MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

VOLUME TWO

2 Safe mines: safe workers

TECHNICAL APPENDICES

Implementing recommendations of the Royal Commission on the Pike River Coal Mine Tragedy

Discussion document
May 2013

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Introduction

This is volume two of the discussion document, *Safe Mines: Safe Workers,* which contains proposals for implementing a number of the recommendations of the Royal Commission on the Pike River Coal Mine Tragedy.

This volume contains the technical appendices referred to in volume one. These appendices provide more detailed information on a number of the proposals in that volume.

The appendices are organised according to the relevant chapter headings in volume one.

CHAPTER TWO

02

A new regulatory approach

Appendix 1: draft table of contents for the new mining regulations

Chapter two: A new regulatory approach

The technical appendices in support of the proposals for a new regulatory approach are set out in this chapter. The summary of the proposals for a new regulatory approach, set out in volume one of the discussion document, is repeated below:

What we propose:

A new set of regulations for the mining industry	The two existing sets of regulations will be replaced. These are: • The Health and Safety in Employment (Mining Administration) Regulations 1996, and • The Health and Safety in Employment (Mining-Underground) Regulations 1999 The new regulations will apply to "principal hazards", where there is the potential for multiple fatalities. Mine operators will still have obligations to manage less hazardous activities in accordance with existing obligations under the Health and Safety in Employment Act 1992.
Processes for managing hazards, and necessary controls, will be set out in regulation	The regulations will set out processes for managing principal hazards. Existing minimum standards (also known as outcome requirements) will also be strengthened in a range of key areas. Principal hazards will include, but are not limited to: • Ground/strata control • Inundation and inrush • Mine shafts and winding operations • Roads, other vehicle operating areas and traffic management • Air quality, airborne dust and other contaminants • Fire and explosion • Gas outbursts • Explosives • Spontaneous combustion, and • Tips, lagoons, dams and voids. Mine operators will have obligations in relation to all principal hazards, where there is the potential for multiple fatalities, not just those listed above.
All mines must have formal health and safety management systems	Systems must include "principal hazard management plans" for every principal hazard at a mine. Processes that can address a number of hazards, such as ventilation, electrical and mechanical engineering, and emergency response, will be set out in "principal control plans". Workers must be involved in the development of the plans. The plans must be reviewed regularly, independently audited at least every three years, and be available for review by the regulator. Risk assessment will be a key aspect of health and safety management systems.

New safety critical positions are established	Mine operators will need to appoint people to new roles that will contribute to health and safety. These will include: • The site senior executive – the person responsible for ensuring that a mine operator meets its obligations to manage health and safety • New technical specialist roles to ensure mine operators have the expertise to manage hazards – these are ventilation officer, electrical engineering manager, mechanical engineering manager, and supervisor. Not all positions will be required for all types of mining operation. The required competencies for these new roles are discussed in chapter three on training and qualifications.
Increased involvement by the regulator	The recently established High Hazards Unit will transfer from the Ministry to the new workplace health and safety regulator. Mine operators will need to submit their documented health and safety management processes to the regulator for review, and report high-risk activities and safety critical incidents to the regulator.
A mining sector advisory group is established	A mining sector advisory group will be established to provide advice to the regulator on implementing the new regulatory framework. Membership will include representatives from different types of mining operation, and worker health and safety representatives (union and non-union).
These proposals address the Royal Commission's recommendation to urgently establish an effective regulatory framework for mining, based on the approach taken by the Australian mining states (recommendation 2).	

The appendices set out in this chapter are:

Appendix 1: draft table of contents for the new mining regulations

- ❖ Appendix 1 outlines the matters that would be covered by the new mining regulations, and how they would be structured

Appendix 2: table setting out processes and standards to be addressed in principal hazard management plans

- ❖ Appendix 2 outlines the requirements for principal hazard management plans. For each type of principal hazard, this appendix identifies the matters that would need to be included in each principal hazard management plan and the specific outcome/performance requirements that mine operators would need to meet in their own principal hazard management plans.

Appendix 3: table setting out processes and standards to be addressed in principal control plans

- ❖ Appendix 3 outlines the requirements for principal control plans. For each type of principal control, this appendix identifies the matters that would need to be included in each principal control plans and the specific outcome/performance requirements that mine operators would need to meet in their own principal control plans.

Appendix 4: table of definitions to be used in the new mining regulations

- ❖ Appendix 4 outlines the technical definitions proposed for the new mining regulations, where these definitions originate from, and the provisions in the current regulations that would be replaced.

Appendix 5: timetable for the development of approved codes of practice

- Appendix 5 summarises the two and a half year programme that is proposed for the development of the approved codes of practice that will support the new mining regulations. The appendix shows the codes to be developed each year, and which forms of mining operations these codes would apply to.

Appendix 6: list of matters to be included in a mine record

- Appendix 6 lists the proposed content of a mine record. The proposed regulations contain a new requirement for mine operators to maintain a mine record. The duty will be to keep a central record of existing requirements. It will not create any new notification, reporting or hazard management processes.

Overview

The Ministry proposes new regulations in seven substantive parts, as listed below.

Coverage is described in the schedule of proposed regulatory definitions.

As noted above, at the broadest level the regulations would apply to all mining operations, including quarries and tunnels of a specified kind.

The more detailed requirements for principal hazard management plans and principal control plans would only apply where the principal hazards or controls exist, and therefore would have limited application to opencast mines and quarries. All mines where principal hazards exist would, for example, be required to maintain an appropriate emergency response plan, but only underground mines would require a ventilation control plan.

Refer to the schedules concerning parts 3 and 4 for a description of the content of principal hazard management plans and principal control plans.

Proposed structure of new regulations
Preliminary ***Title and commencement*** ***Interpretation*** Certificate of competence, Coal, Fresh air, Health and safety management system, Holder, Manager, Metalliferous mine, Mine, Mineral, Mines Rescue Trust (or equivalent emergency response agency), Mining operations, Notifiable events (under s 25 (2)(b)), Opencast mine, Operator, Petroleum, Principal control plan, Principal hazard, Principal hazard management plan, Quarry, Restricted zone (NERZ, ERZ, ERZ0, ERZ1), Site senior executive, Tourist mine, Tunnel Refer to the schedule of regulatory definitions
Part 1 – Competency requirements Appointment of mine manager or acting manager Other employees to hold certificates of competence ***Classes of certificates of competence*** (ref to schedule) Establishment of Board of Examiners Application for and issuance of certificates Renewal of certificates Revocation of certificates Appeal of matters concerning issue etc. of certificates
Part 2 – Maintenance of health and safety management system Mine operator to establish and maintain health and safety management system Allocation of responsibilities for operation and maintenance of the health and safety management system Appointment of site senior executive Responsibilities of site senior executive for hazard management system Review of health and safety management system Consultation on health and safety management system Content of health and safety management system Monitoring and audit of health and safety management system Relevant parts of health and safety management system provided to workers before they commence work

Part 3 – Principal hazard management plans (PHMPs)

Operator to maintain principal hazard management plans

What principal hazard management plans must address for all principal hazards

Risk assessment under a plan

Review of principal hazard management plans

Operator to provide draft principal hazard management plans to Secretary of Labour before work commences

Responsibility of site senior executive for principal hazard management plans

Prescribed principal hazard management plans

3A: Ground/strata control

Matters to be addressed in PHMP

Specific outcome requirements for ground/strata control

3B: Inundation and inrush

Matters to be addressed in PHMP

Specific outcome requirements to prevent inundation and inrush

3C: Mine shafts and winding operations

Matters to be addressed in PHMP

Specific outcome requirements for mine shafts and winding operations

3D: Roads and other vehicle operating areas and traffic management

Matters to be addressed in PHMP

Specific outcome requirements for roads and vehicle operating areas and traffic management

3E: Air quality, airborne dust and other airborne contaminants

Matters to be addressed in PHMP

Specific outcome requirements for air quality, airborne dust and other airborne contaminants

3F: Fire and explosion

Matters to be addressed in PHMP

Specific outcome requirements for underground mines

3G: Gas outbursts

Matters to be addressed in PHMP

Specific outcome requirements for gas outbursts

3H: Spontaneous combustion

Matters to be addressed in PHMP

Specific outcome requirements for managing the risk of spontaneous combustion

3I: Explosives

Matters to be addressed in explosives principal hazard management plan

Specific outcome requirements for explosives

3J: Tips, lagoons, dams and voids

Matters to be addressed in PHMP

Specific outcome requirements for tips, lagoons, dams and voids

Part 4 – Principal control plans

Operator to maintain principal control plans where PHMPs in place.

Control plans must be an integrated component of the Workplace Health and Safety Management System.
Control plans may be combined with or cross referenced to principal hazard management plans.
Prescribed principal control plans
4A: Mechanical engineering control plan
Matters to be addressed in engineering control plan
Specific outcome requirements for mechanical engineering
4B: Electrical engineering control plan
Matters to be addressed in electrical engineering control plan
Specific outcome requirements for electrical engineering
4C: Ventilation control plan
Matters to be addressed in ventilation control plan
Specific outcome requirements for ventilation
4D: Worker health control plan
Matters to be addressed in worker health control plan
Specific outcome requirements for worker health
4E: Emergency response control plan
Matters to be addressed in emergency response control plan
Specific outcome requirements for emergency response
4F: Survey control plan
Matters to be addressed in survey control plan
Specific outcome requirements for survey
Part 5 – Worker participation
Registration of industry health and safety representatives
Identification requirements for industry health and safety representatives
Consultation with workers on health and safety management system
Election of site health and representatives on mining operations
Part 6 – Notification and record keeping requirements (all mines and quarries)
Appointment of mine operator
Site senior executive responsible for maintenance of records and notifications by operator
Notification of commencement, recommencement, installation or cessation
Notification of draft principal hazard management plans before mining operations commence
Operator to maintain plan of mines, quarries and tunnels
Content of plans
Plans of abandoned mines and tunnels
Competency of person preparing plans
Requirement to keep/maintain mine plan
Operations records in relation to mines and tunnels (mine record)
Record of employees underground
Communication between outgoing and incoming shifts
Register of accidents and incidents

Duty to investigate incidents Examinations of mines and tunnels Notification of accidents and incidents Notification of high risk activities Quarterly report of health and safety information
Part 7 – Offences Offence creating provisions
Schedules Notifiable high risk activities Notifiable events Certificates of competence (in addition to *Gazette* notices detailing requirements for individual qualifications) Fees

Appendix 2: table setting out processes and standards to be addressed in principal hazard management plans

<table>
<tr><th colspan="3">Part 3: General requirements and duty to maintain principal hazard management plans (PHMPs)</th></tr>
<tr><th>Recommendation 2: An effective regulatory framework for underground coal mining

• Requiring employers to have a comprehensive and auditable health and safety management system

Vol. 2 part 2, ch.26, pp.311-14</th><th>Proposed change based on the Australian National Mine Safety Framework</th><th>Other sources, including existing New Zealand provisions</th></tr>
<tr><td>The Commission recommended:

Documented health and safety management systems should be expressly required. Documentation and the corresponding systems should:

• cover key risk areas such as mine ventilation, spontaneous combustion, gas management, methane drainage, strata control, training, employee and contractor oversight and emergency response;

• cover or integrate with the health and safety systems of contractors;

• provide for change management; and

• be reviewed when there is significant change in mine plans or operations.

Key health and safety management system documentation should be provided to and scrutinised by the regulator at an early stage and when there are substantial changes, including of ownership.</td><td>3: Mine operators to develop principal hazard management plans (PHMPs)

The requirement applies to:

Mining operations where principal hazards exist.

A “principal hazard” is defined as:

Any activity, process, procedure, plant, structure, substance, situation or other circumstance relating to the conduct of mining operations that could create a risk of multiple fatalities in a single incident or fatalities in a series of recurring incidents, in relation to the following:

• Ground or strata control
• Inundation and inrush
• Mine shafts and winding operations
• Roads and other vehicle operating areas
• Air quality and dust and other airborne contaminants
• Fire or explosion
• Gas outbursts
• Explosives
• Spontaneous combustion
• Tips, lagoons, dams and voids

and any other such hazard that is identified by the mine operator or an inspector.

Responsibility for principal hazard management plans:

Where a principal hazard exists in a mining operation, the mine operator must develop, maintain and comply with a principal hazard management plan for that hazard.</td><td>Part 3 of the revised regulations will create the duty for mine operators to prepare and maintain principal hazard management plans for the prescribed principal hazards.

The site senior executive will have a supporting duty for ensuring that the plans are maintained and reviewed, that workers and their representatives are consulted in their development, and that workers are provided with the information they need from the plans.

It is proposed that regulations will contain mandatory processes and outcome requirements and will be supported by an approved code of practice for each PHMP.</td></tr>
</table>

Health and safety management systems should be regularly audited and reviewed.	The mine operator must provide draft principal hazard management plans to the Regulator for review three months before operations commence. The SSE (site senior executive) is responsible for the development of principal hazard management plans. The SSE is responsible for ensuring PHMPs are developed, maintained and complied with in consultation with workers and their representatives at the operation, and for ensuring that the contents of PHMPs are made available for all workers in a form that they are able to understand. The SSE must ensure that the content of PHMPs is: • developed from a comprehensive risk assessment of the operation • reviewed regularly (at least annually) • reviewed after a major incident relating to that hazard • independently audited at least every three years • available to inspectors for review on request, and • complied with at the mining operation. ***Content of Principal Hazard Management Plans:*** A principal hazard management plans must: • state the nature of the principal hazard to which it relates • describe how a risk assessment will be conducted in relation to the principal mining hazard • involve a cross section of the workforce the risk assessment • specify the results of the risk assessment • specify all control measures to be implemented to control risks to health and safety associated with the principal mining hazard (which may be documented as standard operating procedures (SOPs) and trigger action response plans (TARPs) as appropriate) • include emergency preparedness in relation to the principal hazard • specify the competencies of all personnel responsible for giving effect to controls • be prepared in consideration of the matters specified in the regulations with respect to each principal hazard.	

3A: Ground/strata control PHMP		
Matters to be addressed in PHMP	**3A: Mine operators to develop a ground/strata control PHMP** ***The requirement applies to:*** All mining operations where the principal hazard exists. ***Objects of the plan:*** The purpose of the PHMP is to describe how the mine operator will take all practicable steps to eliminate, isolate or minimise the exposure of workers to risks arising from ground/strata. A geotechnical assessment must be completed to determine the level of ground/ strata support that is required for the safe operation of the mine. To give effect to the outcome of a geotechnical assessment, the ground/strata PHMP must: (1) identify the ground/strata failure mechanisms; (2) provide for the design of suitable strata support methods; (3) ensure suitable ground/strata support methods in the working place are able to be implemented by means of clear rules and diagrams; (4) ensure that no person enters the working place unless the systematic strata support has been installed or the person is supervising, or engaged in, its systematic installation; (5) provide for documented, visible and sufficient suitable ground movement control devices for the monitoring of the effectiveness and integrity of strata support in each place used by a person for normal work or travel; (6) provides for maintaining the integrity of the strata support, including, for example, by replacing defective supports; (7) contain a statement that nothing in the management plan is to be read as preventing the installation of more strata support or support installation at more frequent intervals than is required by the principal hazard management plan itself. ***Matters for inclusion in the PHMP:*** The principal hazard management plan for ground/strata control must provide for measures to eliminate, isolate or minimise local and area failures in ground or strata integrity during the mine's design, operation and abandonment, having regard to all relevant matters, including: (1) the predominant ground stress regime; (2) local geological structure and rock properties and their influence on rock stability and *in situ* rock stress; (3) the local hydrogeological environment, including surface and ground water;	

	(4) geotechnical characteristics of the rocks and soil, including the effects of time, oxidation and water on rock support and stability; (5) the size and geometry of the mine's openings; (6) stope and pillar dimensions in an underground mine; (7) the presence of previously excavated or abandoned workings; (8) water inflow, drainage patterns, groundwater regimes and mine dewatering procedures and their influence on rock stability over time; (9) the collection, analysis and interpretation of relevant geotechnical data, including the monitoring of openings and excavations where appropriate; (10) design, control and monitoring of production and development blasts; (11) proposed blasting activities, including airblast from blasting or other sources; (12) the use of appropriate equipment and procedures for scaling; (13) the proper design, installation and quality control of rock support and reinforcement; (14) the timing of ground and strata support, to take account of geotechnical conditions and behaviour; (15) ensuring appropriate equipment and procedures to provide for the monitoring, recording and interpretation and analysis of data pertaining to seismic activity and behaviour of the mine; (16) the design, layout, operation, construction and maintenance of any dump or stockpile or emplacement area at the mine; (17) the location and loadings from existing or proposed mine infrastructure such as waste dumps, tailing storage haul roads and mine facilities; (18) 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 mine areas and stopes, abutments, periodic weighting and windblast; (19) appropriate filling and the material used for the filling of mined out areas; and (20) slope stability. ***Additional matters for underground mines*** **Support plans:** Support plans under the principal hazard management plan for ground/strata control for an underground mine or tunnel must prescribe:	

	(1) the maximum dimensions of the excavation; (2) the type of support; (3) the dimensions of the support; (4) the locations where there are varying types of support in use; (5) the distance between supports; (6) the maximum distance development can be advanced before support is installed; and (7) the means of development support required to be installed in a manner such that they may be readily understood by those required to install the support. **Stability calculations for underground mines** The principal hazard management plan for ground/strata control must also require calculations and modelling when defining pillar strength and stability and strata support requirements. Calculations to determine whether strata support is sufficient for the mine must include: (1) maximum opening widths; and (2) the minimum dimensions of pillars to determine the probability of instability to be assigned to any pillar, consistent with the pillar's role. A mine support design document must be produced and records of the relevant calculations must be retained. The suitability of the design should be reviewed at appropriate defined intervals set down in the design document and when circumstances indicate the original design is no longer valid. The document should also be reviewed following a major strata or ground failure incident. ***High wall mining*** The principal hazard management plan for ground/strata control must provide for a high wall, and the following is to be taken into account: (1) appropriate extracted void shape, slopes and dimensions (2) within the design, arrangements for suitable access ramps and connecting roads; (3) high wall support if required; (4) the assessment and management of any identified dangerous subsidence; and (5) the type of machinery to be used. ***Dumps and stockpiles*** Where there is not a principal hazard management plan for dumps and stockpiles, the ground/strata control PHMP must ensure that the hazards associated with dumps and stockpiles are managed.	

	Dump and stockpile design should be supported by a geotechnical report. ***Emplacement areas*** The principal hazard management plan for ground/strata control must ensure that the risks associated with emplacement areas are eliminated, isolated or minimised. ***Seismic activity*** The principal hazard management plan for ground/strata control must provide for the monitoring of natural or induced seismic activity and its impact on mining operations. The mine operator must record and analyse data pertaining to seismic activity and its impact on mining operations. ***Other factors*** The principal hazard management plan for ground / strata control must also provide for stope scheduling, explosive use, sequencing and timing of filling processes. The principal hazard management plan should provide for the resulting designs and their assumptions to be continuously modelled, tested and updated. ***Documentation and review*** Records must be kept of ground/strata failures such as rock fall that have the potential to cause serious injury to persons. The mine operator must investigate the causes of ground/strata failures including rock falls at the mine. Such an investigation must also include a risk assessment which is incorporated into the principal hazard management plan for ground/strata control. Records must be kept of the investigation for the life of the mine. Ground/strata control plans must be prepared and available for working places and the plans must be displayed in locations readily accessible to the workers Where an incident occurs that is attributed to a strata support design failure, a review of the design must be carried out by a suitably qualified person who is independent to the mine operation and the original design.	
Specific outcome requirements for ground/strata control	**3A1: No person to enter an area of unsupported ground/strata** **3A2: Sufficient temporary support and protection shall be provided for installers of strata support** **3A3: An underground mine must have a written procedure for installing strata support**	

3B: Inundation and inrush PHMP		
Matters to be addressed in PHMP for inundation and inrush	**3B: Mine operators to develop an inundation and inrush PHMP** ***The requirement applies to:*** All mining operations where the principal hazard exists ***Objects of the plan:*** The principal hazard management plan for inundation and inrush must provide for measures to effectively identify, eliminate, isolate, minimise and monitor all critical factors that may affect the likelihood of an inrush or inundation hazard. The location and maintenance of accurate mine plans and their interpretation by qualified and suitably experienced mine engineers and surveyors to interpret relevant information will be a key minimum requirement. A written report of findings, peer reviewed by a qualified person independent of the mining operation, must be available for examination by an inspector. Every attempt must be made to identify and locate old mine workings that may be in the vicinity of the proposed mining activity and to ascertain whether the old workings contain accumulations of water/fluid material. ***Matters to be considered:*** The development of the principal hazard management plan must include consideration of the proposed activities to be undertaken and: (1) potential sources of inundation, including extreme weather, overflow or failure of levees and dam structures, failure or blocking of flow channels (either regular or overflow/emergency); and (2) the nature and magnitude of all potential sources of inrush and maximum flow rates; and (3) the location of other workings and the strength of the ground between workings; and (4) the location, design and construction of dams, lagoons, tailings dams, emplacement areas and any other bodies of water or material that could become uncontained and enter the mine, including water or material entering the mine from cyclonic weather conditions and other major rain events; and (5) the foreseeable worst case position for each potential source of inrush having regard to such things as the accuracy of plans of the mine including with respect to the location of other workings, variation in rock properties, geological weaknesses, future mining operations, geological changes or similar unknowns; and (6) the potential for an accumulation of water, rock, gas or other materials or substances that could liquefy or flow into other workings or locations.	1999 regs 25,26,27 cf reg 12

	Inrush control The principal hazard management plan for inundation and inrush must: (1) require that mine operators ensure that at all times mine workers are aware of inrush and inundation hazards that might affect the safety of the mine (2) ensure managers and supervisors are at all times aware of the location of the faces being advanced, and effectively monitor work in close proximity to other adjacent workings, including old workings (3) ensure workers are at all times kept fully informed of the location of the faces being advanced, and effectively monitor work in close proximity to other adjacent workings, including old workings (4) identify, establish and maintain a minimum 50m solid coal / rock inrush control zone between the mine workings and each identified potential source of inrush (5) ensure that inrush control zones are clearly marked by symbol, colouring and lettering on the mine plans (6) ensure exploratory bore holes of an appropriate accuracy, design and dimension, or another equally appropriate method, is used to check the location of old workings in the vicinity of the area in which the work is to be carried out, prior to the commencement of work in a new area of the mine, and (7) include a means of sealing or otherwise controlling a bore hole to prevent inrush. **Documentation** The principal hazard management plan for inundation and inrush must: (1) include a written summary of the nature and magnitude of the identified risks of inrush; and (2) document any special systems of working developed for mining operations and working in inrush control zones, along with the assumptions underpinning the development of the special systems of work. **Connection of mining operation to other workings** If underground workings are proposed to be connected to other workings the principal hazard management plan must ensure the other workings are inspected or otherwise explored for any hazard that may pose a risk to the health or safety of any worker, prior to attempting to connect the workings. The mine operator and site senior executive must ensure that the principal hazard management plan for inundation and inrush is reviewed and up-to-date before the mine is extended into any new area as follows:	

	(1) before any work can be carried out within an inrush control zone, a full risk assessment must be conducted by the mine operator using all relevant information to determine the risk of a resulting inrush. (2) in furtherance of any work within an inrush control zone, any scheme to eliminate the risk of an inrush or inundation must be systemically described and must include: a. details of relevant mine plans; b. details of inspection, ventilation , pumping, de-watering or other means of hazard elimination; and c. advance and flank boreholes in any exploratory development, and (3) before any work can be carried out within an inrush control zone, the results of the investigation by the mine operator and any intended control measures must be documented and submitted to the regulator 28 days prior to work commencing. **Maintenance of the PHMP** The mine operator must consider the mine survey plans in the preparation and maintenance of the principal hazard management plan for inundation and inrush, including consideration of original historical survey plans which have been obtained from relevant persons. The mine operator must record the assumptions made in developing the principal hazard management plan for inundation and inrush. Where the mine operator forms the opinion that it is not reasonably practicable for the risk of inrush to be eliminated or minimised in any district of the mining operation: a. mining is to cease in that district; and b. the reasoning of the mine operator must be recorded. The principal hazard management plan must be maintained, reviewed and updated and checked regularly to ensure that it implements the best available knowledge of risk of inrush at the mine.	
Specific outcome requirements to prevent inundation and inrush	**3B1: Holes to be kept in advance of working places** Every mine operator must ensure that drill holes of sufficient number, length and direction and that they are no less than 10 metres in length to indicate a dangerous proximity are kept in advance of a working in a mine or tunnel that is within 50 metres of (a) old workings; or (b) a place containing or likely to contain an accumulation of flammable or noxious gases, or an accumulation of water or mud.	Existing regulations 25-27

	3B2: Holing into old workings Every mine worker who inadvertently drills a hole into old workings in a mine or tunnel must ensure that— (a) firstly, the hole is stopped up immediately (b) secondly, the manager or acting manager is notified, and (c) the incident is then notified to an inspector. **3B3: Protection against inundation** Every mine operator must ensure that, if the workings in a mine or tunnel are liable to an inundation or an inburst of water or material that flows when wet, such additional chambers, drives, shafts, or other workings are provided as are necessary to ensure that workers in the mine or tunnel can escape safely.	
3C: Mine shafts and winding operations PHMP		
Matters to be addressed in PHMP	**3C: Mine operators to develop mine shafts and winding operations PHMP** ***The requirement applies to:*** **All mining operations where the principal hazard exists** ***Objects of the plan:*** The principal hazard management plan must be developed for the purposes of eliminating and minimising risks arising from the design, construction, manufacture, installation, commissioning, maintenance, testing, repair, use, decommissioning and disposal of vertical and underlay or slope haulage mine shafts and winding operations. ***Matters to be considered:*** The principal hazard management plan for mine shafts and winding operations must include consideration of the: (1) stability and integrity of the shaft; (2) potential for fires in underground operations, the shaft or winder areas; (3) potential for any unintended or uncontrolled movement of the conveyances within the shaft; (4) potential for a detached conveyance to fall down the shaft; (5) potential for fall of persons, equipment, materials or support structure into or within, the shaft; (6) potential for failure of, or damage to, safety-related equipment and controls, including:	Regulation 23 requires every mine or tunnel to have suitable and sufficient outlets providing means of entry and exit, with criteria for determining suitability and sufficiency. Regulation 24 contains a general duty to ensure equipment of raising or lowering employees is suitable for the purpose and ready for immediate use.

