenance of ventilation requirements

In terms of an operating a ventilation system, consideration must be given to the following areas when developing the system:

- diesel particulate management (particularly if using diesel ram cars instead of shuttle cars)
- procedures for using Brattice/flood ventilation
- procedures for using Auxiliary fans
- procedures for using Ventilating stubs – Minimum distances for ventilation appliances
- procedures for the management of seam gas
- procedures for minimising the risk of spontaneous combustion
- procedures for the intersection of gas drainage holes
- consideration of the seam dip and cross grade of seam and the characteristics of the seam gas
- the minimisation of water accumulations to manage humidity
- the requirements for monitoring of air velocity/quantity in all places in the panel
- minimising the accumulation of flammable and noxious gases
- procedures for heat management
- exposure to respirable dust, Silica and inhalable dust:
  - procedures for using scrubbers on CM
  - the positioning of personnel relative to sequence/ventilation.

### 3.15 Stonedusting standards

Irrespective of the system of mining being applied stonedust requirements do not vary. Place change mining does pose some unique challenges with respect to maintaining the required stonedust standards and when designing the stonedust application process the Underground Mine Manager has to consider:

- maintenance in accordance with regulations
- methodology for application
- special consideration is required relative the speed and dynamics of mining relative to the exposure to number standing places
- consideration to standards relative dusting on intake side of panel
- the 50m/24 hour rule for stonedust application is applied relative to over-all exposure in any single place and not the overall panel advance.

### 3.16 Water management

In any underground coal mine, water accumulation can pose a risk to the health and safety of coal mine workers. When designing a safe, effective place change mining system, the following consideration must be given to the impact of water (not inrush as this is discussed elsewhere) on the mining process:

- The identification of potential seam inflows so a pumping system that is fit for purpose is installed from the commencement of mining
- provision of suitable and adequate damming and pumping capacities
- the location of pumps and sumps at known low points.

### 3.17 Work area familiarisation and competencies

The complexities of place change mining require that a robust active process must be developed and maintained to impart, assess and re-enforce knowledge onto coal mine workers regarding the place change mining activity and should include but not be limited to:

- coal mine worker area familiarisation and training for the mining process
- ERZ Controller familiarisation and training for the mining process
- visitors and other person's area familiarisation
- the safety and health management system's training scheme needs to reflect the training and awareness requirements relative to the unique risks of place change mining, including the rapid change and dynamics of cutting sequence and span of operations across the panel.

### 3.18 Consideration for the management of completed first working panels

- The risk of potential impacts on other mine workings.
- Determination for the sealing of areas or waste workings.
- The management of waste/abandoned workings and means of preventing inadvertent access.
- Management of water accumulation.
- Environmental management and monitoring of seam and other gases.
- The management of the risk Spontaneous combustion.
- The maintenance of Strata control.
- The inspection regime for these areas in accordance with regulations.
- The management of incombustible dust
- Configuration of a completed first workings panel may vary if the area could be a place open to secondary extraction.

### 3.19 Permit to mine

To capture the good practices and to ensure that good practices are not inadvertently missed, the Underground Mine Manager should develop and implement a Permit to Mine system within the Safety and Health Management System that takes into account a review of the elements and aspects outlined above and considers other aspects, for specific areas of the mine or panel where the operational environment or mining conditions vary to extent that the normal operating risks and hazard have changed. This shall require the consideration as a minimum of the following matters:

- emergency response
- gas management
- methane drainage
- mine ventilation
- spontaneous combustion
- strata control.

Any other identified hazards specific to the mine or area being mined, for example:

- outburst
- frictional ignition
- inrush, which shall consider the following matters:
  - surface structures and lineations – geotechnical applies to mine design
  - abnormal geological and geotechnical issues
  - depth of cover



- location of bore-holes
- any adjacent or overlaying workings.

## 4 Technical Guidance

### 4.1 General

Risk management principles for the implementation of Place Change mining activities shall require that the information provided in this standard is assessed for use in accordance with Recognised Standard #2.

### 4.2 Additional matters

The following matters shall also be required to be assessed using the relevant technical expertise and documented information:

- risk management of all activities
- geotechnical assessment of seam to be worked
- geotechnical controls in the mining process
- equipment selection and suitability
- equipment specifications
- automation of equipment.

## 5 Definitions

First workings	The initial development of access into an area of a coal mine through the drivage of roadways and cut throughs Rim assembly Rim plus tyre.
Standing working place	A place in a ERZ1 (production district) of the last completed line of cut throughs where it is intended to produce coal as part of a mining sequence.
Working place	A place in an ERZ1, production district, where coal or other material is being mined or strata control is being installed.
Safe Havens	A place where a coal mine worker is protected from harm or danger.

## 6 References - Normative Standards

The following documents are referred to, directly or indirectly, in this standard:

- *Queensland Coal Mining Safety and Health Act 1999*
- Queensland Coal Mining Safety and Health Regulation 2001
- Recognised Standard 2: Control of risk management practices
- Recognised Standard 5: Quality of incombustible dust, sampling and analysis of roadway dust in underground coal mines
- Recognised Standard 6: Inspections for underground coal mines
- Recognised Standard 11: Training in coal mines
- ROCK-COR- 42 / 2007 Coroners report for the Jason Blee fatal accident. Recommendation16



## 7 References – Informative Standards

The following documents contain information which has been referred to and also may be of assistance in determining the best practice for Place change mining operations:

- AS/NZS/ISO 31000:2009, Risk management - Principles and guidelines
- AS/NZS/ISO 4240: Remote control systems for mining
- MDG 1 Guideline for Free Steered Vehicles
- MDG 29 Guidelines for the Management of Diesel Engine Pollutants in Underground Environments
- MDG 1004 Outburst Mining Guideline
- MDG 1005 Manual on Pillar Extraction in NSW U/G Coal Mines. Includes Supplementary – Manual on Pillar Extraction in New South Wales Coal Mines – Chapters 7 and 8
- MDG 1024 Guideline for Inrush Hazard Management
- MDG 3006 Guideline for Coal Dust Explosion Prevention and Suppression
- MDG Remote Controlled Operations