	(7) ropes bearing the weight of the shaft conveyance; (8) controls and limiting devices to prevent overwind, overrun, overspeed and other selected limits; (9) measures to detect, prevent or cause the winder to stop in the event of slack rope, drum slip or tail rope malfunctions; (10) braking system including emergency brakes and preventing free-fall of a conveyance; (11) warning systems for any emergency in the shaft; and (12) communication systems; (13) potential for injury to people in a conveyance from material being carried in the conveyance or falling from a conveyance; (14) need to enable people to escape from a stalled conveyance; and (15) competency of the operator of the winder. **Life cycle control measures** The principal hazard management plan for mine shafts and winding operations must provide life cycle control measures for ensuring that every winding system remains in a safe condition. The control measures must have integrity commensurate with the risk to health and safety. The principal hazard management plan must include measures for eliminating or minimising the risk of shaft fires and the unintended movement or fall of persons, plant, equipment, substances, materials and any other objects. The principal hazard management plan must provide measures and life cycle control measures for ensuring that every winding system for a vertical and underlay or slope haulage shaft at the Mine remains in a safe condition and includes (but not be limited to) the following: (1) ropes or other means that will enable the shaft conveyance to bear the weight that can reasonably be expected to be borne by the shaft conveyance; (2) controls and limiting devices that prevent any shaft conveyance from being overwound or overrun or from travelling at an uncontrolled or unsafe speed; (3) measures to prevent, detect and cause the winder to stop in the event of slack rope, drum slip or tail rope malfunctions; (4) effective braking systems, including emergency braking; (5) means for preventing slack rope, drum slip or tail rope malfunction;	

	(6) means for detecting and causing the winder to stop in the event of slack rope, drum slip or tail rope malfunctions; (7) means for persons to escape from a stalled conveyance; (8) effective means of communication to and from the winder room shaft conveyances carrying persons and the entrance to every shaft that is in use; (9) provision for regular testing and inspection of the winding system and its components; (10) measures to prevent a detached conveyance from falling back down the shaft; and (11) means to prevent uncontrolled contact between conveyances, other equipment installed in the shaft and shaft sides. Where automatic winding systems are in use, the control measures must also include: (1) monitor the winder from outside the winder house; and (2) warning systems to alert persons at the mine of any emergency in the shafts. In relation to dual purpose shafts used for winding materials and persons, control measures must also include: (1) adequate protection for persons being carried in a shaft conveyance from any material in the shaft and conveyance that may cause injury; (2) a means to prohibit persons from being carried in a cage while material is being carried in a skip or the shaft conveyance; and (3) means to prevent material or plant carried in a shaft conveyance from protruding from the shaft conveyance and being or becoming unsecured. Principal hazard management plans which apply to automatic winding systems must include measures to prevent spillage into the shaft during loading of plant or material onto or into a shaft conveyance.	
Specific outcome requirements for mine shafts and winding operations	**3C1: Winders, slope haulages and hoists** The mine operator of an underground mine must ensure that: (1) a winder or slope haulage used for carrying persons at the mine has at least 2 braking systems; (2) braking systems must be capable, at all times, of: (3) bringing the winder, or haulage, to rest safely; and	

(4) preventing drum movement, under balanced load conditions, when the maximum torque is applied in either direction.

(5) the brakes are designed and installed to fail to safety;

(6) the winder must have:

(a) an automatic device to prevent the winder overwinding;

(b) a device to prevent the descending conveyance from being landed at the lowest entrance to the shaft at a speed exceeding 3.5m/s;

(c) a device to indicate the position of each conveyance in the shaft;

(d) for a manually controlled winder the speed of which is capable of exceeding 4m/s, a rope speed indicator located on the winder where it can be read by the operator.

(7) the slope haulage must also have the following:

(a) an automatic device to prevent over-travel;

(b) a device to indicate the position of each rope hauled train of vehicles in the roadway;

(c) for a manually controlled slope haulage the speed of which is capable of exceeding 2m/s, a rope speed indicator located on the slope haulage where it can be read by the operator.

3C2: Controls and safety devices for conveyances

The mine operator of an underground mine must ensure that:

(1) the headframe, or tower, of a shaft used for winding at the mine contains:

(a) apparatus that is designed and installed so a conveyance or counterweight will stop safely if the conveyance is overwound;

(b) safety devices that are designed and installed so a conveyance or counterweight that has been brought to rest, or detached from the winding rope, is prevented from falling down the shaft; and

(c) a way of egress to enable persons to safely leave an overwound conveyance.

(2) the shaft contains guides for each conveyance in the shaft if there is a possibility of uncontrolled contact between the conveyances, a conveyance and equipment installed in the shaft or a conveyance and the shaft side;

(3) each winder has:

	(a) if the conveyance has doors, a device preventing the conveyance moving when the doors are not closed correctly; and (b) suspension equipment capable of withstanding stall conditions, or a hook, capable of detaching the ascending conveyance from the rope, if the conveyance overwinds; (4) each winder and slope haulage that is not under direct supervision at the mine has suitable automatically operated fire extinguishers for extinguishing fire in the plant's engine room; (5) each friction winding system at the mine has a device that causes each of the following to happen before the conveyance, counterweight or rope attachment reaches a permanent obstruction to its passage in the shaft: (a) the power to be cut off from the winder; and (b) the brakes to be automatically applied to bring the winding drum or sheave to rest; (6) each winder has a way of automatically synchronising the conveyance's position indicator and automatic safety devices with the conveyance's position; and (7) any synchronising adjustment is done only while the brakes are applied and the winder is stationary; (8) the speed of a friction winder used at the mine does not exceed the following: (a) for raising or lowering persons - 16m/s; (b) for raising or lowering material - 18m/s; (9) the brakes on a friction winder used at the mine: (a) when applied automatically, are not likely to cause the winding rope to slip on the driving sheave; (b) apply automatically when the power to the winder fails; and (c) for a manually controlled winder - are also capable of being applied manually by the winder operator; (10) the brakes apply automatically and prevent the winder's operation if the brake linings become worn to an extent that affects the brakes' safe operation; (11) the supplier of a winder, slope haulage or hoist for use at the mine is given sufficient details of the operating requirements of the plant to allow the supplier and installer to select and install appropriate plant; and	

(12) plant utilising winders, slope haulage or hoists is tested before being put into operation to verify it meets the operating requirements and a record is kept of the details given to the supplier and installer and the test results.

If any plant is intended to be used in excess of the operating requirements, the mine operator must ensure a design check by a competent person is carried out and any necessary modification is completed before the plant is used in excess of the operating requirements.

The mine operator for a mine at which manually operated winder, slope haulage or hoist equipment is used, must ensure the mine has an appropriate number of mine workers who have the competencies to operate the equipment.

A person must not operate a manually operated winder, slope haulage or hoist equipment at the mine unless the person has the competencies for operating the equipment and is appointed to operate the equipment.

If an underground mine uses signals for communicating with a plant operator, the mine's Health and Safety Management System must provide:

(1) a signals code:

(a) which is easily accessible by each mine worker at the mine;

(b) which is posted in the plant operator's view and at each other place where it is appropriate for persons to contact the plant operator by using the code

(c) as agreed with the regulator.

(2) each person who may need to use the code with training in the code and ready access to the code.

3C3: Rope for winders and slope haulage

The mine operator of an underground mine must ensure, so far as is reasonably practicable, that:

(3) a rope is not used for winder or slope haulage at the mine unless the mine has the rope manufacturer's certificate stating the following about the rope:

(a) its date of manufacture;

(b) its tensile strength, diameter, length and mass;

(c) the class of steel used in its construction.

(4) a rope is not used for winding or slope haulage at the mine unless the rope's tensile strength has been tested by a nationally accredited testing station;

(5) for a rope other than a friction winder rope:

(a) a sample of at least 2m is cut off the end of the rope during recapping and sent to a nationally accredited testing station for testing its tensile strength; and

(b) a certificate stating the tensile strength is obtained from the testing station;

(6) if the certificate states the tensile strength is less than 90% of the rope's tensile strength when new, the Mine Operator must ensure that the rope is not used for winding or slope haulage at the mine;

(7) only rope recommended by the manufacturer for winding and slope haulage is used at the mine;

(8) endless slope haulage system must only use a spliced rope;

(9) only rope dressing recommended by the manufacturer of the rope is used;

(10) each rope used at the mine has at least the following safety factor:

(a) for a slope haulage rope - 8;

(b) for a winder rope, other than a friction winder rope:

(i) used for winding persons in a shaft in which persons, materials or minerals may be wound - the safety factor worked out under the following formula:

7.5 - 0.001L

where L is the depth of the wind measured in metres; or

(ii) used for winding materials or minerals in a shaft in which persons, materials or minerals may be wound - the safety factor worked out under the following formula:

5.5 - 0.0003L

where L is the depth of the wind measured in metres; or

(iii) used for winding machinery at less than 2m/s in a shaft in which persons, materials or minerals may be wound - 5; or

(iv) used for winding materials or minerals in a shaft in which only materials or minerals may be wound - 4.5; or

(v) for a friction winder rope used in a shaft in which persons, materials or minerals may be wound by a single rope - the safety factor worked out under the following formula:

	7.5 - 0.001L *where L is the depth of the wind measured in metres;* (vi) for a stage rope used in shaft sinking – 6; (11) each winder rope on a multi-rope winder is attached at the conveyance or counterweight by a device that loads the ropes as uniformly as practicable; (12) if the rope attachments are connected directly to the conveyance or counterweight, devices are provided to adjust rope length and indicate rope tension; (13) provide for regular monitoring and non-destructive testing of winder or slope haulage ropes and establishing discard criteria for the ropes; (14) unsuitable rope is discarded.	
3D: Roads and other vehicle operating areas and traffic management PHMP		
Matters to be addressed in vehicle and traffic management PHMP	**3D: Mine operators to develop a PHMP for roads and other vehicle operating areas and traffic management** ***The requirement applies to:*** All mining operations where roads and/or vehicles are a principal hazard. ***Objects of the plan:*** The purpose of the PHMP is to describe how the mine operator will take all practicable steps to eliminate, isolate or minimise the risks associated with the interaction between vehicles and between vehicles and pedestrians in the mining operation. ***Content of the PHMP:*** The principal hazard management plan for roads and other vehicle operating areas at the mine must: (1) prescribe measures for ensuring the design, layout, operation, construction and maintenance of each road and other vehicle operating areas at the mine to enable the safe operation of all mobile plant authorised to travel on the road or in the area; (2) set out how the mine operator intends to: a) effectively control the risks associated with land adjacent to the road or vehicle operating area at the mine; b) effectively control the risks associated with multiple vehicle interactions, interactions between different types of vehicles (such as heavy and light vehicles, volume of traffic and speed of traffic) and vehicle and person interactions at the mine (including the park up areas, driver access and movement of earth moving machinery); and	

	c) effectively control the risks associated with interaction between mobile plant and public traffic; d) effectively control the risks associated with interaction between mobile plant and fixed structures, including overhead and underground power lines, tunnel walls and roofs; e) effectively control the risks associated with remote control vehicles in mines; f) account for the characteristics of the equipment to be used and the conditions, including environmental conditions such as time of day, visibility, temperature and the effects of weather, on the road or in the particular area of the mine; g) ensure that the following matters are given adequate consideration in the design, layout, operation, construction and maintenance of each road: • the grade and width of the road at the mine; • the drainage system for the road at the mine; • the particular characteristics of the mobile plant or machinery to be used at the mine, including stopping distances, manoeuvrability, operating speeds, driver position and remote control plant; • the movement of vehicles in the formation of dumps or stockpiles; and • the line of the sight for the mobile plant to be used and operated on the road at the mine; h) provide for the operation and movement of load shifting equipment; i) provide for consideration of no go zones; j) include a procedure for discharging loads from fixed or mobile plant, and in relation to dump trucks: • the design, construction and maintenance of safety berms, windrows and bunds on roads used by the trucks; • identifying and controlling risks of the trucks over turning; • safe dump areas and routes; and • methods of working; k) provision of sufficient means of transport to ensure that risks to persons at mining operations, during access and egress from their place of work, is controlled; l) conditions for the safe operation of the transport equipment; m) transport equipment being used only within its design parameters;	

	n) minimum dimensions and the conditions of roadways on which the transport equipment is to operate; o) the maximum loads that may be carried or towed by the transport equipment, whether by reference to weight, dimensions or other criteria; p) the safe carriage of persons, including the segregation of people from loads, the provision of seating and the wearing of seatbelts or the use of other operator restraint devices; q) the safety of persons working, or travelling, in or near roadways used by the transport equipment; r) the safe parking, refuelling (including safe storage of fuel for vehicles) and recharging of the transport equipment; s) periodic inspection and testing of the braking systems of vehicles; t) health and safety impact of vehicles on mining operations; u) the written approval of the mine manager (or delegated person) of appointments of persons who are to operate transport equipment; v) steps to be taken prior to the transport equipment being operated; and w) steps to be taken on discovery of a defect in the transport equipment.	
Specific outcome requirements for roads and vehicle operating areas and traffic management		NB 1999 regs 18 and 23 -- separate air flow and second means of egress
3E: Air quality, airborne dust and other airborne contaminants		
Matters to be addressed in air quality PHMP	**3E: Mine operators to develop a PHMP for air quality, airborne dust and other airborne contaminants** ***The requirement applies to:*** All mining operations where airborne dust and contaminants are a principal hazard. ***Objects of the plan:*** The principal hazard management plan is to ensure that the hazards associated with poor air quality, airborne dust and other airborne contaminants are eliminated or minimised, so far as is reasonably practicable, by providing measures for: (1) ensuring that atmospheric contaminants in workplaces at the mine are maintained at levels below the exposure standards for the atmospheric contaminant and are as low as is reasonably practicable; and (2) monitoring and assessing atmospheric contaminants at the mine; and	

	(3) the regular monitoring of atmosphere to eliminate or minimise the risks associated with unsafe concentrations of oxygen, methane and other gases in the air in mines; and (4) ensuring that monitoring and assessment of the exposure of workers at the mine to an atmospheric contaminant hazard or airborne dust is carried out in a way which complies with all applicable standards; and (5) the use of appropriate suppression, ventilation or exhaust extraction systems to effectively reduce, dilute or extract atmospheric contaminants; and (6) ensuring that ventilating air provided for the mine is of sufficient volume, velocity and quality to remove atmospheric contaminants from mining operations and to maintain a safe and healthy atmosphere at the mine ; and (a) ensuring that the supply of air for any ventilating equipment used underground in the mine is from the purest source available; and (b) monitoring and eliminating, or minimising hazards associated with the formation or emission of toxic, asphyxiant and explosive gases in the mine; and (c) maintaining a plan of the ventilation system at the mine updated at intervals not exceeding 30 days that shows the direction, course and volume of air currents and the position of all air doors, stoppings, fans, regulators and ventilating devices in the mine; and (d) supressing dust from mining operations including by the use of dust collection and dust suppression appliances where appropriate. ***The plan must consider:*** (1) the types of dust and other contaminants (chemical and biological) likely to be in the air from both natural and introduced sources that may result in a risk to health and safety on exposure, including naturally occurring asbestos; (2) the levels of oxygen, dust and other contaminants in the natural or supplied air in the mine; (3) the temperature and humidity of the air at the mine; and (4) the length of exposure of workers at the mine to atmospheric contaminants or airborne dust, including taking account of extended shifts and reduced recovery period.	
Specific outcome requirements for air quality, airborne dust and other airborne contaminants	**3E1: Meaning of fresh air** A reference in these regulations to fresh air means that the air: (a) contains not less than 19% by volume of oxygen; and	1999 regs 3, 17, 18, 19, 28, 29, 30, 31, 32 Cf HSE Act s7-10, s11 (monitoring requirements)

(b) contains not more than 0.25% methane, and,

(c) contains not more than 1 ppm of aldehydes (as formaldehyde); and

(d) shows a concentration of respirable quartz dust of not more than 0.2 milligrams per cubic metre on a long-term exposure; and

(e) shows a concentration of respirable coal dust of not more than 3 milligrams per cubic metre on a long-term exposure; and

(f) contains the following gases at the lowest practicable level and at no more than the following levels:

	Time-weighted average exposure (ppm)	Short-term expo
Carbon dioxide	5 000	30 000
Carbon monoxide	25	200–
Hydrogen sulphide	10	15
Oxides of nitrogen	3	5
Sulphur dioxide	2	5

- (2) In subclause (1),—
- **time-weighted average exposure** is calculated as follows:

$$\frac{\text{Total exposure in day (concentration} \times \text{time)}}{\text{8 hours}}$$

- **short-term exposure limit** means the average exposure measured over any 15-minute period in the working day.

3E2: Barometer, hygrometer, and thermometer

The operator of an underground mine must ensure:

(a) a barometer and thermometer are placed above ground in a conspicuous position that accurately represents the atmospheric pressure and temperature in the vicinity of the mine ; and

(b) a hygrometer is available for use in every panel of a mine, in the main intake airway and in the main return airway of every mine or tunnel. The readings from the hygrometer should be taken and recorded at least monthly.

3F: Fire and explosion		
Matters to be addressed in PHMP	**3F: Mine operators to develop a PHMP for fire and explosion** ***The requirement applies to:*** All mining operations where the principal hazard exists. ***Objects of the plan:*** The principal hazard management plan for fire and explosion must include measures for ensuring that the hazards associated with fire and explosion are eliminated or minimised, so far as is reasonably practicable. ***The plan must consider:*** (1) potential sources of fire in the mine and of the use, presence and storage of certain gases and materials including combustible ore, sulphide dust, coal dust or flammable gas; (2) potential sources of flammable, combustive and explosive materials, both natural and introduced, including gas, dust, fuels, solvents and timber; (3) potential sources of ignition, fire or explosion, including equipment, electricity, static electricity, spontaneous combustion, lightning, hot work and other work practices; (4) potential for propagation of fire or explosion to other parts of the mine; (5) provision for hot work procedures; (6) details of the type and location of the systems for prevention, early detection and suppression of fire (including remote monitoring systems) and of the equipment for fire fighting in the mine; and (7) reference to the principal control plan for emergency management and location of refuge chambers and escape pathways. **Dust suppression in underground coal mines** Principal hazard management plans that apply to coal mines must include provisions for management of dust explosion which contain measures to eliminate or minimise so far as reasonably practicable the risk of coal dust explosion. These provisions must include the means by which the mine operator will: • minimise the production of coal dust by use of engineered mining systems; • minimise the accumulation of roadway dust; • limit coal dust generation, including its generation, by appropriate design including dust suppression systems at coal crushers, coal conveyors and at conveyor transfer points;	

	• suppress, collect and remove airborne coal dust, limit coal dust accumulation on roadway and other surfaces in the coal mine roadways, remove excessive coal dust accumulations on roadway and other surfaces in the coal mine roadways, and determine the stonedust or other explosion inhibitor application rate necessary to minimise the risk of a coal dust explosion; and • suppress coal dust explosions and limit their propagation to other parts of the coal mine by methods such as stone dusting, stone dust barriers, water barriers and deluge systems. The principal hazard management plan for fire and explosion must specify control measures to ensure that the monitoring and sampling of roadway dust, including the application of an explosion inhibitor, is carried out sufficiently in order to suppress and prevent coal dust explosions.	
Specific outcome requirements for underground coal mines The Royal Commission recommended: electrical technology advances need to be better accommodated and regulated. The Royal Commission recommended: the nature of the restricted zone needs clarification. The extent to which electrical equipment may be placed in coal measures, and the necessary protections, require addressing. The Royal Commission recommended: the requirements for monitoring and managing methane need better definition and strengthening. The Royal Commission recommended: methane drainage, including pre-drainage, should be required in appropriate circumstances	**3F1: Roadway dust sampling** In order to comply with the procedure referred to in the PHMP the dust sampling and analysis mentioned above to be carried out at least at the following intervals: • For a strip or spot sample of dust in ERZ0 – weekly; • For a strip sample of dust mentioned in ERZ1 – monthly; and • For a strip sample of dust mentioned in NERZ– every third month. Sampling requirements are as follows: • samples must be taken where practicable, from the complete perimeter of the roadway and the structures in it, and where possible, over a length of roadway of at least 45 metres, by a method of strip sampling by which the dust is collected from a succession of transverse strips as nearly as possible of equal width and equally spaced, not more than 5 metres apart and of an aggregate area of not less than 1 per cent of the total area sampled; • if it appears that dust on the floor of a roadway contains a different incombustible content from dust on the roof and sides of the roadway, the dust on the floor must be sampled and tested separately from the dust on the roof and sides; and • each sample must be collected as near as practicable from a maximum depth of 5 millimetres. If a location is re-sampled, the individual strips from which the increments for a strip sample are taken must not coincide with those from which a previous sample has been taken. The mine operator must ensure both the collection of dust samples and the analysis of each sample mentioned in drafting instruction subparagraphs (3)(b) and (c) above to be carried out in a registered laboratory. Four potential procedures for doing so are to be detailed in a code of practice.	1999 regs 3, 17, 18, 19, 28, 29, 30, 31, 32 Cf HSE Act s7-10, s11 (monitoring requirements)

3F2: Incombustible dust content in roadway dust

For the purpose of the requirements in drafting instructions the requirements immediately above, the mine operator of an underground mine must ensure that the content of incombustible material in roadway dust at the mine is kept at or above 80%. concentration level by volume. To comply with the above requirement, at every part of the mine where stonedust is required to be applied, a scheme must be established which enables every part of the mine so affected to be sampled within 30 days.

Application of stone dust

The mine operator at a coal mine must ensure:

- each 10 metre length of a roadway that is being driven at the mine is stone dusted immediately after the length is driven
- each part of the roadway is stone dusted, within 24 hours after the part is driven
- if an analysis of a dust sample from an underground mine shows that the dust does not comply with the incombustible material content for the dust as set out above, the mine operator at a coal mine must ensure the following:
    - the area from which the sample was taken is retreated with stone dust within **12 hours**; and
    - a record is kept of the date and time when the area was retreated.

3F3: Notification and recording of dust sampling results

The mine operator at a coal mine must ensure the deputy for the area is given notice of the analysis result.

The mine operator at a coal mine must ensure a record is kept of the following information for each roadway dust sample taken at the mine:

- the date it was taken;
- the location from which it was taken;
- its incombustible material content; and
- the method used for analysing the sample

The mine operator of a coal mine must ensure that the results of the analysis of incombustible material content are marked on a plan of the mine.

3F4: Explosion barriers (to be redrafted)

The operator of an underground coal mine must ensure:

	• an explosion barrier is installed and maintained in the part of any roadway (other than part of a single entry roadway) containing a conveyor belt within a face zone; • an explosion barrier is installed and maintained in the part of any return roadway (other than part of a single entry roadway or a part of a roadway referred to in (a)) within a face zone; and • adequate explosion suppression measures are installed and maintained in single entry roadways. An explosion barrier is taken to have been installed in a part of a roadway if the most inbye part of the barrier is in the part of the roadway. When installing explosion barriers, the mine operator must determine through a risk assessment whether to install a: • fixed distributed; or • advancing distributed; or • fixed concentrated; or • advancing concentrated explosion barrier. Where a distributed barrier is used it must: • be kept as near as possible to the face and not further outbye than 100 metres from the face and not further outbye than 30 metres from the conveyor belt feeder or boot-end in a conveyor roadway, and not further outbye than 30 metres from a trickle duster, auxiliary fan (where used) or the last line of cut-throughs (where no auxiliary ventilation fan is used). • be loaded with stonedust or water, to not less than 200 kg per square metre of roadway cross-sectional area. • the spacing between consecutive rows must be such that the mass of water or stonedust in the volume of roadway occupied by the barrier, is not less than 1 kg per cubic metre. Where an advancing distributed bag barrier is used: • the barrier must consist of four sub-barriers, installed over a maximum distance of 120 metres of continuous roadway; and • three complete sub-barriers must be in position at all times and the following distances maintained: • the first sub-barrier closest to the last through road must not be installed closer than 60 metres and not further than 120 metres from the last through road;	

	• the fourth sub-barrier furthest from the last through road must be installed not more than 120 metres from the first sub barrier; • the two intermediate sub-barriers must be equidistant from the first and fourth sub-barriers; • the maximum distance between sub-barriers must not exceed XX metres. Where an advancing concentrated bag barrier is used: • the barrier must be in two barriers each 20 metres to 40 metres long which leap frog to maintain a distance between the last through road and the first row of bags greater than 70 metres but less than 120 metres; and • the second barrier must start no further than 120 metres from the end of the first barrier. The stone dust required is calculated on the basis of Ma=100kg/m2 of roadway cross sectional area. Where a fixed distributed bag barrier is used: • a continuous array of barrier bags must be place in a roadway over its entire length; • the dust density must be Mv=1kg/m3; and • the distance between the start of the continuous distributed bag barrier and the last through road must not exceed 120 metres. Where a concentrated explosion barrier is used: • it must be kept within 200 metres of the face but not closer than 60 metres to the face; • be loaded with stonedust or water, to not less than 200 kg per square metre of roadway cross-sectional area; • the spacing between consecutive rows shall be such that the mass of water or stonedust in the volume of roadway occupied by the barrier, is not less than 1 kg per cubic metre. The mine operator must determine through a risk assessment the need for any additional barriers. The mine operator must ensure the design of the explosion barrier is effective to eliminate, so far as reasonably practicable, a coal dust explosion from travelling. Where a bag explosion barrier is installed the design of the explosion barrier must have the following characteristics: • each bag must contain 6kg of dry stone dust; • the horizontal distance between hooks of the bags in a row must not be less than 0.4 metres and not greater than 1.0 metre;	

	• the distance between the bags and side of the pillar must not be greater than 0.5 metres; • for roadways up to 3.5 metres high each row must have a single level of bags suspended with the hooks not more than 0.5 metres from the roof; • for roadways between 3.5 metres and 4.5 metres high the bags must be distributed evenly between two layers suspended with the hooks at 0.5 metres and 1.0 metre below the roof level; • for roadways between 4.5 metres and 6.0 metres high the bags must be distributed evenly between two layers suspended with the hooks at 0.5 metres, 1.0 metre and 1.5 metres below the roof level; • the distance measured along the roadway between rows of bags must be not less than 1.5 metres and not more than 3.0 metres; • the total mass of stone dust used in the barrier is based upon the values of either Ma or Mv where Ma is 100kg/m2 of roadway cross sectional area and Mv is 1kg/m3 of roadway volume between the extremities of the barrier. The total mass of stone dust must be the greater amount based on the values of Ma and Mv; • the total proportion of broken bags must not exceed 10% of bags in any sub-barrier; and • bags must be to an approved standard. Where any other type of explosion barrier is installed the design of the explosion barrier must have the following characteristics: • is rectangular, and is made of timber or sheet metal with a height of at least 150 millimetres. Two timbers or metal purlins form the front and back of the frame, and are fixed by cross-pieces so that the frame measures no more than 200 millimetres from front edge to back edge; • the frame rests on rigid supports fixed on each side of the roadway, but the frame is not fixed to the supports; and • dust boards or trays must rest on the frame aligned in the direction of the roadway, and are free to move or purlins placed on their edge can 'roll' and displace the trays. The mine operator must ensure that: • troughs used in water barriers are made and tested to a an approved standard; • water troughs are of 80L capacity or 40L capacity; • an explosion barrier is not be installed in a cavity in the roof; and • any explosion barrier in a roadway with a conveyor is installed with a major part of the barrier no lower than the top of the conveyor belt.	

	The mine operator must make enquiries with any supplier or manufacturer of any explosion barrier to ensure it is fit for purpose, having regard to: • proven design criteria; • results of empirical testing; and • relevant guidance or technical specifications made available by the regulator or other authoritative source. **3F5: Explosion risk zones (ERZ) at underground coal mines** Mine operators for underground coal mines must implement explosion risk zones for the mine in accordance with the zones ERZ, ERZ0, ERZ1 and NERZ as defined in these regulations. The mine operator must ensure a risk assessment is carried out to identify the location and type of each ERZ at the mine. **3F6: Location of methane detectors** The mine operator must ensure a place mentioned in these drafting instructions has automatic methane detectors located as specified. ***Intake airways*** At least one automatic methane detector must be located in each intake airway at the interface between: • a NERZ and an ERZ1; and • two NERZs. A detector located at an interface between a NERZ and an ERZ1 must be visible at the interface, and: • when the general body concentration of methane detected at the interface exceeds 0.25% automatically activate a visible alarm; and • when the general body concentration of methane detected at the interface exceeds 0.5% automatically trip the electricity supply to non-intrinsically safe plant in: o the ERZ1 and NERZ; or o if the NERZ has been subdivided – the ERZ1 and the subdivided part of the NERZ adjacent to the ERZ1. A detector located at the interface between a NERZ and an ERZ1 must be a self-contained unit or part of the gas monitoring system for the mine.	

	A detector located at an interface between two NERZs must be visible at the interface and: • automatically activate a visible alarm when the general body concentration of methane detected at the interface exceeds 0.25%; and • if the NERZ has been subdivided – automatically trip the electricity supply to non-intrinsically safe plant in the adjacent subdivided part when the general body concentration of methane detected at the interface exceeds 0.25%. ***Main return airway and return airway in a ventilation split*** At least one automatic methane detector must be located in: • each main return airway; and • each return airway in a ventilation split. The detector must automatically activate a visible alarm when the general body concentration of methane detected in the return air exceeds the percentage stated in the mine's principal control plan for ventilation as the percentage that must not be exceeded before the detector activates the alarm. **3F7: Action to be taken if methane is detected or methane detector is non-operational** *Explosion protected electrically powered loader* If a general body concentration of methane exceeding 1.25% is detected around an explosion protected electrically powered loader that is not fitted with an automatic methane detector, the loader operator must switch off the electricity supply to the loader's trailing cable. *Explosion protected vehicle powered by a battery, or internal combustion engine* This regulation applies to an explosion protected vehicle powered by a battery, or internal combustion engine and fitted with an automatic methane detector. If a general body concentration of methane of at least 1% is detected around the vehicle, the vehicle operator must immediately withdraw the vehicle to a place where the general body concentration of methane is less than 1%. All vehicles working in an ERZ must be fitted with an automatic methane detector. If a general body concentration of methane of at least 1.25% is detected around a vehicle or plant the automatic methane detector must shut down the vehicle or plant.. *Other explosion protected electrical plant* This section applies to explosion protected electrical plant supplied with electricity by a trailing cable, other than plant: • mentioned in the two previous subsections above; or	

	• fitted with an automatic methane detector; or • having explosion protection category Ex ia (to be defined in regulations). If a general body concentration of methane of at least 1.25% is detected around the plant, the person detecting the methane must immediately switch off the electricity supply to the equipment's trailing cable. *Non-explosion protected vehicle powered by a battery or an internal combustion engine* If the automatic methane detector fitted to a non-explosion protected vehicle powered by a battery or an internal combustion engine fails in service, the vehicle operator must immediately park the vehicle. ***The non-explosion protected vehicle must only be allowed to operate in a NERZ and must be fitted with a device that automatically shuts down the vehicle if it passes beyond a NERZ.*** *Ventilation split or main return airway* A mine operator of an underground mine must have a procedure for taking action when methane, at a general body concentration stated in the procedure, is detected at a ventilation split or main return airway. **3F8: Action to be taken if methane detector activates or is non-operational** (*Suggested alternative to following) say all plant powered by electricity or internal combustion should shut down in ERZ0 and ERZ1 zones at 1.25%. In NERZ plant should automatically shut down at 0.25% (other than vehicles fitted with 1.25% shutdown detector, passing through an NERZ that are flameproof)* An operator of an underground mine must have a procedure for taking action when: (1) an automatic methane detector fitted to a coal cutter, continuous miner, tunnel boring and road heading machine, a longwall shearer, mobile bolting machine, electrically powered loader, load-haul dump vehicle or other explosion protected plant powered by battery or internal combustion engine trips the electricity supply to the machine, vehicle or plant or stops its internal combustion engine; (2) a methane detector mentioned in paragraph (1), other than a methane detector fitted to a longwall shearer, fails in service; or (3) a methane detector located at the interface between a NERZ and an ERZ1, or between adjoining NERZs, fails in service or is being tested or relocated. The procedure may provide that, if an event mentioned in (1) or (2) above happens to a machine or vehicle (other than a longwall shearer) in an ERZ1, the methane detector may be temporarily overridden to allow the machine or vehicle to be moved, but only if: • the general body concentration of methane around the machine or vehicle is less than 1.25%; and	

	• a portable methane detector is used to continuously monitor the concentration. The procedure may also provide that: • if an event mentioned in (2) happens to a relevant machine or vehicle being used in a NERZ, the operator must notify their supervisor, park the vehicle, conduct a Job Safety/Risk Analysis and may start the machine or vehicle if: o the general body concentration of methane around the machine or vehicle is less than 0.25%; and o the place where the machine or vehicle is located is continuously monitored by a person using a portable methane detector; or • if an event mentioned in (3) happens, the methane detector: o must be replaced or repaired as soon as practicable; and a. if the event involves a methane detector—at the location of the methane detector; or b. if the event involves more than one methane detector at an interface—by moving between the methane detectors at the interface that have failed or are being tested or relocated; and c. the electricity supply to the affected zones can be readily tripped when the general body concentration of methane at the location of a methane detector being monitored as required under paragraph (1) exceeds 0.25%. In this regulation: **relevant machine** means a machine supplied with electricity by a trailing cable. **relevant vehicle** means an explosion protected vehicle powered by a battery or internal combustion engine. **3F9: Record of tripping of electricity supply** The mine operator must ensure a record is kept of the date and time of the event if an electricity supply is tripped by an automatic methane detector: • located at the interface between a NERZ and an ERZ1, or between adjoining NERZs; or • fitted to a non-explosion protected vehicle. • This should be notified to an inspector as soon as practicable.	

	3F10: General back-up for gas monitoring system The principal hazard management plan fire and explosion must provide for the use of portable gas detectors fitted with suitable extension probes to manage risk in the event of a failure or the non-operation of the gas monitoring system. If the system fails or becomes non-operational, the mine operator must ensure that all production and development activity ceases immediately and the system is repaired or instrument replaced in the minimum possible time as is reasonably practicable. **3F11: Withdrawal of persons in case of danger caused by failure or non-operation of gas monitoring system** The mine operator must ensure all persons are withdrawn to a place of safety when a coal mine is dangerous. A part of an underground mine is taken to be dangerous if the part is affected by the failure or non-operation of the gas monitoring system and the mine does not have: • a procedure for using portable gas detectors; or • sufficient portable gas detectors to continually monitor the part to the extent necessary to achieve an acceptable level of risk. **3F12: Auxiliary or booster fan** An auxiliary or booster fan must be protected by at least one methane detector to detect the general body concentration of methane at the fan. For an auxiliary fan, the detector must be an automatic methane detector that trips the electricity supply to the fan when the concentration exceeds 1.25%. For a booster fan, the detector must, when the concentration exceeds 1.25%, automatically activate an audible and visible alarm located in a place that allows the necessary action to be taken promptly. This section does not apply to an auxiliary or booster fan for a drift or shaft being driven from the surface in material other than coal. **3F13: Signposting ERZ boundaries in underground coal mines** An underground mine's ERZ boundaries must be signposted, and a plan showing the boundaries must be displayed at the surface of the mine. The mine operator of a coal mine must ensure the plan is updated at the end of each shift to reflect any changes in the boundary locations required to be signposted. ERZ boundaries in underground coal mines must be signposted.	

	Signposting is required in circumstances where a person or machine can physically pass through a boundary between a NERZ and an ERZ1 or between an ERZ1 and an ERZ0. Where either of those circumstances is possible, the mine operator must ensure the actual location of the boundary is signposted in each intake airway and machine access leading into: • for a boundary between a NERZ and an ERZ1, the ERZ1; or • for a boundary between an ERZ1 and an ERZ0, the ERZ0. A signpost need not change if: • a temporary change in conditions results in a temporary change in the boundary location; and • the mine operator ensures that appropriate precautions are taken to ensure control of persons and machines entering an ERZ affected by the change.	
3G: Gas outbursts		
Matters to be addressed in gas outbursts PHMP The Royal Commission recommended: the requirements for monitoring and managing methane need better definition and strengthening. The Royal Commission recommended: methane drainage, including pre-drainage, should be required in appropriate circumstances	**3G: Mine operators to develop a gas outbursts PHMP** ***The requirement applies to:*** All mining operations where the principal hazard exists. ***Objects of the plan:*** An underground coal mine operator must develop, implement and maintain a documented principal hazard management plan for minimising the risks in mining operations arising from gas outbursts. The mine operator must firstly determine what outburst potential exists at the mine. The risk of gas outburst exists due to various factors including where the total *in situ* gas content and gas composition, measured in accordance with AS 3980 or an equivalent standard, is greater than 6 cubic metres per tonne of methane or 5 cubic metres per tonne of carbon dioxide or, for a mixture of these two gases, a gas content in the proportion of the percentages of each gas between the two limits. The principal hazard management plan must take in to consideration: (1) 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; (2) the potential for accumulation of gases in existing and abandoned areas of the mine; (3) the nature of the gas that could be released; (4) gas levels in the material being mined; and	

	(5) gas seam pressures. The principal hazard management plan for gas outbursts at the mine must contain the determined risk of gas outbursts, measuring such factors as the *in situ* methane and carbon dioxide gas levels per tonne of material/coal and the specific geological risk features identifiable in the area to be mined. Without limiting the generality of the above, the principal hazard management plan must provide for control processes for eliminating or minimising the risk of gas outburst in underground mining, including monitoring of: (1) carbon dioxide and methane gas levels; (2) seam gas pressure and content; (3) ventilation; (4) gas drainage; (5) pre-drainage of coal seams; (6) in-seam drainage and post drainage; (7) strata de-stressing; (8) bore hole surveying; and (9) mining development rates, compared with the pre-determined gas thresholds and the mining rates adopted in the principal hazard management plan. The mine operator must consider the use of pre-drainage to reduce the outburst potential and, if this is not undertaken, be able to explain why it is not practicable at the operation. The principal hazard management plan must ensure that the highest level of control relevant to the risk which has been identified is implemented, including worker physical protection and remote mining. In determining such risks and controls, the mine operator must gather information by undertaking activities of *in situ* gas sampling, geotechnical investigation and analysis, and statistical analysis of the data obtained as part of a technical review, in order to determine what gas thresholds for safe mining should be applied at the mine. **Permit to Mine system** The principal hazard management plan for gas outbursts must ensure that a Permit to Mine system is implemented by the mine operator. A Permit to Mine system must include the following requirements:	

	• at least two hourly readings and records of the general body gas concentration at the face area; • constant identification of geological structures; • modification of the rate of roadway advance; • survey and sample drill holes; • training of workers in the identification of outburst signs and dangers; • training of workers in outburst rescue and escape procedures; and • provision of physical protection for workers operating continuous miners. A Permit to Mine system must ensure that mining is only undertaken after verification by a designated competent person that all information necessary for work health and safety has been obtained, and all the necessary control measures have been implemented.	
Specific outcome requirements for gas outbursts	*c.f. Ventilation control plan* *Fire and explosion PHMP*	
3H: Spontaneous combustion		
Matters to be addressed in spontaneous combustion PHMP	**3H: Mine operators to develop a spontaneous combustion PHMP** ***The requirement applies to:*** All underground coal mining operations where the principal hazard exists. ***Objects of the plan:*** The mine operator must develop a principal hazard management plan for spontaneous combustion and implement controls appropriate to the risk of spontaneous combustion that exists at the mine. **Assessing the risk of spontaneous combustion** An underground coal mine operator must conduct a risk assessment to determine whether the risk of spontaneous combustion exists. In undertaking the risk assessment, the mine operator must have the coal subjected to an independent test to assess its propensity for spontaneous combustion and with regard to the following indicators: • gas analysis based indicators, and • sensory or observation based indicators. Without limiting the above, the mine operator's risk assessment must include, but is not limited to, the following matters:	

	• the risk assessment and sampling must consider all sections of the mine and the nature of the mining operations;
	• evaluating the spontaneous combustion related history of the mine and any adjacent or prior operations in the same seam and/or coal measures; and
	• evaluating external information including:
	  ○ review of the industry experience,
	  ○ regular review of available information, and
	  ○ regular review of emerging technology.
	The mine operator must consider the indicators when making an evaluation/decision as to whether the risk of spontaneous combustion exists. The basis of the evaluation and the decision must be documented.
	Data collection and record keeping
	The mine operator must maintain, for the life of the mine, written records of all spontaneous combustion events including surveyed locations and other details of all known incidents on spontaneous combustion at, or in the vicinity of the mine and mine specific spontaneous combustion characteristics.
	The mine operator must use the information gathered through the risk assessment process to develop mine specific gas analysis and sensory indicators of spontaneous combustion risk for the mine.
	The mine operator must use the indicators developed for the mine as an internal standard against which the risk of spontaneous combustion is assessed.
	Content of the plan
	The principal hazard management plan for spontaneous combustion must contain:
	(1) a description of the risk assessment
	(2) an adequate description of the mine and definition of the "mine characteristics" as they relate to the control of spontaneous combustion
	(3) the roles and responsibilities of all persons who have responsibilities under the principal hazard management plan
	(4) processes to ensure that all persons who have responsibilities under the principal hazard management plan have up to date knowledge of spontaneous combustion prevention, detection and control
	(5) an inspection program for spontaneous combustion that includes taking recordings and making a written report on findings	

	(6) means of ensuring all workers are trained in to maintain standards and work practices that may impact on potential spontaneous combustion heatings (7) an internal and external audit programme to ensure the effective verification of the plan. (8) periodic review of the plan's continued suitability and effectiveness in managing spontaneous combustion related risks at the mine. (9) a description of the controls available at the mine to eliminate or manage the risk of spontaneous combustion (10) details of the monitoring program that triggers any control (11) details of actions to be taken in response to a spontaneous combustion event, and (12) details of corrective action to be taken where non-conformance with the plan is identified. **Audit** The mine operator must ensure that internal audits are conducted by persons independent of those with direct responsibility for implementing the plan. External audits must be conducted by persons independent of the mine's operations and development of the mines management plans. The mine operator must ensure that records of all audits are maintained for the life of the mine. **Review** The mine operator must prepare a review protocol every three years conforming to the following requirements: • a re-evaluation of the spontaneous combustion related risks and all aspects of the plan; • identification of persons to participate in reviews (indicating who should decide if significant change has occurred, and to what criteria that decision is to be made); • define time based and event based review triggers including: o failure of the plan to control spontaneous combustion, o significant change in mining systems, o change of equipment, and o change of management structure. The mine operator must ensure that records of all reviews are maintained for the life of the mine.	

	The mine operator must ensure that where the conduct of any review indicates that the plan is no longer suitable and effective in managing spontaneous combustion related risks, corrective action is taken to amend the plan to make it suitable and effective for this purpose. **Controls to respond to the risk of spontaneous combustion** Where a risk of spontaneous combustion exists, the mine operator must consider the following matters when developing controls to effectively eliminate, isolate or minimise spontaneous combustion: (1) mine design parameters, including how the mine design and/or mining methods control the spontaneous combustion hazard; (2) available external resources such as off-site or mobile gas analysis services, mines rescue response, inertisation unit, or external expertise; (3) spontaneous combustion treatment including inertisation, flooding or sealing; (4) goods/services acquisition control: ensuring the equipment used for the management of a spontaneous combustion event is fit for purpose and any contracted services are consistent with the plan; (5) mine standards and procedures are based on the site specific details, including developing standards, and procedures for the following: o seal standards and maintenance; o sealed area monitoring; o ventilation monitoring; o gas monitoring system and locations; o gas sampling and analysis; o physical indicator observation and reporting; and o inspection. **Monitoring** The mine operator must monitor for signs of spontaneous combustion and put in place appropriate controls triggered by the monitoring. Monitoring processes must have regard to: • early detection of the onset of spontaneous combustion including gaseous and physical indicators (such as smell and haze) and detection of changes in the mining environment; • inspections; • gas sampling and analysis, including bag sampling and tube bundle systems; and	

	• continuous gas monitoring such as continuous monitoring from boreholes or seals, or within mine airways and goafs, including the appropriate calibration of gas monitoring instruments. **Response** In developing and maintaining the principal hazard management plan for an underground coal mine, the mine operator must define the triggers which will invoke responses to manage spontaneous combustion events. The mine operator must ensure that response action is taken to mitigate the effects of spontaneous combustion events. The mine operator must ensure that personnel responding to spontaneous combustion events have sufficient authority to implement decisions and appropriate expertise. The mine operator must maintain, for the life of the mine, an event log to record issues, decisions, actions and consequences of those actions as a result of a spontaneous combustion event. The mine operator must ensure that withdrawal is triggered when any potentially life threatening situation arises from a spontaneous combustion event. The mine operator must develop and implement processes for the rapid sealing of areas of risk in response to a spontaneous combustion event. Without limiting the generality of the above requirement, the processes for the rapid sealing of areas of risk in response to a spontaneous combustion event referred to above must include: • details of sealing procedures and type D seal design; and • minimum inventory of materials to be maintained on-site, or to have guaranteed ready availability, at all times. **Corrective action** The mine operator must maintain, for the life of the mine, written records of all variations from the principal hazard management plan, causes of non-conformance and corrective action taken.	
3I: Explosives PHMP		
	3I: Mine operators to develop an explosives PHMP ***The requirement applies to:*** All underground mining operations where the principal hazard exists. ***Objects of the plan:*** The purpose of the PHMP is to describe how the mine operator will take all practicable steps to eliminate, isolate or minimise the exposure of workers to risks arising from the use of explosives.	

	Provisions applying to explosives principal hazard management plan for all underground mines The mine operator must develop and maintain an explosives PHMP which addresses the following: (1) transporting explosives at the mine; (2) explosive precursors; (3) inspecting and reporting on the safety of equipment used at the mine for manufacturing, storing, transporting and delivering explosives; (4) taking appropriate action to make equipment mentioned in paragraph (3) safe; (5) accounting for explosives brought onto the mine site and used at the mine; (6) checking for, and isolating, explosives that have deteriorated; (7) minimising the risk of theft or misuse of explosives; (8) identifying and controlling hazards: a. during the charging and firing of explosives; and b. in particular places including, for example, in a storage bin feeder in which an explosive is to be used to clear a blockage; (9) finding, recovering and detonating misfired explosives; (10) keeping a record of misfired explosives; (11) establishing a system to sign explosives in and out of a storage facility and a process to remove explosives from underground places unless there is an approved facility to store the explosive underground; and (12) Ensuring that the PHMP must consider and comply with the Hazardous Substances and New Organisms Act 1996 (HSNO Act) and regulations made under that Act. The explosives PHMP must include the following controls: (1) in the case of the surface parts of a mine, a requirement that a person who designs or initiates a shot must ensure that fly rock does not cause harm to people (whether at the mine or not); (2) the use of explosives only by people who are approved handlers under the HSNO Act; (3) the keeping of a register identifying those people currently at, or providing a service to, the mine who are approved handlers under the HSNO Act to handle explosives; and	

	(4) co-operation between the mine operator and any person authorised under the HSNO Act regarding safety of the storage, handling, transportation and use of explosives, including compliance with any conditions attached to the authorisation under the HSNO Act of the person handling the explosive.	
	3I1: Issuing and dealing with explosives A person must not use, handle or issue explosives at a mine unless the person is authorised, an approved handler under the HSNO Act, and is competent to do so. **3I2: Only authorised explosives to be used** The mine operator must ensure explosives used at the mine are authorised for use. **3I4: Selection and use of explosives** The mine operator must ensure that explosives selected for use at the mine are: • stable; • fit for their intended use; • as insensitive as reasonably practicable to shock, sparks, friction and the environment in which they will be stored, transported and used; and • as far as is reasonably practicable, simple to store, use, transport and control.	
3J: Tips, lagoons, dams and voids PHMP		
Matters for inclusion in lagoons, dams and voids PHMP	**3J: Mine operators to develop a tips, lagoons, dams and voids PHMP** ***The requirement applies to:*** All mining operations where the principal hazard exists. ***Objects of the plan:*** The purpose of the PHMP is to describe how the mine operator will take all practicable steps to eliminate, isolate or minimise the exposure of workers to risks arising from tips, lagoons, dams and voids by ensuring that: a) tips are safely designed, constructed, operated and maintained and that they are adequately drained; b) a competent person is appointed to supervise the carrying out of tipping operations and regular inspections at every tip; c) the person carrying out the inspection makes a written report of all defects revealed by the inspection, and ensure that a written report of the action taken to remedy any defect revealed by the inspection is made. Any defect that poses an unacceptable level of risk should be rectified immediately;	

	d) procedures for the safe construction and operation of tips are established; e) an appraisal by a geotechnical assessment of the tip area and bunding design is carried out prior to beginning tipping; f) the stability of the tip is reassessed at least every two years or sooner if considered necessary and when the tip design deviates from the geotechnical design or a new tip is created; g) suitable records are kept of substances tipped for at least three years; and h) all plans, drawings, sections and reports or records associated with the mine are submitted to the inspector within three months of abandonment or before parting with the whole of the premises on which a tip is situated.	

Appendix 3: table setting out processes and standards to be addressed in principal control plans

Part 4: Principal control plans general requirements		
Recommendation 2: An effective regulatory framework for underground coal mining • Requiring employers to have a comprehensive and auditable health and safety management system Vol. 2 part 2, ch.26, pp.311-14	**Proposed change based on Australian non-core drafting instructions**	**Current New Zealand provisions**
The Royal Commission recommended: Documented health and safety management systems should be expressly required. Documentation and the corresponding systems should: • cover key risk areas such as mine ventilation, spontaneous combustion, gas management, methane drainage, strata control, training, employee and contractor oversight and emergency response; • cover or integrate with the health and safety systems of contractors; • provide for change management; and • be reviewed when there is significant change in mine plans or operations. Key health and safety management system documentation should be provided to and scrutinised by the regulator at an early stage and when there are substantial changes, including of ownership. Health and safety management systems should be regularly audited and reviewed.	**4: Mine operators to develop principal control plans (PCPs)** **The requirement applies to:** Mining operations where principal hazard management plans and the relevant controls are in place. ***Responsibility for principal control plans:*** Where principal hazards exist in a mining operation, the mine operator must develop and maintain principal control plans for each of the following controls where they are in place in the operation: • mechanical engineering • electrical engineering • ventilation • surveying • emergency response, and • worker health. The SSE (site senior executive) is responsible for the development of PCPs. The SSE is responsible for ensuring PCPs are developed and maintained in consultation with workers and their representatives at the operation, and that their content is made available for all workers in a form that they are able to understand. The SSE must ensure that the content of PCPs is: • reviewed regularly (at least annually); • independently audited at least every three years; and • available to inspectors for review on request. PCPs must specify the competencies of all personnel responsible for giving effect to them.	*Part 4 of the revised regulations will create the duty for mine operators to prepare and maintain the prescribed principal control plans applicable to the mining operation.* *The site senior executive will have a supporting duty for ensuring that the plans are maintained and reviewed, that workers and their representatives are consulted in their development, and that workers are provided with the information they need from the plans.* *It is proposed that regulations will contain mandatory processes and outcome requirements and will be supported by an approved code of practice for each PCP*

Worker involvement in the development and maintenance of plans Employers should have to make available to all workers, without request, the results of monitoring of workplace conditions that affect health and safety. Workers should be involved in the development of health and safety management systems, principal hazard plans and safe operating procedures that bear on their health and safety.		
4A: Mechanical engineering control plan		
Matters to be addressed in engineering control plan	**4A: Mine operators to develop a mechanical engineering control plan** ***The requirement applies to:*** All mining operations where relevant principal hazard management plans are in place ***Objects of the plan:*** The mechanical engineering control plan must be developed with regard to the life cycle of mechanical plant and structures, and mechanical engineering practices at the operation to: (1) control risks to health and safety from mechanical plant and structures over their life cycle; (2) prevent injury to people from sources of mechanical energy; (3) provide safeguards to prevent the release of uncontrolled mechanical energy and to prevent unintended operation of mechanical plant; (4) prevent catastrophic failure of mechanical plant or structures; (5) prevent uncontrolled fires being initiated or fuelled by mechanical plant or structures; (6) prevent initiation of gas or coal dust explosions by mechanical energy; (7) specifically prevent initiation of gas or coal dust by cutting equipment caused by incentive sparking; (8) minimise exposure to toxic or harmful materials associated with mechanical plant and structures; (9) provide safeguards for mechanical plant and structures, with a probability of failure appropriate to the degree of risk posed by any mechanical plant or installation; and (10) generally provide the means by which the safety of mechanical plant and structures is managed.	

	Matters to be included in the plan: The mechanical engineering control plan must address the following matters: (1) **the standards of engineering practice for mechanical plant and structures throughout their life cycle at the operation, including:** (i) arrangements for the acquisition and operation of fit-for-purpose plant and structures; (ii) inspection and testing systems to ensure plant and structures are safe to operate; (iii) arrangements for the maintenance, repair and alteration of plant and structures; (iv) arrangements for the documented commissioning of plant and structures; (v) the competence of people who may deal with plant and installations during the life cycle of the plant and structures at the operation; (vi) arrangements for the supervision of people installing, commissioning, maintaining and repairing mechanical plant to be undertaken by people with appropriate competence; (vii) safe work procedures for people who may deal with plant and installations during the life cycle of the plant and structures at the operation; and (viii) identification, assessment, rectification and management of defects of plant and structures; (2) the safe operation of conveyors, winding plant and mobile plant and dredges; (3) the safety of structures and mechanical plant; (4) fitting of appropriate automatic fire suppression and engine/fuel pump shut-down systems of safety critical equipment and all underground diesel engines; (5) the exclusion of petrol engines from underground mines, tunnels and all other mining related underground structures; (6) fitting of heat detection and automatic trip sensors on safety critical mechanical components; (7) the fitting of mechanical operator protective devices to protect from the risk of mobile plant overturning, objects falling on or coming into contact with the operator and the operator being ejected from the seat, in the form of the following: (i) rollover protection and falling object protection on mobile plant that is suitable for the mining operation;	

	(ii) seat belts or other operator restraint devices on mobile plant; and (iii) protective canopies on continuous miners when controlled by an on-board operator; (8) the safe use and storage of pressurised fluids (including managing the risks associated with compressed air and pressurised hydraulic fluids); (9) means for the prevention, detection and suppression of fires on mobile plant and conveyors; (10) the control of diesel-engine plant and equipment, including the following: (i) limiting the number of diesel engines permitted in any underground mine or tunnel consistent with the safe operation of the mine and capacity of the ventilation system to dilute and render harmless exhaust emissions; (ii) the use only of plant and equipment containing a registered diesel engine system in and underground coal mine; (iii) where diesel engines are used on vehicles or equipment underground, such vehicles and equipment must be fitted with steel fuel tanks, automatic fire suppression of adequate delivery means and capacity and a ready method of battery isolation; and (iv) the maintenance of explosion-protected plant and equipment in an explosion-protected state; (11) The use of fire-resistant hydraulic fluids in high risk applications in the underground parts of the operation; (12) engine management systems to control diesel pollutants emitted in the underground parts of the operation; (13) arrangements for safe hot work, including the use of cutting and welding equipment; and (14) prohibition of hot work including cutting and welding in all coal mines except under a case-by-case Permit to Work system.	
Specific outcome requirements for mechanical engineering control plan	**4A1: Diesel additives** The mine operator of an underground mine must assess the hazards to workers of fuel additives applied to diesel engines used underground, including by: • comparison testing of underground diesel engines at appropriate load points; and • regular testing of undiluted exhaust emissions, including from the surrounding atmosphere. The mine operator must use the assessment to minimise the exposure of workers to diesel particulate matter.	

4A2: Flammable liquids

The mine operator must, so far as is reasonably practicable, ensure that the risks associated with combustible liquids stored underground are adequately managed and in particular, controlled.

The mine operator at an underground mine must ensure that:

- items with a flashpoint of less than 61 degrees Celsius are controlled in an underground mine; and
- flammable materials with a flashpoint of 23 degrees Celsius or less are not stored in the underground parts of the mining operation, except in a fire proof room, compartment or box.

4A3: Belt conveyors

Belt conveyors used in mining operations must be designed, installed, used, inspected and maintained to address:

- hazards arising from starting conveyors, including pre-start warnings;
- the fitting of emergency stop system capable of being activated from any point along the length of the conveyor where persons have access;
- protecting persons near or travelling under a conveyor against the risk of being struck by a falling object;
- the hazards of interaction of people and conveyor belts, including provision of safe crossing of conveyor belts; and
- the use of certified fire resistant and antistatic conveyor belting, drum lagging and conveyor accessories in an underground mine;.

4A4: Compressed air in coal mines

The mine operator of an underground coal mine must ensure that there is provision for the electrical bonding to earth of compressed air equipment, hoses and pipes that are likely, during operation, to develop static electrical charges capable of causing an electric shock to a person, or a spark.

4A5: Using plant powered by internal combustion engines in coal mines

An internal combustion engine must not be used to power plant in an ERZ0.

Plant powered by a non-explosion protected internal combustion engine may not be used in an ERZ1 or ERZ0 in an underground mine.

A non-explosion protected internal combustion engine used in a NERZ at a mine must be:

- a compression ignition type and clearly marked as a non-explosion protected engine;
- subject to a risk assessment, and any risk controls identified by the risk assessment must be implemented; and

	• for mobile equipment, prevented from accessing an ERZ1 by a system that is either fail safe or includes multiple redundancy devices. An internal combustion engine used to power plant in an ERZ1 must be: • a compression ignition type of an approved type; • tested by an accredited testing station and clearly marked with information identifying the test report; and • assessed by the engine's manufacturer as safe to use in an ERZ1 and clearly marked with information identifying the assessment report.	
4B: Electrical engineering control plan		
Matters to be addressed in electrical engineering control plan The Royal Commission recommended that: electrical technology advances need to be better accommodated and regulated. The nature of the restricted zone needs clarification. The extent to which electrical equipment may be placed in coal measures, and the necessary protections, require addressing.	**4B: Mine operators to develop an electrical engineering control plan** ***The requirement applies to:*** All underground operations and other operations where relevant principal hazard management plans are in place. ***Objects of the plan:*** (1) prevent injury to persons from sources of electrical energy; (2) prevent uncontrolled fires where electrical energy is the ignition source; (3) prevent initiation of gas or coal dust explosions by electrical energy, including by the use of Explosive Risk Zones (ERZ); (4) prevent unintended operation of plant; (5) provide electrical safeguards for electrical and non-electrical hazards, with a probability of failure appropriate to the degree of risk associated with the hazard; (6) provide the means by which the safety of electrical plant and electrical engineering practices are managed, including requirements of these regulations and any relevant requirements of regulations made under the Electricity Act 1992; and (7) provide for only competent personnel to complete electrical work and contain systems and processes for meeting regulatory requirements.	
	Content of electrical engineering control plans for underground metalliferous mines: To meet the above objects, the electrical engineering control plan for a metalliferous mine must provide effective processes for: (1) ensuring that only competent persons carry out work on electrical equipment that has explosion protection; (2) the rating and design of plant and installations (including cables) for:	

	(a) the prospective electrical fault level; and (b) arc fault control; (3) selecting, installing and using electrical cables and electrical cable accessories at the mine; (4) the design, installation, operation and maintenance of electrical equipment and installations at the mine including: (a) the safe and secure location of the mine's electrical equipment and installations; (b) the design and operation of liquid filled electrical equipment; (c) minimising potential impacts from voltage rise due to lightning, static electricity, voltage surges and other transient voltages to within acceptable limits, including: (i) the prevention of the ignition of gas by a static electric charge; and (ii) prevention of the effects of lightning being transferred to the underground parts of the mine; (d) reliable circuit interruption, under fault conditions, at all points in the mine's electrical distribution system; (5) each circuit protection device at the mine to have an appropriate operating time and tripping current, having regard to a risk assessment of the operation of the part of the electrical installation it protects; (6) each earthing system at the mine to be of sufficiently low impedance to ensure reliable operation of all electrical protection systems and devices and to provide adequate protection against indirect contact; (7) limiting prospective touch, step and transfer voltage to within acceptable limits; (8) the construction of electrical protection devices to an appropriate standard; (9) each electrical control system at the mine to operate safely under all operating conditions, including electricity supply instability or failure; (10) if a control system suffers a fault or fails, all emergency stopping systems and safety alarms associated with that control system remain effective; (11) the interruption of the supply of electricity to mobile or transportable electrical plant, fed by a flexible reeling or trailing cables, when the continuity of the connection to earth is compromised; (12) the prevention of the connection of electrical power to mobile or transportable electrical apparatus in the event of an earth fault on a flexible cable supplying the apparatus; (13) the limitation of earth fault currents to mobile or transportable plant fed via flexible reeling or trailing cables, and to electrical plant in the underground parts of the mine;	

		(14) electrical equipment exceeding extra low voltage used at the mine to have a device or feature for preventing a person inadvertently contacting live parts of the equipment (example of devices or features are: an enclosure, shield, insulation, interlocking device or automatic disconnection device); (15) the control of electrical energy in parts of the mine, including the provision of suitable switch gear to safely switch electric power in the mine, including: (a) at each place where persons enter underground from the surface, either: (i) a suitable communication method for advising a person to switch off the electricity supply to underground electrical equipment and cables; or (ii) a way to switch off the electricity supply; (16) a full current isolator for equipment driven by electricity at the mine including ensuring that: (a) the equipment is clearly identified as being supplied with electricity from the isolator; and (b) the isolator being: (i) clearly identified as the isolator for the equipment; and (ii) easily accessible to a person required to work on the equipment; (17) the removal of power from electrical plant or equipment in the event of: (a) a failure to maintain plant in accordance with the electrical engineering management plan; or (b) unsafe electrical plant or practices being detected; (18) safe restoration of the supply of electricity by a competent person; (19) safe operation of high voltage installations throughout their life cycle; (20) prevention of live electrical work on electrical plant and installations at the mine; (21) prevention of live testing on electrical plant and installations at the mine; (22) reasonable access of people undertaking installation, maintenance or emergency work on an electricity supply authority's infrastructure to that infrastructure; (23) a commissioning, testing and notification process prior to use of the circuit, to be undertaken by competent persons. (24) keeping commissioning and test reports throughout the lifecycle of the plant; (25) specific procedures for the following: (a) use of electric welding plant,	

(b) use of electrical test instruments,

(c) work near overhead power lines and cables, and

(d) treatment of electric shocks and electric burns;

(26) placing appropriate signage and notices at electrical switchgear and other prominent positions, being signage and notices that do the following:

(a) warn of the presence of electricity, and

(b) provide advice on:

(i) what to do in the event of:

- a fire on or in electrical plant,
- an electric shock and other electrical injuries,

(ii) the isolation point for the electrical plant;

(27) drawings and plans of the mine's electrical installations, maintained up to date, easily accessible by each mine worker required to access the drawings or plans, and including:

(a) the location of each main electricity reticulation line;

(b) the location of all high voltage cables and switchgear on a mine plan;

(c) the location, rating, identifying label and purpose of each main isolator, substation and high voltage switchboard;

(d) any information required to perform switching programs;

(e) for a surface mine, the general location of each item of high voltage mobile plant supplied with electricity by a trailing cable;

(f) for an underground mine, the location of each fixed communication device at the mine; and

(g) the location of all buried services on the surface of the mine;

(28) access procedures for working on high voltage installations that include the isolation of electrical installation, testing for the presence of electricity, the application of locks to switch gear to prevent inadvertent energisation of an isolated circuit and the application of working earths;

(29) the security and maintenance of the mine's electrical control system software and control circuits; including:

(a) controlling modification of the software and circuits; and

(b) keeping records of any modifications;

	(30) the safe use of lasers, including fibre optic equipment at the mine; and (31) constructing, installing, operating and maintaining the battery powered vehicles and battery charging stations used at the mine.	
	Content of electrical engineering control plans for underground coal mines: To meet the above objects, the mine operator of an underground coal mine must ensure that the electrical engineering control plan provides for the following matters and that reference must be made to the appropriate approved code of practice in developing this plan: (1) explosion protected electrical plant and cables that the mine operator, in consultation with the electrical engineering manager of the coal mining operation, has determined are suitable for their intended environment of use and that comply with the prescribed requirements: (a) for electrical plant used in an ERZ0; (b) for electrical plant used in an ERZ1; (c) for electrical equipment installed or operated in an NERZ, except: (i) electrical cables; (ii) electrical equipment associated with hot work being undertaken in accordance with a hot work management system; (iii) portable electrical equipment in accordance with an approved scheme; and (iv) electrical equipment installed in a pressurised room; (2) explosion protected equipment used in a coal mine has a valid certificate of conformity as set out in the relevant approved code of practice; (3) specified information is supplied by the manufacturer or supplier of the explosion protected plant used in an underground coal mine; (4) explosion protected plant and installations is maintained in an explosion protected state; (5) repair, overhaul or modification of explosion protected electrical equipment is undertaken only by recognised service facilities; (6) the repair of flexible reeling, trailing and feeder cables for use in an ERZ is undertaken only by an approved repair facility; (7) only persons who are competent in maintaining electrical equipment for explosive atmospheres carries out the following work at the mine: (a) electrical work in an ERZ; (b) work on electrical equipment used in a ERZ;	

	(c) work on extra low voltage systems associated with explosion protected equipment in installations; (d) work on explosion protected electrical equipment installed at a surface mine, or on the surface of an underground mine; or (e) electrical work in an area, at a surface mine, or on the surface of an underground mine, that has been identified by a hazardous area assessment in accordance with AS/NZS 3000 as presenting an explosion risk; (8) the rating and design of plant and installations (including cables) for: (a) the prospective electrical fault level; and (b) arc fault control, including prevention of arcing faults compromising explosion protection properties; (9) selecting, installing and using electrical cables and electrical cable accessories for use at the mine; (10) the design, installation, operation and maintenance of electrical equipment and installations at the mine to provide for: (a) the safe and secure location of the mines electrical equipment and installations; (b) the design and operation of liquid filled electrical equipment; (c) minimising potential impacts from voltage rise due to lightning, static electricity, voltage surges and other transient voltages to within acceptable limits, including: (i) the prevention of the ignition of gas by a static electric charge; and (ii) the prevention of the effects of lightning being transferred to the underground parts of the coal mine; (d) reliable circuit interruption, under fault conditions, at all points in the mines electrical distribution system; (e) each circuit protection device at the mine having an appropriate operating time and tripping current, having regard to a risk assessment of the operation of the part of the electrical installation that it protects; (f) each earthing system at the mine to be of sufficiently low impedance to ensure reliable operation of all electrical protection systems and devices and provide adequate protection against indirect contact; (g) limiting prospective touch, step and transfer voltage to within acceptable limits; (h) the construction of electrical protection devices to an appropriate standard;	

(i) each electrical control system at the mine operates safely under all operating conditions, including electricity supply instability or failure;

(j) if a control system suffers a fault or fails, all emergency stopping systems and safety alarms associated with that control system remain effective;

(k) the interruption of the supply of electricity to mobile or transportable electrical plant, fed by a flexible reeling or trailing cables, when the continuity of the connection to earth is compromised;

(l) the prevention of the connection of electrical power to explosion protected mobile or transportable electrical apparatus in the event of an earth fault on a flexible cable supplying the apparatus;

(m) the limitation of earth fault currents to mobile or portable plant fed by a flexible reeling or trailing cables, and to electrical plant in the underground parts of the coal mining operations; and

(n) electrical equipment exceeding extra low voltage used at the mine having a device or feature for preventing a person inadvertently contacting live parts of the equipment.

(11) the control of electrical energy in parts of the coal mining operations, including the provision of suitable switch gear to safely switch electrical power in the mine, including:

(a) at each place where persons enter underground from the surface, either:

(i) a suitable communication method for advising a person to switch off the electricity supply to underground electrical equipment and cables; or

(ii) a way to switch off the electricity supply;

(b) a full current isolator for equipment driven by electricity at the mine;

(c) the equipment clearly identified as being supplied with electricity from the isolator;

(d) the isolator being:

(i) clearly identified as the isolator for the equipment; and

(ii) easily accessible to a person required to work on the equipment;

(12) the interruption of the supply of electricity in the event of the following circumstances:

(a) in the presence of flammable gas levels at or above:

(i) NERZ - 0.25%

(ii) ERZ1 – 1.25%;

	(b) if ventilation falls below a specific quantity (to be determined by the mine operator in consultation with the underground mine manager and the electrical engineering manager); (13) the removal of power from electrical plant or equipment in the event of: (a) a failure to maintain plant in accordance with the electrical engineering management plan; or (b) unsafe electrical plant or practises being detected; or (c) if inspections determine it is necessary; (14) the safe restoration of the supply of electricity by a competent person; (15) the safe operation of high voltage installations throughout their life cycle; (16) the prevention of live electrical work on electrical plant and installations at the mine; (17) the prevention of live testing on electrical plant and installations at the mine, except in approved circumstances; (18) the safety of persons undertaking installation, maintenance or emergency work on an electricity supply authority's infrastructure; (19) the reasonable access of persons undertaking installation, maintenance or emergency work on an electricity supply authority's infrastructure; (20) a commissioning, testing and notification process prior to use of the circuit, to be undertaken by competent persons (21) commissioning and test reports to be kept by the mine operator throughout the life cycle of the plant; (22) specific procedures for: (a) use of electric welding plant; (b) use of electrical test instruments; (c) work near overhead power lines and cables; and (d) treatment of electric shocks and electric burns; (23) the placing of appropriate signage and notices at electrical switch gear and other prominent positions, being signage and notices that do the following: (a) warn of the presence of electricity; (b) provide advice on what to do in the event of: (i) a fire on or in electrical plant; or	

	(ii) an electric shock and other electrical injuries; (c) provide advice on the isolation point for the electrical plant; (24) drawings and plans of the mine's electrical installations that are maintained and kept up to date, easily accessible by each worker at the coal mine, required to access the drawings or plans, and that include: (a) the location of each main electricity reticulation line; (b) the location of all high voltage cables and switch gear on a mine plan; (c) the location, rating, identifying label and purpose of each main isolator, substation and high voltage switch board; (d) any information required to perform switching programs; (e) for a surface mine, the general location of each item of high voltage mobile plant supplied with electricity by a trailing cable; (f) for an underground mine, the location of each fixed communication device at the mine; and (g) the location of all buried services on the surface of the mine; (25) plant and procedures to ensure that, in the event of a failure of the main ventilation system, the electric power supply entering the coal mining operations (other than power to intrinsically save plant): (a) is automatically cut off, as soon as reasonably practicable; and (b) is incapable of being restored before the main ventilation system is repaired and restarted; and (c) is not restored until it is safe to do so; (26) access procedures for working on high voltage installations that include the isolation of electrical installation, testing for the presence of electricity, the application of locks to switch gear to prevent inadvertent energisation of an isolated circuit and the application of working earths; (27) the security and maintenance of the mine's electrical control system software and control circuits, including the following: (a) controlling modification of the software and circuits; and (b) keeping records of any modifications; (28) the safe use of lasers, including fibre optic equipment at the mine; and	

	(29) constructing, installing, operating and maintaining the battery powered vehicles used at the mine and battery charging stations.	
Specific outcome requirements for electrical engineering control plan	***Minimum standards for consideration in the development of electrical engineering control plans:*** **4B1: Qualified personnel** The installation, commissioning, maintenance and repair of electrical plant and installations must only be undertaken only by a qualified electrical engineer or qualified electrical tradesperson, or persons under the supervision of a qualified electrical engineer or qualified electrical tradesperson. **4B2: Electrical standards for all mines** The standards of engineering practice for electrically powered plant, electrically controlled plant, installations, electrical engineering practices used at the mining operations, and, in particular, all electrical installations located on the surface at a mining operation are required to comply with AS/NZS 3000 and AS 3007 Parts 1 to 5. **4B3: Live electrical work** Live electrical work (excluding live testing) is prohibited in a mine. Live testing at a mine is prohibited: • in high voltage electrical operations, except where the testing is undertaken as a part of a process of verifying isolation and safe access; • on extra Low Voltage or Low Voltage circuits except where the testing is in areas identified as non-hazardous; • additionally, for a coal operation: (a) in an ERZ0 (b) in an ERZ1 unless it involves: (i) intrinsically safe circuits and test equipment which complies with explosion protection certification requirements for the circuit being tested and the persons undertaking the work are competent in maintaining in the electrical equipment for explosive atmospheres; or (ii) intrinsically safe circuits being tested with test instruments where the environment in which the circuit is located has been tested and found to contain less than 10% Lower Explosive Limit (LEL) of the explosive gas and controls implemented to maintain the environment at that condition for the duration of the testing. **4B4: Third party audit certification** A person conducting a business or undertaking at a coal mine that carries out the repair, overhaul or modification of explosion protected equipment must be recognised as set out in the approved code of practice.	1999 Part 3, regs 41-59

4B5: Portable electrical equipment

A mine operator must ensure that mains powered portable electrical equipment will be safe from electrical shock such that the equipment operates at not more than 250v and has an earth leakage of not more than 30mA sensitivity.

The mine operator must ensure that the electrical engineering control plan for a coal mine provides for using certified and uncertified portable electrical equipment, other than portable gas detectors, in an ERZ1.

The mine operator must ensure that the electrical engineering control plan for a coal mine must provide procedures for using certified and uncertified portable electrical equipment, other than portable gas detectors, in a NERZ.

4B6: Definitions of Explosion Risk Zones

ERZ means Explosion Risk Zone.

ERZ0 means:

an underground coal mine, or any part of it, where the general body concentration of methane is known to be, or is identified by a risk assessment as likely to be, greater than 1.25%

If the general body concentration of methane in a part of the mine that is an ERZ1 or NERZ becomes greater than 1.25% the part becomes an ERZ0.

ERZ1 means:

an underground coal mine, or any part of it, where the general body concentration of methane is shown by continuous and recorded monitoring to range, from 0.25% to 1.25%.

Each of the following places is an ERZ1:

a) a workplace where coal or other material is being mined, other than by brushing in an outbye location;

b) a place where the ventilation does not meet the requirements for ventilation set out in the mine safety legislation;

c) a place where connections, or repairs, to a methane drainage pipeline are being carried out;

d) a place where holes are being drilled underground in the coal seam or adjacent strata for exploration or seam gas drainage;

e) a place, in a panel, other than a longwall panel that is being extracted, inbye the panel's last completed cut-through;

f) a goaf area;

g) each place on the return air side of a place mentioned in paragraphs (a) to (f) above, unless the place is an ERZ0; and

	h) the part of a single entry drive with exhaust ventilation inbye the last fixed ventilation ducting in the drive. Clause a) above does not apply to: a) a place where work is undertaken that is a shaft or roadway driven from the surface in material other than coal; or b) between seams that are predominantly driven in material other than coal. **NERZ** means negligible explosion risk zone, including: • An underground mine, or any part of it, where the general body concentration of methane is demonstrated by means of continuous and recorded monitoring to be, less than 0.25%; or • A part of a mine submerged by water. A mine operator may classify a NERZ at the mine as an ERZ0 or ERZ1. If the mine operator makes such a classification, the NERZ is considered, while the classification is in force, to be an ERZ of the type stated in the classification.	
4C: Ventilation control plan		
Matters to be addressed in ventilation control plan	**4C: Mine operators to develop ventilation control plan** ***The requirement applies to:*** All underground operations and tunnels. ***Objects of the plan:*** The mine operator of an underground mine or tunnel must develop and implement a ventilation control plan addressing: (1) the supply to all accessible parts of the mine of sufficient ventilation including: (a) the installation of ventilation control devices and ensuring that they are not interfered with; (b) the maintenance of return airways in a condition so that they are accessible to those who must inspect them or travel through them in an emergency; (c) prescribing competency requirements and processes for ensuring the operation, maintenance and adjustment of the ventilation system for the mine is only completed by competent personnel; (d) the control of ventilation; (e) reporting procedures relating to ventilation; (f) the maintenance of ventilation records and plans;	

	(g) the manner of sealing of parts of the mine and the precautions to be taken in sealing parts of the mine; (h) independent audits of the operation of the arrangements and for reviews (at least annually) of the effectiveness of the ventilation arrangements; (i) ensuring those areas of the mine that are unventilated and / or disused, and or sealed areas are not inadvertently entered; (j) procedures for constructing, installing, using and maintaining the mines' ventilation control devices; (k) procedures to be followed in the event of failure of the main ventilation system of the mine and, where considered necessary, the safe withdrawal of people from the underground parts of the mine. **Additional considerations for underground coal mines** (2) the assessment of potential explosive gas entrained within the coal seam being mined; (3) based upon the above assessment (1), establishing a design for the delivery of adequate ventilation to maintain the maximum concentration of methane in any production area below 0.5%; (4) the monitoring and control of the underground ventilation arrangements to ensure the atmosphere in each part of the mine has a general body concentration that is within the prescribed limits (including design, monitoring and control required to support gas management, spontaneous combustion management or other hazard management arrangements at the mine that are dependent on ventilation); (5) a procedure for ventilating the parts of the underground coal mine where work is conducted is developed and implemented which includes the maximum distances from the mine face for locating ventilation ducting and brattice lines; and (6) ensuring fans used for ventilating the mine where methane may be present are connected to methane detectors and that an automatic visible alarm is triggered when the general body concentration of methane is exceeded.	
Specific outcome requirements for ventilation control plan The Royal Commission recommended that: the notification requirements for uncontrolled accumulations of flammable or noxious gas need strengthening. A ventilation officer, responsible for key aspects of the ventilation system, should be required.	**4C1: Air flow rates** The volume of fresh air passing through each continuous working place in which a mine worker conducts work must not be less than 0.3 cubic metres per second for each square metre of normal development cross-sectional area. The "normal development cross-sectional area" is to be determined by measuringfrom side toside, ignoringthe presence ofventilationdevices and notmeasuring at any partially or fully completed intersection of two roadways. The volume ofairpassingthrough each longwallworking placemustnotbe less than4cubic metres per second for each metre of extracted height.	1999 regs 28-32, reg 40 (gassy mines)

Placement of main fans underground in coal mines must be prohibited. Explosion protection should be required for main fans. Design and construction standards for ventilation control devices, such as stoppings and overcasts, are required. **Withdrawal of workers when gas present or ventilation fails** The requirements to withdraw workers from a mine following a ventilation failure or uncontrolled accumulation of flammable or noxious gas need strengthening. **Gas monitoring** Commission recommended: Underground atmospheric monitoring requirements need defining and strengthening.	Not more than two temporary stoppings are to be installed in a line of ventilation stoppings separating an intake airway from a return airway immediately adjacent to the last line of cut- throughs in the panel. **4C2: Main fans** An underground mine's ventilation plan must: (1) ensure that every main ventilation fan is installed at the surface part of the mine and is placed in such a position and under such conditions as to ensure that it will not be damaged by an explosion in the mine; and (2) ensure that an effective airlock is provided and maintained at each shaft or outlet connected to the main ventilation fan or fans on the surface part of the mine and used for winding or the transport of people or materials; and (3) ensure that at the surface part of the mine in connection with every main ventilation fan a continuously indicating pressure gauge and a device for continuously indicating and recording the volume of air passing through the fan are provided and maintained; (4) ensure each type of fan including the main fan has a procedure for starting; and (5) ensure each fan installed on the surface, and each booster fan installed below ground, at the mine as part of its ventilation system: (a) is fitted with an equipment condition monitoring device; (b) is fitted with a device capable of continuously monitoring and recording the fan's static pressure that operates in such a way that, if it detects a significant departure from the fan's normal operating parameters, it: (i) firstly, triggers a visible alarm; (ii) secondly, trips the electricity supply to the fan; and (iii) records the date and time of the action mentioned in paragraphs (i) and (ii); and (c) has the part of the device displaying the results of the monitoring located where it is easily accessible by a person whose task includes checking the condition of the fan. **4C3: Auxiliary fans** An underground mine's ventilation plan must: (1) ensure that an auxiliary ventilation fan used in the underground parts of the mine is located and operated in such a manner as to prevent recirculation of air through the fan; (2) where two or more fans are in a panel, the minimum quantity of air flowing in any panel at the mine is: (a) 30% in excess of the sum of the open circuit capacity of the auxiliary fan; and	

(b) the minimum quantity of air flowing at the mine in any panel where two or more auxiliary fans are operating is 30% in excess of the open circuit capacity of the largest fan in the panel;

(3) ensure an auxiliary fan, other than a compressed air powered auxiliary fan, that is used at the mine is capable of switching off automatically if the main ventilation system fails totally;

(4) include procedures for using the following types of fans that are part of the mine's ventilation system:

(a) auxiliary fans, including auxiliary fans used for degassing places where methane has accumulated;

(b) booster fans; and

(c) scrubber fans;

(5) have regard to ways of ensuring a compressed air powered auxiliary fan is de-energised promptly if the main ventilation system fails; and

(6) ensure a scrubber fan used at an underground mine is located and operated in a way that prevents the uncontrolled recirculation of air through the fan.

4C4: Dealing with fans

The mine operator must ensure that a person does not start, stop, remove or alter a fan ventilating a place below ground at an underground mine unless that person is authorised to do so.

The mine operator must ensure that before a person starts or stops a fan ventilating a place below ground at an underground mine, the person ensures that each person likely to be affected is notified.

4C5: Ventilation failures

No part of the mine is worked if the requirements of the mine's ventilation plan for that part of the mine are not met.

The mine operator must be satisfied that all areas of a mine are adequately ventilated before any person may enter the relevant work area unless an emergency situation or for rectifying the problem with the ventilation.

4C6: Process to be followed when there is a ventilation failure

Where ventilation is found to be inadequate, the mine operator must ensure that the person with responsibility for the affected area undertakes the following:

(1) immediately takes such measures as are available to the person to restore adequate ventilation to the affected area; and

(2) notifies the ventilation officer of the interruption of the ventilation; and

(3) ensures that no person gains access to that affected area before adequate ventilation has been restored; and

(4) provides a written report to the mine operator of the measures which have been taken to restore adequate ventilation.

The mine operator of an underground mine must prepare procedures to be followed in the event of failure of the main ventilation system of the mine for the purpose of ensuring health and safety and, where considered necessary, the safe withdrawal of people from the underground parts of the mine.

The mine operator must develop and implement procedures for the action to be taken to ensure the safety of persons if the system for ventilation at the mine fails either totally or in part for more than 30 consecutive minutes and ensure that the system installed and maintained to monitor the operation of the main ventilation fan or fans of the mine provides for the giving of an alarm at the surface part of the mine if the fan or fans stop.

If an underground mine is ventilated by more than one main ventilation fan, a failure of one or more of the fans is to be considered a failure of the main ventilation system.

4C7: Heat stress

The mine operator must ensure that the health and safety risks associated with extreme temperatures are eliminated and, where not reasonably practicable to eliminate, are minimised. Documented intervention measures should be taken if the effective temperature exceeds 28 degrees C.

The ventilation control plan applying to underground mines must also contain requirements for the monitoring and controlling of heat stress conditions for the mine to be addressed in the ventilation plan for the mine.

Additional requirements for underground coal mines

4C8: Ventilation system failure in an underground coal mine

If the ventilation system fails in an underground coal mine, the mine operator must cut off electrical power in the coal mine as soon as reasonably practicable in order to safeguard against any rising levels of gas and must also restore the system as soon as possible.

The mine operator of an underground coal mine must ensure that, in the event of a failure of the main ventilation system for part of the coal mine, every battery operated portable or mobile plant located in that part of the coal mine is brought out without any delay to:

(1) the main intake airways; or

(2) a charging or repair station of suitable fire proof construction that is normally ventilated with intake air.

4C9: Provision of air to ERZ to be free of methane

The mine operator of an underground coal mine must take such steps as are necessary to ensure that the ventilation at the commencement of an ERZ in each production area of mining operations is normally kept free from methane. An ERZ is not considered to be free from methane if the readings obtained from a continuous monitoring system, or if that is not installed, the average percentage by volume of methane in the general body of air in the airway (from at least two determinations over at least two days) exceed 0.25%. In the event of any inconsistency in determination, a determination by an inspector as to the percentage by volume of methane is to prevail over the determination that has been made by another person.

4C10: Procedures when monitoring identifies the presence of flammable or noxious gases or other hazardous conditions

The procedures put in place by an underground mine operator must include the following:

(1) in an underground mine, a person who finds or suspects that an accessible place at the mine constitutes a risk by reason of the presence of flammable or noxious gases must notify a supervisor at the mine of the risk;

(2) a mining supervisor at the mine who has been notified of such a place of risk must as soon as reasonably practicable, and as far as safely possible, inspect the place;

(3) a worker at the mine who finds that a place at the mine constitutes a risk by reason of the presence of flammable or noxious gases must immediately inform their supervisor;

(4) a deputy or underground supervisor who becomes aware of such a risk must immediately remove other persons from the place and isolate or fence off the place; and

(a) take such steps as are available to the supervisor at the mine to eliminate the risk and then,

(b) as soon as practicable, report the risk, and the steps taken to eliminate it, to the mine operator;

(5) if the risk has not been eliminated, the mine operator must minimise the hazard;

(6) a supervisor at the mine must ensure that a record of any report made above is made before the end of the relevant shift on which the risk has been identified; and such records are to be kept at the mine for a period of at least five years.

For the purpose of the above provision, a place is taken to constitute a risk:

(1) by reason of the presence of flammable gases if the percentage of flammable gases in the general body of air in that place is found to be 2% or more; or

(2) if it is within a hazardous zone, electrical apparatus is in use and the percentage of flammable gases in the air is 1.25% or more.

4C11: Goaf management

Where an underground mine contains a goaf, the mine operator must ensure that appropriate steps are taken for the purpose of controlling risks posed by emissions of flammable and noxious gases from the goaf, including to:

(1) prevent intake air from travelling across the face of a permanent seal at the mine; and

(2) eliminate, isolate or minimise the risks of inrush and leakage, into intake airways, of atmospheric contaminants from goaf areas and abandoned or sealed workings; and

(a) ensure leakage through the seal is minimised and damage to the seal is prevented;

(b) ensure that the seal is, as a minimum, a type C seal;

(c) install a monitoring device in each intake airway on the return side of the seals over which the intake air passes to detect the intake airway's general body concentration of:

(i) oxygen; and

(ii) carbon dioxide, if it is present behind the seal in a general body concentration greater than 3%; and

(iii) any other gas that is present behind the seal in a quantity and concentration that is likely to create a risk if it enters the intake airway adjacent to the seal;

(d) for longwall workings— position the monitoring device described in paragraph (c) is positioned at the intersection of the longwall face and the intake airway;

(e) ensure that the monitoring system described in paragraph (c) triggers an alarm to warn each person who may be affected if a gas mentioned in the paragraph is present in a predetermined concentration.

4C12: Ventilation control devices and design criteria

The mine operator at an underground coal mine must ensure that a seal installed, other than at the surface, at the mine is, of a following type, as a minimum:

(1) if the level of naturally occurring flammable gas at the mine is insufficient to reach the lower explosive limit for the gas under any circumstances – type B;

(2) if persons remain underground when an explosive atmosphere exists and there is a possibility of spontaneous combustion, spark or other ignition source – type D;

(3) for an underground mine, or part of an underground mine, which is not mentioned in the subparagraphs of this drafting instruction immediately above – type C; or

(4) for sealing the entrance to an underground mine- type E.

Ventilation control device	*Design criteria*
Brattice line or temporary stopping	Antistatic and fire resistant
Mine entry airlock	Capable of withstanding an overpressure of 70kPa whilst it is open
Separation stopping for a primary escapeway	Antistatic, fire resistant and of substantial construction providing for minimal leakage
Stopping, overcast or regulator installed as part of the main ventilation system	Capable of withstanding an overpressure of 35kPa

Stopping, overcast or regulator installed as part of the ventilation system for a panel	Capable of withstanding an overpressure of 14kPa
Type B seal	Capable of withstanding an overpressure of 35kPa
Type C seal	Capable of withstanding an overpressure of 140kPa
Type D seal	Capable of withstanding an overpressure of 345kPa
Type E seal	Capable of withstanding an overpressure of 70kPa
Ventilation ducting	Antistatic and fire resistant

An underground mine operator must notify the Secretary of Labour of their intention to seal the mine.

In the event sealing becomes impracticable in an underground mine, or part of it, in the way in which the notice provided to the regulator under the high risk activities notification table provides, the mine operator must:

(3) notify the regulator of the changes from the initial proposed method of sealing the underground mine; and

(4) if the notification provided is by the mine operator to the persons identified in the subparagraph of this drafting instruction immediately above, ensure that the notification is confirmed in writing as soon as reasonably practicable.

There is a need for different requirements to be placed on mine operators in the context of emergency sealing. In that regard, when an underground mine, or part of an underground mine, requires sealing in emergency conditions, the mine operator must:

(5) ensure the sealing is carried out in a way that manages risk and that a risk assessment is conducted in relation to the emergency sealing; and

(6) as soon as reasonably practicable after the sealing, provide an inspector with a written notification regarding the sealing.

4C13: Sealing of mine

A type E seal must be used for sealing the entrance of an underground coal mine.

The mine operator of an underground coal mine must ensure that:

(1) each entrance from the surface to the underground coal mine is capable of being sealed at the following locations:

(a) the surface without requiring persons to travel in front of the entrance to seal it; or

(b) in the event that the entrance is a vertical shaft:

	(i) in the way mentioned in the subparagraph (a) above immediately above; or (ii) in a roadway at the bottom of the shaft. (2) at least one of the entrances has a mine entry airlock capable of withstanding a pressure pulse of 70 kPa passing through the entrance while the airlock is open; (3) when sealed, the mine has facilities allowing the following: (a) the use of inertisation equipment from a safe position; (b) monitoring the atmosphere behind the seal from the safe position; (c) persons to re-enter the mine through the entrance; and (d) large mobile equipment to enter or exit the mine through an airlock. The mine operator at an underground coal mine must ensure the operation of each airlock installed for an entrance at the mine is tested, other than pressure tested, on a regular basis and at least once a year. The mine operator at an underground coal mine must ensure that the following facilities at the mine are tested at appropriate intervals to ensure that the facilities are capable of being used in the event of an emergency: (1) the connection point for using inertisation equipment; and (2) each airlock and seal required to be used with the inertisation equipment. The mine operator must ensure the mine, or part of it, is not sealed unless: (1) the mine operator has given notice of the proposed sealing under section to the inspector; (2) the mine operator must ensure the mine, or part, is sealed in the way acknowledged by the inspector; (3) this section does not apply to sealing the mine in an emergency. A person must not, without an inspector's written consent, enter or remain in an underground mine after the mine, or part of it, has been sealed. The mine operator of an underground coal mine must ensure that necessary facilities including, for example, water and cleared areas, are available for use with inertisation equipment. Modelling to ensure that the inertisation points are located effectively should be undertaken at least once in every year. **4C14: Air flow in working areas** The air at a working place in the mine must, so far as is reasonably practicable, be provided at an adequate quantity and velocity to prevent workers from being exposed to a concentration of dust in excess of the limit as scheduled or otherwise prescribed and to prevent over-exposure to pollutants contained in the exhaust from diesel engines.	

	Sufficient air velocity must be delivered across the working face of any production or development place, and within the roadways leading to any working face, to dilute and render harmless any firedamp layering. Every production and development place must be designed as to minimise the risk of layering taking into consideration the natural buoyancy of firedamp The flow of air passing through each continuous working place in which a mine worker conducts work must not be less than 0.3 cubic metres per second for each square metre of normal development cross-sectional area. For the purposes of the above, the normal development cross-sectional area is to be determined by measuring from side to side, ignoring the presence of ventilation devices and not measuring at any partially or fully completed intersection of two roadways. The volume of air passing through each longwall working place must not be less than 5 cubic metres per second for each metre of extracted height. **4C15: Diesel emissions** In designing the mine ventilation and transport system, the risks associated with contaminants produced by diesel engines must be considered and arrangements put in place to eliminate, isolate or minimise risk of harmful exposure to employees. The ventilation control plan must provide for controlling the exposure of persons to an atmosphere at the mine containing internal combustion engine pollutants. Sufficient ventilation must be provided to dilute harmful exhaust pollutants for each type of compression ignition engine. This is to be a requirement of the ventilation control plan. In order to ensure that sufficient ventilation is provided, the mine operator must verify by testing, the gaseous and particulate characteristics of each compression ignition engine at the mine. This is to be done on a regular basis, and at least monthly. The volume of air in each place where a diesel engine operates must be such that a ventilating current of not less than: (1) 0.05 cubic metres per second for each kilowatt of maximum output capability of the engine; or (2) 3.5 cubic metres per second, whichever is the greater, is directed along the airway in which the engine operates. If more than one diesel engine is being operated in the same ventilating current, the mine safety legislation must prescribe that the engine kilowatts must be added and the minimum ventilation requirement is 0.06 cubic metres per second per kilowatt or 3.5 cubic metres per second, whichever is the greater.	

4D: Worker health control plan		
Matters to be addressed in worker health control plan	**4D: Mine operators to develop a worker health control plan** ***The requirement applies to:*** All mining operations where relevant principal hazard management plans are in place. ***Objects of the plan:*** Where a hazard that may have long-term health effects on mine workers is present in a mining operation the mine operator must develop and implement a worker health control plan to monitor the presence of the hazard in the working environment and its effects on the workers in the mine. The worker health control plan must describe how the following hazards, if arising in the mining operation, are to be monitored and controlled so as to ensure the health of workers and others affected by the mining operations: (1) noise (2) vibration (3) dust (coal dust, silica dust, mixed dust) (4) diesel particulates (5) fumes (exhaust fumes, welding, other metal fumes) (6) temperature (heat, cold and humidity) (7) changes in atmospheric pressure (8) manual handling, lifting (9) shiftwork/overtime (10) other psychosocial hazards (11) ultraviolet radiation (12) ionising radiation, and (13) biological hazards. **Health surveillance systems** *Worker health* A worker health control plan must include a documented system for the ongoing surveillance of the health of workers who are or are likely to be exposed to occupational health risks in the course of mining operations. *Work environment* The health surveillance system must provide for periodic monitoring of hazards in the work environment which can adversely affect a worker's health.	

	Medical examination Where a health hazard is present in the work environment, the health surveillance system must provide medical examination of mine workers by a registered medical practitioner before they commence employment, immediately before they cease working at the mine (if there has not been an examination within the preceding 12 months), and periodically throughout their involvement in mining operations, to establish their level of health at each point. *Processes for removing workers with adverse health effects* The worker health control plan must describe processes for workers who have experienced adverse effects from exposure to a hazard at the mining operation to be removed from the hazard and not resume work until the hazard is effectively controlled. *Records* The mine operator must maintain a record of the results of its health surveillance and the mine operator must notify the regulator of the mine's health surveillance results if requested by the regulator. A mine operator must keep worker health records as confidential records for at least seven years and until the worker or workers to whom the record relates ceases or cease to perform work at the mine, or 30 years in the case of records relating to hazards with a cumulative or delayed effect. **Notification and disclosure requirements** A worker must be provided with a statement dealing with any exposure he or she may have had to hazardous substances exceeding the national exposure limits during the course of their work at a mine, upon the termination of their engagement, and upon request. Health surveillance must be in accordance with an approved code of practice. The notification must be in writing and must provide the details of the hazardous substance, the level of exposure and the manner of exposure. **Fitness for work** The health control plan must have regard to fitness for work. Measures taken should be in proportion to the hazards of the workplace and the role of the worker. **First aid** The mine operator must put in place suitable arrangements for dealing with seriously injured workers which are appropriate for that workplace, taking into account the nature of the terrain, travel distance, isolation and remoteness of the workplace from externally provided medical assistance. The mine operator must keep records of all first-aid treatment provided at the mine for a period of seven years.	

Specific outcome requirements for health control plan		Sections 7-12 HSE Act 1992 contain detailed requirements for monitoring and responding to employee exposure to workplace hazards
4E: Emergency response control plan		
The Royal Commission recommendations on emergency management plans (Rec.13) Operators of underground coal mines should be required by legislation to have a current and comprehensive emergency management plan that is audited and tested regularly. The emergency management plan (EMP) should be developed in consultation with the workers and Mines Rescue Service (MRS). The EMP should specify the facilities available within the mine, such as emergency equipment, refuges and changeover stations, and emergency exits. The EMP should contain a strategy for notification of next of kin and ensuring that genuine enquirers receive appropriate information. The mining operator must keep and regularly update a list of emergency contact details for all workers. The EMP needs to be compatible with CIMS used by New Zealand's emergency services and Police. The regulator should include the EMP in its audit programme.	**4E: Mine operators to develop emergency ranagement control plan** Mine operators to prepare an emergency response control plan also known as an emergency management plan or EMP for the mining operation, commensurate with its nature, size, complexity and associated risks. ***The requirement applies to:*** Mining operations where principal hazard management plans and the relevant controls are in place. ***Objects of the plan:*** The emergency response control plan must describe the means of responding to a situation or incident involving a risk of serious injury or death, including, but not limited to: (1) the co-ordination and control of emergencies; (2) identification of personnel at the mine with functions and responsibility within an organisational structure for emergency response; (3) documented triggers for the activation of the emergency response plan; (4) the use of communications systems; (5) giving timely notice, information and warnings about emergencies to anyone potentially affected (including next of kin); (6) measures for isolating the area of an emergency; (7) the reasonable availability of trained rescue persons or emergency services at the mine; (8) locating and accounting for persons in the event of an emergency; (9) maintaining an accurate record of all persons underground at a mine at any time, and their likely location, which is kept and maintained at the mine and made available at any time for the purposes of emergency response; (10) emergency evacuation; (11) appropriate transportation from the mine; (12) documenting the first aid arrangements including first aid equipment, facilities, services and personnel at the mine;	New Zealand mining regulations currently include no requirements to prepare an emergency management plan. Any relevant New Zealand regulations are referred to alongside relevant elements of this chapter. The proposed standards in 4E are drawn from the Australian non-core drafting instructions (NCDIs), amended in minor ways to reflect the following: • to reflect the Royal Commission recommendations if there is a variance • adopting aspects of the Safe Work Australia Model Work Health and Safety Regulations, Chapter 9 – Mines, released for publication on 15 July 2011, in relation to aspects of metalliferous mining. Amendment to NCDIs 27.3(5) from specific Royal Commission recommendations NZ HSE (Mining Underground) Regulations currently provide: 15. Record of employees underground- Every employer must take all practicable steps to ensure that

	(13) providing for all facets of fire fighting including adequate and compatible fire fighting equipment (for example, foam generators), procedures, training and personnel with adequate minimum standards for mines; (14) identifying conditions for withdrawal from a mine which must include circumstances where there is an imminent risk to health or safety as part of the emergency evacuation procedure for the mine; and (15) a procedure for the prompt notification of all relevant emergency services and the mine rescue services. **For underground mines** In relation to underground mines, emergency response plans must also provide for: (1) ensuring there is an effective means of communicating between the surface of the mine and any part of the mine where persons may be located underground; and (2) provision for a suitable number of trained persons and maintained equipment to allow rapid and continuous rescue operations in conditions of reduced visibility and irrespirable and irritant atmospheres to take place at the mine and to assist the escape or safe recovery of any worker or other person from a mine where necessary – and, for appropriate levels of incident, this means in conjunction with the Mines Rescue Service; and (3) safe egress of persons from underground parts of the mine through conditions of reduced visibility and irrespirable and irritant atmospheres (including escape devices and adequately maintained self-rescuers, where appropriate); and (4) ensuring appropriate means of egress to the surface; and (5) maintaining an up-to-date plan of the exits from and refuges in the underground part of the mine; and (6) provision for training of underground mine workers in donning and changeover of self-contained self-rescuers in a simulated work environment every three months. **For underground coal mines** In relation to underground coal mines, emergency response plans must also provide for: (7) emergency sealing of a mine from a safe place at the mine (which is out of the direct line of any potential blast); and (8) the safe positioning of inertisation equipment. ***General requirements as to communication, maintenance, testing and review of plan*** The mine operator must ensure that the emergency response plan is:	(a) No employee is allowed to enter a mine or tunnel without the permission of the manager or acting manager; (b) An accurate record is made of every employee's entry into, and exit from, a mine or tunnel; and (c) The record, or a copy of it, is kept at the entry point.

	(1) written and otherwise communicated in plain language; (2) reviewed and tested on a regular basis (at least annually) and at any time there is a significant change to mining operations at the mine. This includes testing the plan in conjunction with the emergency services, or the Mines Rescue Service if the plan was developed in conjunction with them; (3) maintained; and (4) amended as necessary to ensure that it adequately provides for the response to incidents involving a risk of serious injury or death. All personnel must be provided with training in the emergency response plan including when review and testing occurs. The emergency response plan must, so far as is reasonably practicable, be developed in co-ordination with the emergency services that have responsibility for the area in which the mine is located, and in the case of all coal mines, underground mines and tunnels [of a certain size], with the Mines Rescue Service. The mine operator must: (1) make a copy of the emergency response plan accessible to persons identified as having functions and responsibilities in relation to the emergency response plan and to workers at the mine; and (2) provide a copy of the emergency response plan, including the mine plan, to the Mines Rescue Service and other relevant emergency services. **Mine plans** The emergency response plan must contain an up-to-date plan of the mine, identifying the points of egress from and refuges in underground parts of the mine, and the mine operator must ensure that the mine plan is : (1) prepared and reviewed at least once every three months; (2) updated when required (including whenever it is defaced or destroyed) to reflect the workings or circumstances of the mine; and (3) displayed in a prominent and secure position on the surface of the mine and at strategic places underground. **Provision of resources** The mine operator must provide adequate resources for the mine to ensure: (1) the effectiveness and implementation of the emergency response plan (including mine rescue arrangements); and (2) that the relevant facilities and equipment (including communications systems) are regularly inspected and maintained in a fully operational condition.	These provisions have been adapted from the NCDIs to: • reflect the core function of the Mines Rescue Service to assist in the development, review and testing of certain EMPs (rec15), and • and re wider mining, from Australian 9.2.232(4) and 9.2.235 of Safe Work Australia Model Work Health and Safety Regulations, Chapter 9 – Mines, released for publication on 15 July 2011 Adapted from NCDIs Strengthens NZ HSE (Mining Underground) Regulations mine plan provisions in regs. 11-13, which provide for 6-monthly updating (reg.11). Requirement for plans to include the location of emergency escapeways, first-aid stations, refuge bays, and rescue facilities are already in reg.13 (h)(iv)

Specific outcome requirements for Emergency Management : **Rec 16: Operators should be required to have equipment and facilities to support self-rescue by workers during an emergency** Emergency equipment, including self-rescuers and compressed air breathing apparatus (CABA), should be required at suitable places and spacings underground. Changeover or refuge stations should be defined and required. The need for at least two means of ingress and egress must be stated more clearly. The means of ingress and egress must accommodate workers, rescue personnel and equipment. (Rec 13) Emergency navigational aids to egresses, self-escape facilities and equipment should be mandatory The mine should also accommodate swift sealing and emergency inertisation. (Re Rec.2) There should be comprehensive operator emergency response management plans addressing: • The facilities and training required to enable and support self-rescue and rescue; • How atmospheric conditions will be monitored following an emergency; and • Emergency mine sealing and intertisation including airlocks and docking stations.	**4E1: Competent person at surface of underground mine** The mine operator must ensure that a competent person with the requisite training and authority is at the surface of an underground mine at any time persons are underground. The competent person who is on the surface of an underground mine, must be trained to answer alarms, must be capable of electrical switching to either cut or restore power to the underground workings, and must have authority to take action in the event of an emergency. **4E2: Emergency contact details for underground mines** Underground mine operators must keep and regularly update a comprehensive list of emergency contact details for all workers. **4E3: Breathing apparatus and further rescue equipment in underground mines** The mine operator of an underground mine must ensure that adequate breathing apparatus and further rescue equipment is provided for persons in underground parts of the mine. ***Self-contained rescuers*** The mine operator of an underground mine must ensure that a person who is to go underground is provided with a self-contained rescuer. The mine operator may provide the person with a filter self-rescuer if a self-contained rescuer is not available and a risk assessment indicates that a self-contained rescuer is not required to control risks to which the person will be exposed at the mine; and the mine is not a coal mine. The mine operator must ensure that the person is trained in the use of, and is able to use, the self-contained rescuer provided. ***Additional breathing apparatus where there is potential for irrespirable atmospheres*** Additional adequate breathing apparatus is required for mines where there is potential for irrespirable atmospheres. ***Further rescue equipment*** The obligations for further rescue equipment will also need to include suitable resuscitation equipment and persons qualified to use it, and an alarm system and procedure for activating it. In underground mines, emergency lighting and navigation aids marking egress, self-rescuer change-over stations and fresh air bases must be provided so that people can travel safely in conditions of reduced visibility. Persons who may need to use paths of egress must be made familiar with those paths and the marking of paths of egress must be such that persons can safely travel on them in conditions of poor visibility; **4E4: Fresh air bases, refuges, secure areas** The mine operator must ensure that the mine has the following as appropriate to the mine and mining operations, having regard to the nature and complexity of the mine's operations:	Added to address RC rec13. No current NZ provision and NCDIs not specific. Expands current NZ HSE (Mining Underground) Regulations: **22. Self-rescue units**-Every employer must take all practicable steps to ensure that (a) Suitable self-rescue units are provided and maintained in good order and condition in every mine and tunnel; and (b) Every employee who enters a mine or tunnel has a self-rescue unit immediately available for use at all times while underground; and (c) Every employee who enters a mine or tunnel has received sufficient training in the use of the self-rescue unit provided. Royal Commission sought requirement for compressed air breathing apparatus (CABA) and strategically located compressed air exchange stations, however, technical advice is that CABA is only one means of providing additional apparatus, and regulations need to allow for changes in best practice – consistently with NCDIs, CABA should be in Codes. Specifies lighting and navigation aids from RC, not in NCDIs. Addresses Rec16, utilising wording from NSW. Specific aids will be in Code.

	(1) fresh air bases; (2) and, particularly in relation to metalliferous mines (a) self-contained refuges; and (b) secure areas where persons can be protected against the hazard causing the incident which requires the use of a self-contained refuge. **4E5 Access and egress – underground coal mines** An underground coal mine must have: (1) at least two escapeways from the surface of the mine that are separated in a way that prevents any reasonably foreseeable event happening in one of the escapeways stopping persons from being able to self-escape through the other escapeway; (2) each ERZ1 at the mine where a person works has two escapeways leading to the surface or a refuge. This does not apply to an ERZ1 in the following circumstances: (a) where an inspection is being carried out under the mine's work health and safety management system and no one else is working; or (b) in a single entry drive or shaft that is being sunk. (3) at least one of the escapeways at the underground coal mine is: (a) an intake airway or a combination of adjacent intake airways; and (b) designated as the primary escapeway; and (c) separated, as far as is reasonably practicable, from all other roadways by separation stoping that is anti-static, fire resistant and of substantial construction providing for minimal leakage; and (d) the risk associated with fire has been managed so far as is reasonably practicable; and (e) is trafficable by vehicle; and (f) fire fighting equipment is located on, or near, any equipment installed in the primary escapeway. **4E6: Escapeways from underground metalliferous mines** A mine operator of an underground metalliferous mine must undertake a risk assessment to determine what is an adequate means of escape for the mine. The risk management process must be documented and must consider emergency egress and evacuation, including refuges.	NCDIs refer specifically to meltalliferous mines in relation to refuges, but in relation to rec. 16, the Royal Commission said there should be a requirement to consider the need for them in underground coal mines. Specifics as to equipment would be in Codes. Strengthens current NZ HSE (Mining Underground) Regulations: **23. Outlets for workings-**(1) Every employer must take all practicable steps to ensure that (a) Every mine or tunnel has suitable and sufficient outlets providing means of entry and exit for every employee in the mine or tunnel; and (b) The suitability and sufficiency of the outlets are determined having regard to the factors in subclause (2). *(2)* The factors are (a) The size of the mine or tunnel; (b) The maximum number of employees likely to be in the mine or tunnel at any one time; (c) The need to have at least *2* outlets that are separate from each other but that interconnect; and (d) The need to have at least (i) 1 outlet that can be traversed on foot for the purpose of entry and exit; and

	Where an underground mine operator has identified that facilities or procedures are required for evacuating persons, the mine operator must ensure that the metalliferous mine has the following features as appropriate for the mine, having regard to the nature and complexity of the mine's operations: (1) a usual way of access; (2) where the mine operator has identified that refuges for emergencies are required at the mine, signed escapeways independent of the usual way of access. The mine operator of an underground metalliferous mine must ensure that: (1) before stoping operations at a level on a mine commences, the mine has at least two trafficable egresses (the escapeways), accessible from all stoping operations to the surface; and (2) the escapeways: (g) are located strategically to manage risk; (h) allow for the passage of rescue persons and rescue equipment, including stretchers; and (i) are separated in such a way that an event happening in one of the escapeways would not prevent persons escaping through the other escapeway; and (j) are maintained in a safe, accessible and useable condition; and (k) are adequately marked or signposted, having regard to the potential for reduced visibility in the event of an emergency**.** **4E7: Underground coal mine communication systems** The mine operator must ensure that the underground mine's telephonic communication system complies with the following requirements: (1) it incorporates an adequate fail safe, or backup, power supply for the system; (2) the system's electrical components installed underground are suitable for use in an ERZ0, unless the components are installed in a drift or shaft being driven from the surface in material other than coal. **4E8: Adequate equipment and transportation for medical treatment in the event of an emergency** The mine operator must ensure that adequate appropriate means are available at the mine to be used in the event of a crush injury and the need to move plant. The mine operator must ensure that either appropriate ambulance service arrangements or a vehicle equipped to transport injured or sick persons is available at the mine at all times while persons are working at the mine.	(ii) 1 other outlet that has a mechanical means of entry and exit. Requirement to provide for monitoring during emergency is not covered in current New Zealand regulations. Text has been drawn from Royal Commission wording, as this outcome standard does not appear to be covered in NCDIs. Monitoring generally covered in Ventillation PCP. The NCDIs specify airbags, but these may not be the only or the best method available, so specific provisions would be in the Code. Note that the Royal Commission sought a requirement for tube bundling systems, per Queensland. However, as with CABA tube-bundling is the current technology and may be subject to change and the regulations need to allow for this. The NCDIs do not specify tube bundling, and, in Queensland, the specific provision for tube bundling is in Recognised Standard 09 (i.e. the Code). Requirement to provide for safe intertisation is not covered in current New Zealand regulations. Text has been drawn from Non-Core drafting Instructions, Ventilation PCP above, p43. The Ventillation PCA also sets seal outcome standards.

	4E9: Monitoring of atmospheric conditions in underground mines The mine operator's gas monitoring system must provide for continued monitoring of atmospheric conditions during an emergency. **4E10: Provision for safe inertisation** The mine operator of an underground coal mine must ensure that the mine has appropriate seals to support inertisation, and when sealed, has facilities that allow the use of inertisation equipment from a safe position.	
4F: Surveying control plan		
	4F: Mine operators to develop a survey control plan **The requirement applies to:** All underground mining operations, but excluding tunnels ***Objects of the plan:*** To be determined	
	4F1: Surveying No underground mine shall be worked unless the owner has appointed a suitably qualified and competent person to be the surveyor for the mine. (1) Where the post of surveyor becomes vacant, the mine may be worked without a surveyor for a period up to 28 days or for such longer period as the Ministry may approve. (2) For mines, appointees to the post of mines surveyor must be in possession of the appropriate qualification and should normally have three years' relevant post-certification experience. In considering the qualifications of a surveyor, the owner should also take into account such matters as education, knowledge and experience, having regard to the type and size of the mine and the nature and complexity of the technology employed. (3) In considering competence, the owner should take into account such matters as fitness and capacity to exercise the skills required in the particular mines. The surveyor's competence may need to be reviewed if and when events require or circumstances change.	

Appendix 4: table of definitions to be used in the new mining regulations

Proposed key definitions for regulations

This list only refers to terms critical to the determination of coverage and the framing of duties in the regulations. There will be additional definitions of specific technical terms within the regulations, which are not described here.

Term defined	*Summary of content*	*Source of regulation* *NC = Australian mining states (NMSF) requirements*	*Existing regulation replaced/revised*
Certificate of competence	May be defined by a particular regulation requiring competency standard.	NC 7.1 and Schedule A	1999 reg 16
Coal	Use existing definition from 1999 regulations but removing references to peat or oil shale, while retaining catch-all of substances extracted with coal	Crown Minerals Act s2 (as amended)	1999
Explosion risk zone (and NERZ, ERZ0, ERZ1)	Replaces "restricted zone", "gassy mines", "coal mines" etc. from 1999 regulations with classifications consistent with Australian jurisdictions, but using .25% and 1.25% methane concentrations as triggers Refer to Electrical Engineering Control Plan 4B6	NC 2.7, 2.8, 2.9, 2.21	1999 reg 2, "gassy mine" and "restricted zone"
Explosives	Link to Hazardous Substances and New Organisms Act 1996 definition	--	--
Fresh air	Retain 199 definition of "fresh air as the standard for the supply of uncontaminated air	1999 reg 3	
Health and safety management system	New term, needed as an umbrella term and to include different components To be intrinsic to part 2 description of requirements	NC 2.34 and C9.2.5-9	-
High wall mining	New term. Mining equipment that uses remote controlled equipment to drive an underground excavation from the surface into a coal seam.	NC 2.11	-
Holder/mine holder	New term. Provides linkage to CMA and HSE (Petroleum) Regs	Crown Minerals Act s2 (as amended)	-

Term defined	*Summary of content*	*Source of regulation* *NC = Australian mining states (NMSF) requirements*	*Existing regulation replaced/revised*
Hot work	Means welding, soldering, heating, cutting, grinding or vulcanising in which the surface temperature of the work or a tool for the work is likely to exceed 150°C	NC 2.13	-
Hydro mining	New term required to describe activity	-	-
Manager	Uses existing definition, aligned with requirement for site senior executive and revised competency requirements	-	1996 reg 7
Metalliferous mine	Need for definition to be determined. Not defined in Australia *(cf. iron sands and alluvial gold mining)*	-	1999 reg 2
Mine	Align with Australia	NC 2.17	1999 reg 4
Mine worker	Align with HSE (Petroleum) Regulations definition of "petroleum worker", i.e: (a) means any natural person employed or engaged to work in a mining operation; and (b) includes any contractor or subcontractor engaged to carry out any work relating to the operation, and the employees of any such contractor or subcontractor.	HSE (Petroleum Exploration and Extraction) Regulations 1999	
Mineral	Align with Crown Minerals Act (as amended) and Australia where appropriate	CMA s2	1999 reg 2
Mines Rescue Trust (or equivalent emergency response agency)	New term require for emergency response agency Authority may be established by amendments to HSE Act or separate statute	Definitions in MRT Act or replacement	-
Mining operation	Includes all activities associated with the extraction of minerals. Includes the exploration, mining, and processing of minerals associated with a mine.	NC 2.18, C 9.1.2,	1999 reg 2 "operations"

Term defined	*Summary of content*	*Source of regulation* *NC = Australian mining states (NMSF) requirements*	*Existing regulation replaced/revised*
	Includes: • tunnels of a specified type only (refer to Vol 1) • quarries of a specified type only (refer to Vol 1) • tourist mines.		
Notifiable events (under s 25 (2)(b))	Align notifiable events with Australian non-core requirements The list of notifiable events in the 1999 regulations is comparable with Australian NMSF mining states, with some additions required	NC 34	1999 r10
Notifiable high risk activities (under s 23(1)(c))	Align notifiable activities with Australian non-core requirements There are currently no notifications other than commencement etc. of operations or prescribed "accidents"	NC 37 including schedule Schedule to consultation document to include an alignment list	1999 r8 (commencement only)
Opencast mine	Not required Currently only 1996 regs extend to all mines. 1996 and 1999 regulations use different definitions New definition of "mining operation" will extend regulations to opencast mine Definition of "quarry" will distinguish from opencast mine	NC 1	1996 r2, r3 1999 r2, r4
Operator/ Mine operator	Person conducting mining operations Term will replace current deemed "employer". Consistent with HSE (Petroleum Exploration and Extraction) Regulations, Crown Minerals Act and Australian core and non-core requirements Consistent with "mining operation"	Crown Minerals Act s2 (as amended)	1999 reg 6 (1)

Term defined	*Summary of content*	*Source of regulation* *NC = Australian mining states (NMSF) requirements*	*Existing regulation replaced/revised*
Petroleum	Use consistent definition against HSE (Petroleum)	CMA s2 and Petroleum Regulations	1996 reg 2 (amended)
Principal control plan	New requirement from Australian NC Part 4	NC 2.25	-
Principal hazard	Definition to include prescribed hazards, and extend to other hazards as identified in the workplace	C 9.1.4 ((1) only)	-
Principal hazard management plan	New requirement from Australian NC part 4 Definition may be contained in the interpretations regulation, or in the regulation requiring the plans to be maintained	NC 2.26	-
Quarry	Based on the regulation 4 from the 1996 regulations modified to refer to mining operation for the extraction of any mineral other than coal or metal Only quarries meeting two or more criteria will be included (refer to Vol 1 discussion)	--	1996 reg 4
Site senior executive	The most senior natural person employed or otherwise engaged on and ongoing basis on or near the mine appointed by the mine operator as the site senior executive.	NC 2.31	-
Tourist mine	Non-operational mines (exempt from most requirements other than notification and plans etc.)	NMSF core regulations	-
Tunnel	Definition is required to maintain coverage of tunnels (additional to Australian NMSF) Definition in 1996 regulation 5 will be modified to include only larger tunnels or where two or more workers are underground. Refer to Vol 1 discussion of coverage		1996 reg 5

Term defined	*Summary of content*	*Source of regulation* *NC = Australian mining states (NMSF) requirements*	*Existing regulation replaced/revised*
Underground mine	Not defined in Australian NMSF. Definition may be required to distinguish mining operation from tunnel	1996 reg 2	-

Definitions/ schedule of notifiable high-risk activities and associated time periods

Applies to	*High-risk activity*	*Length of time between notification and when activity can be undertaken*
All mines	Highwall mining (mining by entry into a previously formed high wall and during which no people are underground)	1 month
	Entering a highwall mining excavation	48 hours
All mines	Shot firing underground, where shotfiring has not been undertaken within a year prior to the intended time of shot firing	1 day
All mines	Commissioning or use of mine shaft and winding operations plant	3 months
Underground mines	Working within inrush control zones	1 month
Underground mines	The introduction for the first time of a vehicle with a non-flameproof (fire protected) diesel engine to an underground part of a coal operation that is not an ERZ	3 months
Underground mines	Shaft or drift sinking, raise boring or development of a new underground mine entry	3 months
Underground mines	The use of voltages in excess of 1200V in ERZ 1 for electrical plant other than electrical plant and cables associated with long-wall mining	12 months
Underground metalliferous mines	Newly devised method of mining a rise involving drill and blast and entry to the rise	1 month
Coal mines	The establishment or discontinuance of emplacement areas	3 months
Coal mines	Secondary extraction in a coal mine: ▪ pillar or pillar dimension reduction ▪ longwall ▪ miniwall ▪ shortwall	4 months
Underground coal mines	Injection or application of polymeric material for ventilation or strata	24 hours

Underground coal mines	Hot work in an explosion risk zone underground (an explosion risk zone is any area where the concentration of methane is greater than 0.25%)	1 month Initial submission of hot work management plan 24 hours Each hot work occasion thereafter
Underground coal mines	Driving an underground roadway with a width greater than 5.5 metres	7 days
Underground coal mines	Widening an existing underground roadway	7 days
Underground coal mines	Installation of a booster fan underground	3 months
Underground coal mines	The use of voltages in excess of 4000V in a ERZ 1 for electrical plant and cables associated with long-wall mining	12 months
Underground coal mines	Barrier mining	3 months
Underground coal mines	• Multi-seam mining • Formations of small pillars • Shallow depth of cover • Mining under massive roof conditions • Mining under significant bodies of water	4 months
Underground coal mines	Working within outburst control zones	3 months

Definition/schedule of notifiable incidents ("accidents" defined by the regulations in terms of section 25(2)(b) of the HSE Act) – in addition to any occurrence of "serious harm" notifiable under section 25(3) of the HSE Act.

- asphyxia;
- the loss of consciousness of the person;
- imminent risk of explosion or fire;
- entrapment of a person;
- the unplanned immersion of a person in liquid;
- damage to any plant, building or structure such as to impede safe operations;
- damage to, or failure of any part of a powered winding system or a shaft or shaft equipment;
- the unintended activation, movement, or failure to stop of vehicles or machinery;
- a collision involving a vehicle or mobile plant;
- a failure of ground, or of slope stability control measures;
- an air blast;
- a coal or rock outburst
- an escape of fluid under pressure that endangers a person
- an abnormal inrush of fluid or material
- overturning of vehicle, machinery or plant and loss of control of vehicles, plant or machinery
- where a vehicle, machinery or other plant makes contact with an energised high voltage source;
- a fire in the underground parts of a mine (fire is the presence of flames, not just heat);
- an uncontrolled outburst of gas;
- ejection of fly rock so that it falls outside an exclusion zone (an area from which people are excluded during blasting) or near people;
- an unplanned event causing the withdrawal of a person from the mine or part of the mine;
- an unplanned event that causes only one escapeway from the mine to be available for use;
- a major structural failure of equipment;
- a fire on a vehicle or plant;
- electric shock greater than 50 Volts ZC or 120 ripple free Volts DC;
- the first indication that the underground parts of a coal operation are subject to windblast, outbursts or spontaneous combustion;
- initial self-heating of coal or other material, or any heating of coal in any underground parts of a coal mine;
- an unplanned fall of ground, roof or sides that impedes passage, extends beyond the bolted zone or disrupts production or ventilation or failure of ground support where persons could potentially be present;
- the burial of machinery such that it cannot be recovered under its own tractive effort;
- a creep or progressive pillar collapse;
- a sudden pillar collapse;
- an event that occurs in an hazardous zone in the underground parts of a coal mine and from which an electric arch is observed or that leaves visible evidence on an electric cable of arching having occurred;
- the in-service failure of the explosion protection characteristics of explosion protected plant;

- an unplanned ignition, misfire or explosion of a blasting agent or explosive;
- unintended activation or movement of vehicles or machinery that does not present an immediate threat to life or permanent injury; and
- a ventilation failure causing a dangerous accumulation of methane or other gas.

Appendix 5: timetable for the development of approved codes of practice

The following table sets out the approved codes of practice (ACOPS) that the Ministry is preparing, with industry and worker input, over the next two and a half years. In some areas, ACOPs will be required for some, but not all, forms of mining.

Priority	Code	Proposed Coverage				Timing
		U/ground coal	U/ground metalliferous	Tunnels	Opencast / quarries	
1.	A guide to preparing a health and safety management system for small mines, quarries, and tunnels	✓	✓	✓	✓	2013
2.	Hazard management system	✓	✓	✓	✓	2013
3.	Ventilation	✓	✓	✓	×	2013
4.	Electrical	✓	✓	✓	×	2013
5.	Fire and explosion	✓	×	×	×	2013
6.	Strata management	✓	✓	✓	×	2014
7.	Emergency response	✓	✓	✓	✓	2014
8.	Spontaneous combustion	✓	×	×	×	2014
9.	Inundation	✓	✓	✓	×	2014
10.	Air quality and diesel particulate matter (DPM)	✓	✓	✓	×	2014
11.	Occupational Health	✓	✓	✓	✓	2014
12.	Roadways	✓	✓	✓	✓	2015
13.	Gas outbursts	✓	×	×	×	2015
14.	Mechanical engineering	✓	✓	✓	×	2015
15.	Explosives	✓	✓	✓	✓	2015
16.	Opencast mining and quarries	x	x	x	✓	2015

The ACOPs that will be developed in 2013 are either those that are already close to completion (code 1 and 2 in the above table) or are the areas specifically identified in the Royal Commission's recommendation 2 as requiring urgent attention (codes 3-5 in the above table).

The Ministry has considered options to accelerate the development of the ACOPs; however industry and worker representatives advised that they did not have the capacity to develop the ACOPs any faster than outlined in the table above.

While the ACOPs are being developed over the next two and a half years, mine operators will be able to work with the regulator on a case-by-case basis to establish how these hazards can be best controlled in their operations.

Appendix 6: list of matters to be included in a mine record

1. Mine operator
2. Site senior executive responsible for maintenance of records and notifications by the operator
3. Notifications of commencement, recommencement, installation or cessation
4. Notifications of draft principal hazard management plans before mining operations commence
5. Plan of mines, quarry or tunnel
6. Plans of abandoned mines and tunnels
7. Record of competency of personnel
8. Records of employees underground
9. Register of accidents and incidents
10. Results of examinations of mines and tunnels
11. Notifications of accidents and incidents
12. Notifications of high-risk activities, and
13. Record of statutory notices received and responses by mine operator

CHAPTER THREE

03 Training and qualifications

Chapter three: training and qualifications

The technical appendices in support of the proposals for training and qualifications are set out in this chapter. The summary of the proposals for training and qualifications, set out in volume one of the discussion document, is repeated below:

What we propose:

Competency requirements for all safety critical roles are set out in the mining regulations	The required competencies for the safety critical roles at mining operations will be clearly specified in the regulations, rather than the current approach which leaves it to an employer to appoint a "competent person". Competencies (including unit standards) will be aligned with Australia. Appointees to the new safety critical roles will be required to meet the new competency requirements upon appointment. For other roles there will be a transition period of three years to enable compliance with new competency requirements.
There are minimum training requirements for mine workers	Workers will need to be directly supervised until they meet minimum training requirements. The minimum requirement will be a new New Zealand Certificate in Mining (Induction).
An independent board sets the standards and examines mine workers' competency	The workplace health and safety regulator will establish a New Zealand Mining Board of Examiners to: • Provide advice on competency requirements • Assess applicants for certificates of competency • Grant, renew and revoke certificates as appropriate, and • Set requirements for continued professional development. The board will work closely with its Australian counterparts, and will be tasked with progressing a joint New Zealand/Australia accreditation framework.
Mine managers to have formal training in risk management and health and safety	Risk management will be added to the competencies for mine managers, the new role of site senior executive and other safety critical roles. There will be guidance for mining sector managers on how to create a workplace culture that delivers good health and safety outcomes.

These proposals address the Royal Commission's concerns about mine managers being appropriately trained in health and safety, strengthening the competencies for safety critical roles and aligning these with Australia, and the regulator having a greater role in the supervision and granting of mining qualifications (recommendations 8, 9, 10 and 12). Chapter two considers the role and functions of the persons appointed to the new safety critical roles.

Raising standards for health and safety consultants is not dealt with here. The Government has referred this matter to the Independent Taskforce on Workplace Health and Safety.

The appendices set out in this chapter are:

Appendix 7: table of proposed competencies

- Appendix 7 identifies the proposed qualifications and competencies for each of the statutory roles in mines in the future. The tables in this Appendix outline:
    - the current New Zealand qualifications/competency requirements are,
    - the current Australian qualification/competency requirements are, and
    - the proposed changes to New Zealand qualifications/competency requirements.

Appendix 7: table of proposed competencies

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Site senior executive	*Current* No position in current New Zealand regulations *Proposed* Establish a new certificate of competence for a site senior executive	Current Nil	In Queensland: A statutory legislation exam conducted by the Board of Examiners and the competency RIIRIS601A , Establish and maintain the risk management system and RIIOHS601A, Establish and maintain the OHS management system. If the SSE gives directions to the underground mine manager or underground coal mine manager then the SSE must hold the appropriate mine manager certificate of competency.	Add proficiency in: Risk management, equivalent to RRIIRIS601A; plus Occupational Health and Safety, equivalent to RIIOHS601A; plus Emergency management; plus NZ mining and workplace legislation. It is proposed that the regulations will require the SSE to also be the holder of a mine manager certificate of competence applicable to the particular type of mining operation.
Underground coal mine manager	*Current* Certificate of competence as a first-class coal mine manager *Proposed* unchanged	Prescribed unit standards; and Certificate of competence as a gas tester; and either: Mineral Technology degree plus 3 years practical experience; or First class mine manager certificate (metalliferous) plus 1 year practical experience in coal mines; or 5 years practical experience in a coal mines.	In Queensland: First class mine manager's certificate of competency granted under the Coal Mining Act 1925 or under the Coal Mining Safety and Health Act 1999; plus RIIRIS601A Establish and maintain the risk management system	Queensland Board of Examiners currently grants a mine manager certificate of competency to the holder of a New Zealand first class coal certificate of competency provided the applicant completes RIIRIS601A and completes a written exam on mining legislation We propose to add proficiency in: Risk assessment proficiency, equivalent to RIIRIS601A; plus Occupational health and safety management systems, equivalent to RIIOHS601A; plus Emergency management

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Underground coal mine manager of a small coal mine (not more than 15 men underground at any one time) *Proposed* Redefine a small coal mine to be not more than 5 men underground at any one time, or Eliminate the provision that defines a small mine so that the competencies required by the mine manager are the same regardless of the size of the mine.	*Current* Certificate of competence as a coal mine underviewer; or Certificate of competence as a first-class coal mine manager *Proposed* unchanged	*Current* Prescribed unit standards; and Certificate of competence as a gas tester; and either: Mineral Technology degree plus 3 years practical experience; or First class mine manager certificate (metalliferous) plus 1 year practical experience in coal mines; or 5 years' practical experience in a coal mine.	In Queensland: First class mine manager's certificate of competency granted under the Coal Mining Act 1925 or under the Coal mining safety and health act 1999; plus RIIRIS601A Establish and maintain the risk management system	We propose to add proficiency in: Risk assessment equivalent to RIIRIS402A; plus Conduct health and safety investigations, equivalent to RIIOHS301A; plus Emergency management We have considered whether the certificate of competence as a first class coal mine manager should be mandatory for all underground mines, regardless of size and number of people employed, but have not proposed this change.
Underviewer *Proposed* Consider re-titling as undermanager to bring into alignment with Australia	*Current* A certificate of competence as a coal mine underviewer	*Current* Specified unit standards; and First aid certificate: and Gas testing certificate; and either A first class certificate of competency (metalliferous) or a certificate of competency as A-grade tunnel manager and one year's experience in a coal mine; or 5 years' experience in coal mines	In Queensland: There is a second class mine manager's certificate of competency but there is no current requirement to appoint an undermanager(s). There is discussion happening in Queensland about whether re-establishing undermanager positions is appropriate and desirable. The National Mine safety Framework includes the requirement for the mine operator to appoint undermanager(s).	We propose to add proficiency in: Risk assessment equivalent to RIIRIS402A; and Conduct health and safety investigations, equivalent to RIIOHS301A

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Ventilation officer	*Current* No position in current New Zealand regulations	*Current* No current certificate of competency in the Mining Administration regulations. The employer is required to appoint a competent person to carry out some of the functions of this position.	In Queensland: A ventilation officer is required to be appointed in all underground mines. The underground mine manager may assume the duties and responsibilities of the ventilation officer if he holds the required competencies. The chief inspector may approve a ventilation officer being appointed to the position at more than one mine if he is satisfied that the person can effectively carry out the duties at the mines. The competencies required are risk management and ventilation training.	We propose to add proficiency in: Risk assessment proficiency equivalent to RIIRIS402A; plus Occupational health and safety management systems, equivalent to RIIOHS301A; plus Equivalent of Australian Diploma in mine ventilation RIIUND603A
Coal mine deputy	*Current* Certificate of competence as a coal mine deputy *Proposed* No change	*Current* Specified unit standards; and First aid certificate; and Gas testing certificate; and First class mine manager's certificate or tunnel manager's certificate and 1 years' experience in a coal mine; or 5 years' experience in coal mines	In Queensland: The underground mine manager must appoint ERZ controllers to have control of the mining activities and to carry out inspections. The ERZ controllers are to hold: Deputy's certificate of competency; or first or second class coal mine manager certificate of competency RIIRI402A Carry out risk management process	We propose that the proficiencies of the coal mine deputy are aligned with those required of the ERZ controller We propose to add proficiency in: Risk Management equivalent to RIIRIS402A; and Occupational health and safety equivalent to RIIOHS301A

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Mine surveyor	*Current* Certificate of competence as a mine surveyor *Proposed* unchanged	*Current* Be trained under a mine surveyor who is the holder of a certificate of competence as a mine surveyor or under a registered surveyor; and Have 3 years' practical experience in mine surveying in prescribed activities; and Be trained in units standards: 17741 Demonstrate specialist underground survey techniques; and 17742 Survey and draw an underground extractive site plan.	In Queensland: A mine surveyor must be a registered surveyor with mining (A) endorsement and hold either: A mine surveyor certificate; or A degree or diploma in mine surveying and RIISDM501A conduct mine surveying operations.	We propose to require the applicant for a certificate of competence as a mine surveyor to hold a New Zealand diploma in surveying or New Zealand degree in surveying; and to have proficiency in: Risk Management equivalent to RIIRIS402A
Electrical engineering manager	*Current* No position in current New Zealand regulation *Proposed* Certificate of competency as a mine electrical engineer	*Current* Health and Safety in Employment (Mining-Underground) Regulations require employer to ensure every electrical work activity is carried out by a competent person	In Queensland: The underground mine manager must appoint an underground electrical engineering manager to control and manage the electrical engineering activities of a mine. The required competencies are: Mine electrician certificate or equivalent electrical qualifications; and RIIRIS402A carry out the risk management process	NZ diploma of engineering (electrical strand); and Risk assessment proficiency equivalent to RII RIS601A; plus Occupational health and safety management systems, equivalent to RIIOHS601A

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Mechanical engineering manager	*Current* No position in current New Zealand regulations *Proposed* Certificate of competency as a mine mechanical engineer	*Current* Health and Safety in Employment (Mining-Underground) Regulations require the employer to ensure every electrical work activity is carried out by a competent person	In Queensland: The underground mine manager must appoint an underground mechanical engineering manager to control and manage the mechanical engineering activities of a mine. The required competency is: RIIRIS402A carry out the risk management process	New Zealand diploma of engineering (mechanical strand); and Risk assessment proficiency equivalent to RII RIS601A; plus Occupational health and safety management systems, equivalent to RIIOHS601A
Opencast coal mine manager	Certificate of competence as an A-grade opencast coal manager *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in an opencast mine; or 1 year work experience in an opencast mine and 2 years' work experience in an underground mine or tunnel; or Holds certificate of competence as a first class mine manager, and 1 year work experience in an opencast coal mine	No equivalent position in current Queensland legislation. The non-core drafting instructions include requirement for a Surface Mine Manager to be appointed who holds a BoE practising certificate. The competencies do not appear to be yet defined. The current certificate of competency is that of the open-cut examiner	We propose to add proficiency in: Risk management equivalent to RIIRIS402A; and Occupational Health and Safety, equivalent to RIIOHS601A; plus Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives. We should ensure alignment with the new Australian Surface Mine Manager when that position and competencies are determined.

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Mine manager of small opencast coal mine (in which not more than 4 people work at any one time)	Certificate of competence as a B-grade opencast coal mine manager *Proposed* Certificate of competency as an A-grade opencast coal mine manager	*Current* Prescribed unit standards; and either: 2 years' work experience in an opencast mine; or 1 year work experience in an opencast mine and 2 years' work experience in an underground mine or tunnel; or Holds certificate of competence as a first class mine manager, and 1 year work experience in an opencast coal mine	No equivalent position in current legislation. The non-core drafting instructions include requirement for a Surface Mine Manager to be appointed who holds a BoE practising certificate. The competencies do not appear to be yet defined. The current certificate of competency is that of the open-cut examiner	We propose to add additional prescribed units standards for the A-grade certificate; and add proficiency in: Risk management equivalent to RIIRIS402A; and Emergency management: and Occupational Health and Safety, equivalent to RIIOHS601A Include as mandatory the unit standards in Group 13 that pertain to the use of explosives
Manager of a quarry	Certificate of competence as an A-grade Quarry Manager *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in an opencast mine or quarry; or 1 year work experience in an opencast mine or quarry and 2 years' work experience in an underground mine or tunnel; or Holds certificate of competence as a first class mine manager, and 1 year work experience in an opencast mine or quarry	Queensland requires an SSE to be appointed but there is no requirement for a manager. There is provision for a supervisor to be appointed who must hold: RIIRIS301A apply risk management processes; RIIOHS301A conduct safety and health investigations; RIICOM301A communicate information	We propose to add: Risk management equivalent to RIIRIS402A; and Occupational Health and Safety, equivalent to RIIOHS601A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Manager of a small quarry (not more than 4 people employed)	Certificate of competence as a B-grade Quarry Manager; or Certificate of competence to manage a specified quarry *Proposed* Certificate of competence as a B-grade quarry manager	*Current* Prescribed unit standards; and either: 2 years' work experience in an opencast mine or quarry; or 1 year work experience in an opencast mine or quarry and 2 years' work experience in an underground mine, coal mine or tunnel; or Holds certificate of competence as a first class mine manager, and 1 year work experience in an opencast mine or quarry	Queensland requires an SSE to be appointed but there is no requirement for a manager. There is provision for a supervisor to be appointed who must hold: RIIRIS301A apply risk management processes; RIIOHS301A conduct safety and health investigations; RiiCOM301A communicate information	We propose to add proficiency in: Risk management equivalent to RIIRIS402A; and Occupational Health and Safety, equivalent to RIIOHS301A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives
Mine manager (metalliferous)	Certificate of competence as a first-class mine manager; or Certificate of competence as a first class coal mine manager *Proposed* unchanged	*Current* Prescribed unit standards; and either: Mineral Technology degree plus 3 years practical experience in underground mines or tunnels; or Certificate of competence as a first class coal mine manager plus I year practical experience in an underground mine or tunnel; or 3 years practical experience at the face of a mine or tunnel.	In Queensland: First class mine manager's certificate of competency; and RIIRI601A Establish and maintain the risk management system	We propose to add proficiency in: Risk assessment proficiency equivalent to RIIRIS601A; plus Occupational health and safety management systems, equivalent to RIIOHS601A; and Emergency management

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Manager of metalliferous mine with not more than 10 people below ground at any one time	Certificate of competence as an A-grade tunnel manager; *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in the workings of a tunnel; or 1 years' experience in a tunnel and 2 years' experience in an underground mine or underground coal mine; or First class mine manager certificate (metalliferous) plus 1 year's work experience in a tunnel	In Queensland: First class mine manager's certificate of competency; and RIIRI601A Establish and maintain the risk management system	We propose to add: Risk management equivalent to RIIRIS402A; and Occupational Health and Safety, equivalent to RIIOHS601A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives We did consider whether the certificate of competence as a first class mine manager should be mandatory for all underground mines, regardless of size and number of people employed but have not proposed this.
Manager of a metalliferous mine in which not more than 3 people are below ground at any one time	Certificate of competence as a B-grade tunnel manager; or *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in the workings of a tunnel; or 1 year experience in a tunnel and 2 years' experience in an underground mine or underground coal mine; or Certificate of competence as a first class mine manager (metalliferous) plus 1 year work experience in a tunnel	In Queensland: First class mine manager's certificate of competency; and RIIRI601A Establish and maintain the risk management system	We propose to add: Risk management equivalent to RIIRIS402A; and Occupational health and safety equivalent to RIIOHS301A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives We did consider whether the certificate of competence as a first class mine manager should be mandatory for all underground mines, regardless of size and number of people employed but have not proposed this.

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Tunnel manager	Certificate of competence A-grade tunnel manager *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in the workings of a tunnel; or 1 year experience in a tunnel and 2 years' experience in an underground mine or underground coal mine; or First class mine manager certificate (metalliferous) plus I year work experience in a tunnel	Tunnels are part of the construction industry and mining certificates of competency do not apply	We propose to add: Risk management equivalent to RIIRIS601A; and Occupational Health and Safety, equivalent to RIIOHS601A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives
Manager of small tunnel (where not more than 2 people work at the face at any one time) *Proposed* Restrict the tunnels to pipe-jacking operations where men are not exposed to un-encased ground and where the diameter of the tunnel is less than 1.5 metres and where not more than 2 people are underground at any one time.	Certificate of competence as a B-grade tunnel manager *Proposed* unchanged	*Current* Prescribed unit standards; and either: 2 years' work experience in the workings of a tunnel; or 1 year experience in a tunnel and 2 years' experience in an underground mine or underground coal mine; or First class mine manager certificate (metalliferous) plus I year work experience in a tunnel;	Tunnels are part of the construction industry and mining certificates of competency do not apply	We propose to add: Risk management equivalent to RIIRIS402A; and Occupational Health and Safety, equivalent to RIIOHS402A; and Emergency management Include as mandatory the unit standards in Group 13 that pertain to the use of explosives

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Mine worker	*Current* None specified in current regulations Employers may choose to train their employees using a comprehensive range of unit standards offered by MITO Proposed New Zealand certificate in mining (Induction)	*Current* MITO has two qualifications available: Level 2 New Zealand Certificate in Extractive Industries (Introductory Skills); and Level 3 New Zealand Certificate in Extractive Industries (Operations).	In Queensland: No prescription	Either New Zealand certificate in Mining (Operations); or New Zealand Certificate in Mining (Introduction); or New Zealand Certificate (Induction). This is a new certificate and will include proficiency in: • Fire fighting • JSA/risk assessment • Hazardous substances • Machine isolation • Pre-start checks • PPE • H&S management system • HSE Act, mining regulations • Knowledge of site SoPs For underground induction add: • Knowledge and ability to work in an underground mine (7146) For opencast and quarry induction add: • Knowledge and ability to work in an opencast mine or quarry
Surface supervisor	No current position in New Zealand regulations		Prescribed in the Australian National Mine Safety Framework. Queensland regulations require opencast coal mines to appoint opencut examiners.	Introduce a new certificate of competence as an underground supervisor to be aligned with the proficiencies required of an underviewer in New Zealand underground coal mines.

Position/role	What do role holders need to bring to the job?		How do we ensure trans-Tasman equivalence in qualifications and competency?	
	Qualifications	**Current competencies**	**What are the Australian requirements?**	**Proposed changes to current competencies**
Underground supervisor	No current position in New Zealand regulations	No current certificate of competence in the Mining Administration Regulations	Prescribed in the Australian National Mine Safety Framework.	Introduce a new certificate of competence as an underground supervisor to be aligned with the proficiencies required of an underviewer in New Zealand underground coal mines.

CHAPTER FIVE

05 Emergency management

Chapter five: emergency management

The technical appendices in support of the proposals for emergency management are set out in this chapter. The summary of the proposals for emergency management, set out in Volume One of the Discussion Document, is repeated below:

What we propose

Emergency management procedures and strengthened minimum standards are set out in the regulations	This will include procedures for self rescue by workers and rescue by emergency responders. There will also be new and strengthened minimum standards (also called outcome requirements) for emergency preparedness. The biggest change will be to the emergency equipment and facilities that are required (see below).
New requirements for emergency equipment and facilities in underground mines	Required equipment and facilities for self rescue in underground mines will include: early warning systems, breathing devices, changeover stations, fresh air bases and refuges, second means of egress, navigational aids, vehicular exit, and communication and personnel location systems. What is required will depend on the type of mine. Underground coal mines must have equipment or facilities to: • Monitor atmospheric conditions during and after an emergency • Seal and inertise a mine.
All mining operations must have an emergency management plan	Emergency management plans will: • Set out the processes for self rescue by workers and rescue by emergency responders • Specify the emergency facilities and equipment at a mining operation to support rescue • Be audited, and tested regularly through emergency exercises • Be developed in consultation with workers and the Mines Rescue Service or relevant emergency services.
The Mines Rescue Service has broader coverage and is better funded	The Mines Rescue Trust Act 1992 will be amended to better reflect the role of the Mines Rescue Service (MRS) in training mines rescue brigades, responding to emergencies and helping operators with emergency planning. The MRS coverage will extend beyond coal mines to underground metalliferous mines and large or long tunnels. The levies that fund the MRS will change. All mining operations within scope will need to contribute. The liability of the MRS for any damage caused by actions done in good faith as part of its role during rescue operations will be limited.

These proposals address the Royal Commission's concerns about emergency preparedness, equipment and facilities (recommendations 13, 15, and 16).

The Royal Commission's concerns about the Co-ordinated Incident Management System (CIMS) (recommendation 14) are being addressed through the development of an interagency process for large-scale mining emergencies, which will be tested by December 2013.

The appendix set out in this chapter is:

Appendix 8: emergency management plans contents overview

- Appendix 8 outlines the content and coverage of the proposed emergency management plans, and identifies how the proposed plans would differ from current regulatory requirements

Appendix 8: emergency management plans contents overview

1. Purpose of emergency management plans (EMP) (also called an emergency response plan)

This sets out the duty to have an EMP and why: namely, this plan's primary purpose of setting in motion the necessary actions to respond to an emergency and ensuring readiness for such an event.

Content	Change with new regulatory framework
1.1 Duty and purpose This recognises the mine operator's duty to have an EMP and its broad purpose to: • Set in motion the necessary actions to respond immediately, effectively and safely to an emergency that threatens peoples' safety or working conditions of the mine/assets • Ensure appropriate readiness for an emergency in terms of facilities, equipment, training, rescue capability and testing.	• New requirement for mine operators to have a documented, auditable EMP – which hopefully reflects existing practice • There will be general and specific requirements both for: o content of the EMP, including some outcome standards (covering roles, processes, equipment and facilities), and for o development, communication, maintenance, testing and audit of the plan • Mines Rescue Service developing template to assist mine operators

2. Using the EMP - emergency response

This covers key components of using the EMP to respond an emergency, such as activation, roles, and trigger action response plans (TARPs).

Content	Change with new regulatory framework
2.1 Alerts Defines the method(s) of EMP activation	• New regulatory requirement for clear EMP activation process • Activation will be supported by severity scale (3 levels in ascending order), to be by Code
2.2 Key roles Defines the key roles in emergencies	• New regulatory requirement for identification of personnel at the mine with functions and responsibility within an organisational structure for emergency response • Roles at mine align with competencies and standard coordinated incident management system (CIMS) protocols, terminology and training, and to be best practice in mining (as reflected in Queensland Mining Emergency Management System, MEMS). This is apart from protocols for catastrophic underground incidents, which are being developed in interagency workshop, and alignment will be ensured with EMPs will be ensured as part of that process • New regulatory requirements for contacting emergency services, including Mines Rescue Service • New regulatory requirement for competent, trained person at surface of underground mine to respond to alarms
2.3 Standardised immediate responses Provides standard procedures for immediate response to emergencies	• New regulatory requirements for trigger action response plans (TARPs) – some will arise from specific triggers in regulation (e.g. for evacuation in response to gas levels in underground mines); others may be SOPs arising under more general regulatory requirements or by Code – the Ministry understands that TARPS and SOPs are already in common use • TARPs to be developed based on risk assessment

2.4 Incident management Defines a range of processes for managing emergencies	• New regulatory requirement for EMP to provide for the coordination and control of emergencies - as above, this will align with CIMS (and new interagency protocol being developed for catastrophic underground incidents), and will include the current practice of, for example, preparing the emergency operations centre with such things as information packs for assigned roles, and an emergency board • New and enhanced regulatory requirements for EMPs to include processes, such as notification of next of kin, isolating the area of the emergency, locating and accounting for persons in an emergency • Enhanced record-keeping requirements to support emergency response, such as the accurate current record of persons underground and their likely location, more current mine plans
2.5 Incident closure Provides for closure of incident	• No specific new regulatory requirements, but will form part of using EMP as a practice

3. Supporting the EMP – equipment, facilities & mine design, capability, testing, training

This section covers specific aspects of emergency preparedness that will be covered by the EMP.

Content	Change with new regulatory framework
3.1 Emergency equipment Specifies equipment and the need for it to be maintained	• Additional general requirements (e.g. transportation from the mine), and, for underground mines, specific requirements for equipment and its use, e.g. increased requirements for use of self-rescuers, additional breathing apparatus, navigation aids, fresh air bases, communication systems with back-up power supply • In some cases, additional requirements for the placement of equipment (fire-fighting equipment) • New regulatory requirement for equipment to be regularly tested and maintained in a fully operational condition – in practice a register of equipment, testing and maintenance is appropriate to monitor this • New requirements for certain mines to allow for inertisation equipment
3.2 Testing Specifies EMP testing	• New requirement for testing EMP at least annually. This will link to emergency severity levels in Codes • In practice, a register of testing is an appropriate way to monitor testing in the EMP • Testing for high level emergencies in underground mines that require an inter-agency response is part of the work being undertaken by the working group to develop the mining emergency protocol, and will be aligned to the testing requirements
3.3 Training Specifies training in relation to EMPs and support systems and equipment	• New requirement for all personnel to be provided with training in the EMP, including review and testing • Enhanced requirement for training of underground mine workers in donning and changeover of self-rescuers in a simulated work environment every 3 months • New requirement for persons who may need to use paths of egress to be made familiar with those paths and their marking to be such that persons can safety travel on them in conditions of poor visibility • New requirement for trained person on the surface to respond to alarms • In practice, a training register is an appropriate way to monitor training in the EMP
3.4 Facilities and mine design Specifies second egress	• Enhanced requirements for second egress from the mine from the outset

Content	Change with new regulatory framework
3.5 Rescue capability Specifies mines rescue provision	• New requirement to provide adequate resources to ensure the effectiveness and implementation of the EMP, including mine rescue arrangements • New requirement for the reasonable availability of trained rescue persons or emergency services at the mine, and, for underground mines, for a suitable number of trained persons and maintained equipment to allow rapid and continuous rescue operations in conditions of reduced visibility and irrespirable and irritant atmospheres to take place at the mine and to assist the escape or safe recovery of any worker or other person from a mine where necessary (for appropriate levels of incident, this means in conjunction with the Mines Rescue Service) • New requirement for a procedure for the prompt notification of all relevant emergency services and the Mines Rescue Service • New requirements to involve mines rescue services and other relevant emergency services in the development of EMPs, and provide them with copies of the EMP and mine plans

4. Developing, maintaining, communicating the EMP

This section covers a range of requirements administering the EMP.

Content	Change with new regulatory framework
4.1 Document owner General responsibility for EMP	• New regulatory role, site senior executive, will have responsibility for EMP
4.2 Development Sets processes for developing the EMP	• New provisions regarding worker participation will include role in developing EMPs • New requirements to involve mines rescue services and other relevant emergency services in the development of EMPs, and provide them with copies of the EMP and mine plans • New requirement to use risk assessment in developing EMP
4.3 Maintenance and review Shows how EMP is to be maintained	• New requirements for EMP to be reviewed and tested on a regular basis, at least annually, and to be maintained and amended as necessary
4.4 Presentation and communication Shows how EMP to be presented and communicated to staff and others	• New requirement for EMP to be in plain language • New requirement for EMP to be displayed in prominent and secure location on the surface of the mine and at strategic places underground • New requirement for EMP to be made accessible to all personnel with functions and responsibilities, and to mines rescue and emergency services • New requirement for all personnel to be trained in EMP
4.5 Reporting, references, definitions Additional processes	• Other matters will be included in EMPs that are not itemised here and have no specific regulatory change • Reporting emergencies to the regulator required under HSE Act and regulations • Relevant forms for new regulatory requirements, where needed, will be provided in regulations • The EMP should include key definitions as a matter of good practice

Draft Regulatory Impact Analysis

Draft Regulatory Impact Analysis

To help ensure that the regulatory process is open and transparent, Regulatory Impact Statements (RISs) are prepared and published as part of the consultation for proposals for regulatory change. A RIS provides a high-level summary of the problem being addressed, the options and their associated costs and benefits, the consultation undertaken, and the proposed arrangements for implementation and review.

The RIS in Appendix 9 has been prepared for the Ministry by the Institute of Economic Research. It is a draft that relates to the proposals being consulted on. It will be finalised once the feedback from this consultation has been analysed and final proposals for regulatory change have been developed.

Appendix 9: Draft Regulatory Impact Statement

Pike River Implementation Plan RIS

NZIER report to the Ministry of Business, Innovation, and Employment

April 2013

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

Each year NZIER devotes resources to undertake and make freely available economic research and thinking aimed at promoting a better understanding of New Zealand's important economic challenges.

NZIER was established in 1958.

Authorship

This paper was prepared at NZIER by Chris Nixon.

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Pike River Implementation Plan

1.1. Agency Disclosure Statement

This draft Regulatory Impact Statement has been prepared under the direction of the Ministry of Business, Innovation and Employment. It provides an analysis of costs and benefits of implementing the recommendations of the Royal Commission on the Pike River Coal Mine Tragedy (the Royal Commission).

While Cabinet has agreed to implement the Royal Commission's recommendations, the final details of how best practice[1] will be adapted to meet New Zealand conditions are still under discussion between industry, Ministry specialists, and other stakeholders. This is because the cost implications of how best practice should be adapted to the New Zealand mining sector, given the geotechnical challenges faced by New Zealand mines, and the specific details required to control the risks of a catastrophic accident, have not yet been fully worked through.

The Ministry has grouped the costs associated with Royal Commission recommendations into five areas:

(1) new regulations requiring processes for hazard management in mining operations (principally Royal Commission recommendation 2)

(2) increased involvement by the regulator and oversight by a sector advisory board (Royal Commission's recommendations 1, 2, 3, & 4)

(3) improvements in emergency preparedness by mines and in the provision of mines rescue services and emergency management of incidents (Royal Commission's recommendations 2, 13, 14, 15 & 16)

(4) strengthened training and competency requirements for safety critical roles in the sector (Royal Commission's recommendations 8, 9, 10, & 12)

(5) increased worker involvement in health and safety management (Royal Commission's recommendation 11)

This analysis focuses on economic, fiscal, compliance and social costs. Cultural and environmental costs are not covered.

Overall, the Royal Commission's recommendations result in a positive $11,500,000 net present value using an 8% discount rate. The main benefits from implementing the recommendations are the avoided loss of life associated with a major mine accident.

[1] The reference point here is Australian regulations, which are considered to be international best practice, although reference was made to other jurisdictions such as the United Kingdom.

We have carried out sensitivity analysis on the key cost parameters within reasonable bounds, including increasing costs, reducing/increasing discount rates, reducing the value of statistical life, and increasing the cost of structural changes. In all cases, the benefits outweigh the costs.

The cost benefit analysis (CBA) is subject to uncertainty due to the difficulty involved with predicting the likelihood and consequence of major incidents, both in the status quo and under the Royal Commission's recommendations. This means the benefit figures (largely the avoided loss of life and output) are difficult to predict with certainty, therefore we have not carried out sensitivity analysis on the benefits.

The CBA is premised on what is required to implement the Royal Commission's recommendations. This fundamentally shapes the draft Regulatory Impact Statement as we consider a very narrow range of options: the status quo and a scenario where the recommendations are implemented. We have not considered whether the Royal Commission's recommendations are economically optimal relative to other alternatives (aside from the status quo) – merely whether the costs outweigh the benefits.

The status quo (option 1) assumes one major accident every 30 years with 30 fatalities. This mirrors New Zealand's historical pattern of mine disasters followed by strong health and safety regulation that diminishes over time. This option has been ruled out by Cabinet.

The Royal Commission's recommendations (option 2) will introduce a higher standard of process-orientated regulation and sustain this over the longer term, to reduce the likelihood of a major mine accident over the working life of a mine (at least 40 years) – although it will not totally eliminate the risks. It differs from the status quo primarily in the way that standards are maintained over time, rather than being allowed to drift lower. Other points to note are:

- in both options, for the first 5 years the costs will be the same as operators and regulators improve safety levels
- all one-off costs are likely to occur in the first 5 years. Therefore, they do not affect the cost benefit analysis since the costs will occur in both options.

A number of the recommendations will impose extra costs on firms in the sector and other stakeholders such as the miners' union. These costs are less than the potential costs to society of a major mine accident. Most mining companies support the recommendations. They accept that the costs are a necessary part of doing business in a country that is committed to applying the best safety practices to mining operations.

The Royal Commission's recommendations recognise a trade-off between worker safety and innovation is required. A consistently higher standard of safety will impact on the sector's ability to innovate, since operational flexibility will be constrained. The proposals will not impair private property rights, or override fundamental common law principles.

Michael Papesch
Director, Pike River Implementation Team
Labour and Commercial Environment Group
Ministry of Business, Innovation & Employment

1.2. Problem definition and status quo

1.2.1. Status quo

New Zealanders expect work place safety conditions to be of a standard that controls the risk of accidents. In industries such as mining, maintaining safety standards are especially important since the environment and operating conditions present a complex range of hazards. These range from occupational safety hazards that impact on individual workers through to catastrophic accidents that result in multiple injuries and fatalities, as well as economic, financial, social, and environmental damage.

Mining exploration and production companies operating in New Zealand are subject to and must comply with the duties set out in the Crown Minerals Act 1991, the Health and Safety in Employment (Mining-Underground) Regulations 1999, the Health and Safety (Mining Administration) Regulations 1996 and the Mines Rescue Trust Act 1992. The mining regulations are made under the Health and Safety in Employment Act 1992 (the Act) and provide for the management of hazards associated with mining operations. They are administered and enforced by the Ministry of Business, Innovation and Employment (the Ministry).

1.2.2. Problem definition

The Pike River mining tragedy focused attention on safety in high-hazard industries. The 29 lives lost and the substantial economic and financial damage resulted in the Royal Commission on the Pike River Coal Mine Tragedy. The Royal Commission identified a number of shortcomings in the health and safety regulations and on the 5th November 2012, Cabinet agreed to implement the Royal Commission's recommendations.

In short, the problem definition is that the Pike River tragedy showed that the regulation and safety practices in the New Zealand mining sector were not consistent with international best practice.[2]

The Royal Commission documented in more detail the problems facing the industry in general. Firms, regulators and other stakeholders had the following deficiencies that created potential hazards:

- deficiencies and inconsistencies with hazard management processes in mining, tunnelling and quarry operations including a lack of clear standards and limited guidance available to operators. Specifically, this includes:

    hazard management regulations were inconsistent with international best practice for the mining sector. No clear expectations and processes for the management of principal hazards were in place and this led to significant gaps in practice and accountabilities for mine operators e.g. management of methane and carbon monoxide, the hazards of electricity in combustible atmospheres and strata control

[2] Royal Commission Report on the Pike River Coal Mine Tragedy. The Royal Commission considered that Australian health and safety regulations are international best practice.

critical systems failures occurred within the mine and its infrastructure e.g. ventilation, engineering and electrical. These failings were attributed to deficiencies in the regulations

inadequate guidance was given to mine operators on how to manage hazards and meet their obligations under the Act and regulations.

- inadequate oversight of individual mining operations by the inspectorate, and of the sector as a whole by the regulator. Of particular importance was:

  the health and safety inspectorate were unable to inspect mining operations to ensure minimum standards were consistently being met. Being unable to audit the systems and processes in place at the mine contributed to the failure

  there was ambiguity in the phrasing of the minimum standards contained in the regulations that made enforcement difficult and created gaps in the coverage.

- deficiencies in emergency preparedness by individual mines and the provision of mines' rescue services and emergency responses to incidents. Specifically these included

  a lack of planning and provision for emergency preparedness that was exacerbated by limited mandatory requirements to plan, prepare and equip and test for an emergency

  there was uncertainty and confusion about the roles of different emergency response agencies and who should lead the emergency response

  there was uncertainty regarding the role of the Mines Rescue Service (MRS) in emergency response and the legislation did not support their role or provide adequate levy funding.

- deficiencies and inconsistencies were found in the training and competency for safety critical roles in the sector. This included:

  a lack of expertise and the ability to critically evaluate certain key health and safety functions available to the mine operator including ventilation, electrical systems and line management responsibilities

  inconsistencies in the standard of competency of safety critical roles that are prescribed for mine health and safety management, between mines, and between New Zealand and Australia

  regulations that did not adequately prescribe duties, or set out accountabilities for key health and safety functions performed by mine management. There was confusion between the development and maintenance of on-going workplace health and safety management systems and day-to-day line management responsibilities.

- inadequate worker involvement in health and safety management processes and the absence of an independent check for workers were identified. Of particular concern were:

  a low level of uptake of the employee participation provisions contained in the principal Act. This was attributed to the Act not containing sufficient prescription of processes and not providing

powers commensurate to the role of employee health and safety representative in a workplace as hazardous as an underground mine

employee participation provisions were seen as deficient and not providing for the needs of contract workers or providing an independent authority to which all workers could make their health and safety concerns known.

Since Cabinet has already agreed to implement the Royal Commission's recommendations we have not considered whether the package is economically optimal. That is, we do not consider a wide range of alternatives and determine which has the highest benefit cost ratio. We take the Royal Commission's recommendations as given, and evaluate their costs and benefits, relative to the status quo.

The new regulations are designed to controls the risks of individual and multiple injuries and deaths over the long term. To do this requires an integrated package of health and safety measures that are subject to regular robust monitoring and verification and five yearly reviews.

The safety measures are required as a package[3] because any lessening of one part of the package is likely to negate its effectiveness. Without these measures, it is very likely in the long term risks will not be controlled to a standard expected by the New Zealanders i.e. the risks of a major accident will rise.

1.3. Objective

The Royal Commission's package of recommendations is aimed at ensuring that the health and safety regulations of mining, quarrying and tunnelling create a low risk environment that is consistent with international best practice. This is aimed at controlling the risks while allowing businesses to operate. Attaining this standard will be seen as being achieved if the recommendations are implemented.

In terms of this assessment, the key objective was to sustain the level of risk control over the long term in a high hazards context, rather than letting standards drift down over time.

1.4. Coverage

The Royal Commission's recommendations aim to ensure that the safety regulations for coal mining, other mines, large tunnels, and a limited number of quarries are more consistent with best practice. They come as a package; since any withdrawal or watering down of one set of safety recommendations is likely to compromise all of the social benefits. Specifically, the safety package addresses the issues identified in the problem definition. This includes:

- developing new regulations for hazard management in mining operations
- increased involvement by the regulator and oversight by a sector advisory body

[3] Apart from the emergency preparedness aspect of the package.

- improvements in emergency preparedness by mines and in the provision of mines rescue services and emergency management
- strengthening training and competency requirements for safety critical roles in the sector
- increased worker participation in health and safety management through a strengthened role for elected worker health and safety representatives and through union-appointed check inspectors with statutory powers.

The Implementation Plan is expected to become operational by December 2013.

1.5. Regulatory Impact Analysis

The Royal Commission's recommendations are aimed at modernising New Zealand's hazard management processes to minimise the long run possibility of low frequency high impact events. Current regulations for high hazard industries broadly have performance outcome requirements; whereas the Royal Commission states that best practice regulations describe processes. Specifically, the recommendations are designed to stop any erosion of safety standards in the face of regulatory budgetary pressures and the financial pressures experienced by owners/duty holders.

A key part of this package of recommendations is to ensure monitoring and evaluation processes are robust enough over the long term to underpin desired regulatory standards identified in the status quo as needing attention e.g. new regulations to bring health and safety regulations up to international best practice, improve oversight of high hazards within the sector with more monitoring and verification documentation processes, improved emergency preparedness, improved competencies within mining operations, and increase worker participation in health and safety.

1.5.1. Options

We have used a cost benefit analysis (CBA) framework to compare the two feasible options: the status quo (option 1) and implementing the Royal Commission's recommendations (option 2). Since Cabinet has already agreed to the Royal Commission's recommendations we have not considered whether the package is economically optimal (i.e. whether alternative options might deliver better benefit cost ratios). Even though option 1 has been ruled out by Cabinet we have used it as a point of comparison with the Royal Commission's recommendations.

CBA has been used to identify the value of the Royal Commission's package of proposals against a credible alternative. A particular issue with high hazards health and safety is preventing incidents that are infrequent but have high impact. Any number of alternatives could be used to characterise this but since the probability and incidence are unknown, we have settled on one alternative that draws on New Zealand's regulatory and mine safety activity history.

We use a 40-year period for the CBA, broadly reflecting the average working life of a mine. The regulatory changes are required for 3 underground coal mines, 19 open cast coal mines, 2 gold mines 10 open cast gold mines, 12 quarries and 7 tunnels.

We do not attempt to quantify any environmental or cultural costs and benefits of the options.

The differences between Option 2 and Option 1 (status quo) are:

- additional regulatory oversight ensures that there is no drift in health and safety standards after 5 years, which is expected to occur in Option 1. So there are higher costs to firms, regulators and other stakeholders in Option 2
- the major incident expected in Option 1 after 30 years is avoided in Option 2, so the benefits – largely the avoided loss of life and output – accrue from year 30 onwards.

Option 1: Status quo

No attempt has been made to forecast future safety events under a scenario where the Royal Commission recommendations are not adopted. Some degree of regulatory change is inevitable – what varies is the likely nature and extent of the regulations.

Therefore, we have created an artificial status quo that draws from regulatory and mine safety activity experience from the period between the Strongman Mine tragedy in 1967 and the Pike River Mine tragedy of 2010.

This is a model for evaluation purposes, despite Cabinet ruling this option out because the costs are considered too high. Under the status quo, mine regulation and mine safety will be maintained at the same level as the proposed Royal Commission-recommended regulations for the first five years.[4] After five years, we assume a slow decay in regulatory oversight and mine management safety, to a point where another tragedy is likely. At what point a tragedy would happen is uncertain, but for the purposes of this artificial approach, a major accident is assumed to occur 30 years after a previous accident. The major accident would see 30 lives lost.

Costs

Table 1 sets out the costs incurred as a result of this accident. These are the costs the Royal Commission's recommendations are designed to avoid. These include loss of life, ill health and injuries, accident and emergency response, cost of enquiry, and economic loss of the mine. These avoided costs become the benefits that the costs of the Royal Commission's safety recommendations are compared against.

The costs have been developed with consultation with industry and Ministry experts.

[4] Five years has been chosen because we expect those closely involved with decisions on safety at the time of a major tragedy (both regulators and regulated) would have been moved on with the loss of institutional knowledge and key relationships would not operate as effectively.

Table 1 Costs of the status quo

Discount rate 8%

Cost item	Value in today's dollars	Description
Loss of life	$11,200,000	30 lives lost multiplied by Value of Statistical Life in year 30
Illness and injury		Not valued
Accident and emergency	$99,000	$1,000,000 in year 30
Cost of enquiry	$199,000	$2,000,000 in year 31
Economic loss	$11,900,000	$17.8 million per year in each year after the accident – year 31 to 40
Total	**$23,500,000**	Numbers rounded, so do not exactly sum
Notes (1): Assumes one accident in year 30 with the loss of 30 lives.		

Source: NZIER

Option 2: Implementing the Royal Commission's recommendations

In this section we have grouped proposals under 5 headings, assigned initial costs, and cross referenced them with the Royal Commission's recommendations. The costs are initial estimates since there is still uncertainty about how introducing best practice will impact on regulators, the mining industry and other stakeholders, given the unique geographical situation faced by New Zealand mines and the specific details required to control the risks of a catastrophic accident. For completeness we also briefly discuss other alternatives to the recommended regulations, although we do not model them in the CBA.

All of these costs also apply in the first 5 years of the status quo.

1. Developing new regulations for hazard management of mining operations

These proposed regulations are based principally on the Royal Commission's recommendation 2. Implementing the recommendations requires structural changes to mines and an increase in documentation of safety activities. For large underground mines this includes:

- defining standards and improving ventilation control devices
- clarifying the restricted zone within which electrical equipment requires protection
- updating electrical safety requirements

It also involves:

- improving plant and transport safety in open cast mines
- other structural changes deemed necessary by the High Hazards Unit.

Safety modifications will have a significant cost impact in large underground coal mines. Currently, New Zealand has one larger (Huntly East) and two smaller underground coal mines, which will be required to upgrade ventilation, restricted electrical equipment zones, update electrical safety and upgrade documentation processes. Other mines, large quarries and larger tunnelling operations will require improved road safety (open cast mines only) and upgraded documentation processes.

Increased documentation is required for development of principal hazard management plans (PHMPs) and principle control plans (PCPs). PHMPs are prepared for each hazard while PCPs identify controls that address concerns about multiple hazards. Regulations will be set out the matters that need to be dealt with by the PHMPs and PCPs.

Table 2 sets out the costs for new regulations. All structural changes (apart from road safety in open cast mines) will be incurred by Huntly East only, while half the costs of documentation will be incurred by Huntly East. The remaining documentation costs will be shared by the rest of mining sector.

Possible alternatives

There are few alternatives to the structural changes proposed. The "gassy" nature of New Zealand coal mines suggests that under any scenario ventilation, restricting zones for electrical equipment and continual update of electrical safety improvements are required. Most of these structural adjustments would occur under the status quo and there is little opportunity for partial implementation e.g. not implementing explosion risk zones would jeopardise the effectiveness of any other safety improvements to electrical or mechanical engineering, coal dust suppression etc.

Where alternatives could be considered is in the reduction in documentation costs around hazard management. While this might reduce costs and not compromise safety in the short term, it is unlikely to support the maintenance of safety standards over the longer term. Documentation allows for verification and monitoring of individual and system wide hazards and is crucial for the maintenance of safety as staff (and their institutional knowledge) come and go.

The structural changes being made are necessary and would have occurred under most scenarios. Documented safety requirement set out in the PHMPs and the PCPs are required to ensure durability and consistency of health and safety standards over time.

Table 2 Costs associated with new regulations

Discount rate 8%

Benefit item	Value in today's dollars	Description
Structural changes within the mine(s)		
Ventilation	$1,700,000	One-off cost of $7 million and on-going costs of $500,000 per annum. Cost fall on the mine owners (currently mainly Huntly East)
Restricted zones for electrical equipment	$496,000	One-off costs of $2 million and on-going costs of $400,000 per annum. Cost fall on the mine owners (currently mainly Huntly East)
Updating electrical safety	$248,000	One-off costs of $1 million and on-going costs of $100,000 per annum. Cost fall on the mine owners (currently mainly Huntly East)
Improving plant and roading safety in open cast mines		One-off cost. $2million per large open cast mine. Cost fall on open cast mine owners
Documentation of health and safety requirements		
PHMP	$621,000	Assume all large coal mines require these plans (cost: $125,000 for one coal mine). Other mines, large quarries, and large tunnels can manage and adapt current practice at a total cost of $125,000 per annum). Cost fall on the mine owners. 50% on Huntly East and 50% on the rest of the industry
PCP	$621,000	Assume all large coal mines require these plans (cost: $125,000 for one coal mine). Other mines, large quarries, and large tunnels can manage and adapt current practice at a total cost of $125,000 per annum). Cost fall on the mine owners. 50% on Huntly East and 50% on the rest of the industry
Total	**$3,700,000**	
Note: (1) All of the one-off costs are likely to occur within the first five years. The costs will occur under the status quo and in a situation where the Royal Commission's recommendations are implemented. Therefore, they are not included in the cost benefit analysis. (2) Numbers rounded so do not necessarily sum. (3) Costs are discounted by 2% from year 5 since workers, since we have assumed that mine operators and regulators will become more familiar with the health and safety system, improving efficiency.		

Source: NZIER

2. Increased involvement by the regulator and oversight by a sector advisory body

The Royal Commission's recommendations 1, 2, 3, & 4 are aimed at maintaining best practice in health and safety over the long term. The Royal Commission believed that durability of safety standards required:

- the removal of ambiguity from regulation e.g. the qualifier "all practicable steps" will be replaced with mandatory provisions
- ensuring the provision of better safety information by the employer to the regulator
- amending the Crown Minerals Act 1991 to ensure earlier and increased involvement by the inspectorate before a mine commences operations
- introducing new process regulations consistent with best practice that are auditable by inspectors, employees and their representatives, and others with a role to play in safety
- creating new jobs within mines, quarries, and tunnels responsible for the maintenance of health and safety management systems
- creating an independent advisory body to oversee the operation of mining regulations. Its role is to ensure verification, monitoring and review occur on a regular basis.

The removal of the qualifier "all practicable steps" from minimum standards contained in the regulations is a good example of where the Royal Commission believed that a trade-off between innovation and worker safety was required. For example, the way "all practicable steps" was interpreted at Pike River in relation to the provision of a second means of egress was not considered adequate by the Royal Commission. In the view of the Royal Commission, certainty of is required to ensure detailed safety specification requirements are applied in mines.

However, this does not mean discussion and consultation about how best practice should be adapted to the New Zealand coal mining sector should not be on-going, particularly as advances in technology and the need to adapt best practice safety measures to the local environment may require different approaches to controlling the safety risks.

These changes and the creation of an independent body to produce advice and feedback on the operation of the regulatory framework will be met out of existing baseline funding, and are therefore not included in the CBA calculations. Costs associated with creating new safety roles within the mine are covered in the section on strengthening training and competency requirements.

Possible alternatives

One clear alternative exists to this approach. This is for regulators to maintain a "hands-off" approach that allows the mine operators to decide on appropriate health and safety measures.

The recommendations made by the Royal Commission and many other enquiries into high hazard tragedies overseas (e.g. the Piper Alfa Disaster) assert that this approach is untenable and will lead to further high consequence accidents.

3. Improvements in emergency preparedness by mines and in the provision of mines rescue services (MRS) and emergency management

Improvements in emergency preparedness are based around two issues identified by the Royal Commission: emergency preparedness in mines and inter-agency responses to catastrophic emergencies. These are set out in recommendations: 2, 13, 14, 15 & 16.

A specific recommendation of the Royal Commission was the development of emergency management plans (EMP) in line with Australian best practice. This includes using a common EMP template in West Coast mines that addresses emergency management compatibility, in function, and design; specific location of emergency equipment, exits etc.; and specific EMP content development for the site.

The MRS is also assisting in the setting up and observation of, and reporting on, emergency exercises; and running training in emergency management, scene management, first aid, and incident control duties for surface controllers.

Inter-agency coordination is based around reviewing the Co-ordinated Incident Management System (CIMS). A review is underway by the Ministry of Civil Defence and Emergency Management (MCDEM) of an overall CIMS approach including the mining sector. Work is also under way to investigate the potential role of the Chief Inspector of Mines in future underground emergency responses and search and rescue operations. Inter-agency collaboration is also being fostered with a proposed Memorandum of Understanding with Police and MRS to guide agencies' roles and responsibilities.

Table 3 sets out the costs associated with emergency preparedness. These include health and safety training, provision for breathing apparatus (CABA), maintenance of health and safety systems, and testing systems.

Possible alternatives

It is unclear what the alternative to this approach might be, apart from the business as usual scenario under the status quo. Emergency preparedness may not prevent a mine catastrophe; however, as part of a package of health and safety measures it assists in reinforcing the safety culture being developed. Therefore, to only partially implement an emergency preparedness system will signal to workers, management, regulators, and other stakeholders a lack of commitment to health and safety which over time could potentially spill over into other health and safety commitments, reducing their effectiveness e.g. having emergency drills on a regular basis and documenting any problems ensures safety issues are in the forefront of workers', mine management and regulators' thinking.

The development of EMPs and a CIMS assists in keeping the health and safety messages at the forefront of all stakeholders' thinking and assists in the maintenance of standards that controls hazard risks.

Table 3 Costs associated with emergency preparedness

Discount rate 8%

	Value in today's dollars	Comment
Development of an EMP		Covered by PCP costs
Inertisation (sealing doors)		$1,000,000 per underground coal mine. One-off cost, one door per mine
Nitrogen	$83,000	$100,000 per underground coal mine. Intermittent cost, once every 10 years
CABA (breathing apparatus)	$372,000	$50,000 per underground mine per annum (leased equipment)
Training	$400,000	80 miners @ $2,000 = $160,000 annually
Fresh air base (set up drill and vent)		$500,000 for 2 mines. One-off cost
Communications equipment		All 41 mines @ $40,000. One-off cost
Safety trained person	$45,000	1 person for each shift (3) @ $2,000
2nd egress		None required in the mines operating
Additional transport		$300,000 per underground coal mine. One-off cost
Alarms		$40,000 per underground coal mine. One off cost
Maintenance	$75,000	$10,000 per underground coal mine (3) per annum
Testing	$1,000,000	$10,000 per mine (41) per annum
Training	$204,000	$2,000 per mine (41) per annum
Total	**$2,250,000**	
Notes: (1) All of the one-off costs are likely to occur within the first five years. The costs would have occurred under the status quo and in a situation where the Royal Commission's recommendations where implemented. Therefore, they are not included in the cost benefit analysis. (2) Numbers rounded so do not necessarily sum. (3) Costs are discounted by 2% from year 5 since workers, mine operators and regulators will become more familiar with the health and safety system, improving efficiency.		

Source: NZIER

4. Strengthening training and competency requirements for safety critical roles in the sector

Royal Commission recommendations 8, 9, 10, & 12 have led to proposals that will introduce new safety positions within mines. Specifically these positions are a:

- Site Senior Executive (SSE) position that is responsible for the maintenance of health and safety management systems, ensuring employee participation and meeting information disclosure requirements for employees. The SSE is accountable for the development and maintenance of all health and safety systems and would normally be the mine manager
- ventilation officer to ensure the safe workings of the ventilation system within a mine by ensuring the provision of a safe atmosphere in the underground environment. In a small mine, the ventilation officer and SSE roles may be combined.

Responsibility for mine health and safety resides in these two roles. The positions require a certain level of competency (e.g., a mine manager certificate for an SSE). By creating these positions, the regulations will address the current lack of expertise, inconsistencies in standards between mines, and meet and verify prescribed regulatory standards.

Other part-time positions are also required. These include electrical, mechanical, and mine survey officers. This is to ensure that one person has direct responsibility for safety in these areas and documentation for verification purposes is kept up-to- date.

The costs are set out in Table 4. All mines require an SSE, however, most will be part-time equating to 10% of their job description (based on Ministry expert advice). Only large underground mines require a ventilation officer. Electrical, mechanical and mine survey officers equate to 10% of one staff member's time on a per annum basis.

Table 4 Costs associated with strengthening competencies within the mine

Discount rate 8%

Benefit item	Value in today's dollars	Description
Site Senior Executive	$1,316, 553	Part-time in large mines and 10% of the job in small mines, tunnels, & quarries. Per annum over 40 years
Ventilation officer	$62,000	Part-time in large mines (25% of one person's job). Per annum over 40 years.
Electrical officer	$1,316, 553	Part-time in large mines and 10% of the job in small mines, tunnels, & quarries. Per annum over 40 years
Mechanical officer	$1,316, 553	Part-time in large mines and 10% of the job in small mines, tunnels, & quarries. Per annum over 40 years
Mine survey officer	$1,316, 553	Part-time in large mines and 10% of the job in small mines, tunnels, & quarries. Per annum over 40 years
Total	**$5,328,000**	
Note: (1) Numbers rounded so do not necessarily sum. (2) Costs are discounted by 2% from year 5 since workers, mine operators and regulators will become more familiar with the health and safety system, improving efficiency.		

Source: NZIER

Possible alternatives

The alternatives are having no positions at all or having officers at a lower level in the organisation. Not having a SSE, for example, is similar to the status quo and over time we would expect safety standards to slip. Having officers at a lower level in the organisation relegates the importance of maintaining health and safety standards. The relevance of health and safety will become less important, not only for mine staff but also for regulators checking on safety. Therefore, we would expect health and safety standards to slip along the lines of the status quo.

Elevating the status of each officer signals that maintaining health and safety standards is of preeminent concern. In this situation, it is more likely that health and safety standards will remain at best practice levels.

5. Increased worker participation in health and safety management

Increase worker participation is based on the Royal Commission recommendation 13. Following consultation with the industry, stakeholders (particularly the mine union and Ministry experts) the best way to improve worker participation was to amend the Act to:

- ensure that contractors in the mining industry are covered by worker participation systems and requirements to ensure adequate training and supervision
- require all mines to have documented worker participation systems, not just where there are over 30 workers or where it is requested
- modify the requirements concerning the results of health and safety monitoring so that this information is proactively made available to all mine workers, not just on request
- introduce new functions and powers for health and safety representatives
- establish the position of an industry health and safety representative.

The costs of this process are set out in the following table.

Table 5 Costs of worker participation

Cost item	Value in today's dollars	Description
Ensuring all workers covered by worker participation systems		Minimal cost expected
All mines require documented health and safety		Responsibility of the SSE (costed elsewhere)
Proactively making health and safety information available		Part of documentation required for other cost items
New site health and safety representation	$25,000	Designated worker. Training of $10,000 per annum per mine
Establish position of health and safety representative	$497,000	Cost to the union of $200,000 per annum
Total	**$521,600**	
Notes (1): Numbers rounded so do not necessarily sum. (2) Costs are discounted by 2% from year 5 since workers, mine operators and regulators will become more familiar with the health and safety system, improving efficiency.		

Source: NZIER

Possible alternatives

There are few alternatives to improving worker participation in mine health and safety management. The proposed approach encompasses all workers, involves a motivated mine union, and has buy-in from all stakeholders. It is also very difficult to see how it could be done at a lower cost without compromising safety.

For example, an independent safety representative could do the job of a health and safety representative, although there is a question of who would fund the position, possibly the mine operator or government.

The motivations for both an independent mine inspector and an official funded by the mine union are similar since both will strive to maintain safety standards that minimise risk and keep the mine functioning as a viable concern. However, a key question is acceptance and trust by workers of a safety representative. Since a safety

culture in high hazards requires open communication channels between employee and employer (similar to pilots and doctors and their employer), a union official is more likely to foster this environment by encouraging greater participation in health and safety by workers relative to an independent safety inspector paid for by government or the employer.

Other alternatives might involve dispensing with documenting worker participation in health and safety systems. However, dispensing with documentation is unlikely to assist in monitoring and verification processes required in minimising risk over the medium to long term.

Summary

The package of Royal Commission recommendations have been adopted by Cabinet. They are considered to be the best option for minimising the long term risk of a catastrophic accident in New Zealand underground mines, open cast mines, tunnels, and quarries. Table 6 compares and contrasts the Royal Commission's recommendations with possible alternatives.

Table 6 Comparison of Royal Commission recommendations and alternative approaches

Safety issues	Royal Commission recommendations	Alternative(s)	Comment
New regulations to ensure processes for hazard management	Structural changes required for large mines and documentation of hazard management plans	No alternatives to the structural changes. Documentation could be reduced	To maintain safety standards over the long term, documentation that assists in verification, monitoring and review is required
Increased involvement by the regulator and oversight by an advisory body	Reduce ambiguity in regulation, introduce process regulations, create new safety positions within mines, and create a new advisory board to oversee verification and monitoring functions	Create a hands-off approach and allow mine operators to set safety stands	The hands-off approach is untenable in high hazard industries, since the risks are misaligned
Emergency preparedness	Increase mine preparedness and increase inter-agency co-ordination	Introduce partial changes to an emergency preparedness system	Partial changes would signal a lack of willingness to embrace a health and safety culture and reduces potential spillovers to other parts of the health and safety system
Strengthening training and competency requirements within the mine	Creating the SSE, ventilation and other positions at high levels within a mine ensures	Reducing the health and safety positions to lower level management positions	Reducing the positions to low levels within the mine increases the risk that health and safety

	health and safety remain a primary focus	within the mine diminishes the importance of health and safety	will be taken less seriously allowing standards to slip
Worker participation	Union representative can potentially foster worker participation and improved communication between staff and management Documentation processes also assist in verification of health and safety processes and actions	Independent monitoring could work. Question of who would pay for the service. Real problem of maintaining open communication between staff and management, as it is needed in high hazard industries Dispensing with documentation will not help with monitoring	Union representation is likely to provide for a higher level of health and safety communication between staff and management Documenting systems will also assist in the durability of the health and safety system

Source: NZIER

The cost and benefits of implementing the Royal Commission recommendations are set out in Table 7. The benefits are the avoided cost of the status quo. In the central scenario, the benefit cost ratio is 1.96. This implies that – given our assumption that the regulations will lead to the avoidance of a serious incident with 30 deaths – the costs of the regulatory changes recommended by the Royal Commission could be almost double expectations and still deliver net benefits.

A number of parameters are also tested to examine the robustness of the cost benefit analysis. This is because of the uncertainty surrounding the exact details of how best practice will be implemented are yet to be decided. To take into account this uncertainty we have varied the discount rate, halved the value of statistical life estimate, increased costs by 25% and increased mine costs under new regulations. In all cases the benefits outweigh the costs.

However, it needs to be reiterated that at this initial stage of investigation, the costs and benefits remain indicative.

Table 7 Results

Discount rate 8%

Central scenario	Costs and benefits in today's dollars	Comment
Costs	$12,000,000	Costs associated with all five priority areas
Benefits	$23,500,000	Costs avoided from having a catastrophe
Net benefit	$11,500,000	
Benefit cost ratio (BCR)	1.96	
Scenarios (BCRs)		
Halve loss of life calculations	1.49	Reduces costs avoided
Increased costs by 25%	1.56	Increase in all costs
Mine adjustments cost more than anticipated	1.22	Cost of structural changes under new regulations is three times what is anticipated
Discount rate reduced to 6%	2.33	Benefits occur in year 30 onwards, therefore results are sensitive to discount rates
Discount rate 10%	1.61	Benefits occur in year 30 onwards, therefore results are sensitive to discount rates
Discount rate 1.5%	3.18	United Kingdom discount rate for health and safety measures
Notes (1): Numbers rounded so do not necessarily sum. (2) One-off costs associated with structural changes to mines, quarries and tunnels are not included, since they are likely to occur in all scenarios. (3) Costs are discounted by 2% from year 5 since workers, mine operators and regulators will become more familiar with the health and safety system, improving efficiency.		

Source: NZIER

1.6. Consultation

The Royal Commission, as part of its deliberations, undertook extensive consultation with all affected stakeholders. Feedback from that consultation process has been considered as part of the Royal Commission's findings.

Cabinet's commitment to implement the Royal Commission's recommendations this year means that a Bill to make changes to the Health and Safety in Employment Act 1992 (the Act) will need to be introduced by June 2013 prior to the completion of consultations. If feedback from the consultations suggests useful changes to what is proposed are required, then changes to the proposed Bill can be made when a parliamentary select committee considers the proposed Bill. The public will also have an opportunity to make submissions on the Bill at this point.

A key consultative requirement will be how the Royal Commission's best practice requirements are adapted to the New Zealand mining sector. We expect this to be an

iterative process where health and safety processes are discussed in detail with industry. Of particular interest will be how the different geographical situations impact on the specific best practice recommendations.

1.7. Impact

Groups considered to be affected by the recommendations include:

- the mine workers who are important beneficiaries since the regulations are designed to protect them and minimise risk
- the mine owners/duty holders will shoulder substantial short term costs (with and without the regulations) and longer term compliance costs to ensure safety standards are maintained at a level that minimises hazard risk
- the regulator will also face some costs in the short term from developing and implementing health and safety regulation
- the mine union will face some on-going costs associated with ensuring worker participation in mine health and safety activities
- the general public will also be assured that health and safety standards minimise the risk of accidents.

1.8. Conclusions and recommendations

Option 2 that implements the Royal Commission's recommendations is the preferred option of Cabinet. It offers a mutually reinforcing package of health and safety measures that will strengthen the management of high hazards in the mining, tunnelling and quarrying sector over the long term.

It sets out a proportionate response to improving health and safety measures, recognising the unique geographical situation faced by New Zealand mines and specifies in detail what is required to control the risks of a catastrophic accident. This option is preferable to the status quo and is consistent with international best practice.

1.9. Implementation

Change management

Cabinet has directed the Ministry to develop the Pike River Implementation Plan (the Plan). The role of the Plan is to develop a response to the recommendations of the Royal Commission on the Pike River Coal Mining Tragedy. Cabinet has also decided that the focus of the regulations should be broader than just underground coal mines and include all underground mines, open cast mines, tunnels and quarries.

Information

The overall objective of the Plan is to make immediate changes to New Zealand's mining regulations where possible and to start an active and immediate engagement with the Australian jurisdictions with a view to developing a more harmonised trans-Tasman mining regime. The Australian mining industry is seen as best practice.

The incremental introduction of the best of the regulatory approaches from the Australian jurisdictions is proposed, since this is likely to produce a better long term outcome for New Zealand's mining industry.

Regulators in Australia (and also the United Kingdom) have developed very good guidance material to support the development of regulatory processes. The Ministry is considering the material and will re-use it where possible.

Implementation focus

1. New regulations

The focus of new regulations is on two areas:

the development of PHMPs and PCPs that set out the defined hazard area

the structural changes required for mines identified in the PHMPs and PCPs.

The identification of hazards and mitigation steps is an on-going process while the development of PHMPs and PCPs is required for documentation and verification purposes and will be in place when the regulation comes into force.

2. Increased regulatory oversight

Increased regulatory oversight requires changes in legislation, development of systems that provide better health and safety information that are auditable, the creation of new health and safety roles within mines and an advisory body to oversee monitoring, verification and review processes.

The legislative amendments are underway and other health and safety systems' documentation processes and auditing functions are being developed. These will be in place when the new regulations come into force.

3. Improvements in emergency preparedness

Most of the improvements in emergency preparedness are underway and will be completed by the time the regulations come into force.

4. Strengthening training and competency requirements

To strengthen health and safety competencies within the mines and evaluate the importance of health and safety a SSE and ventilation (for larger mines) officer will be required at a senior level.

The SSE and other officers are expected to be in place when the regulations come into force.

5. Improved worker participation

Worker participation in health and safety initiatives is seen as crucial in the effort to minimise hazard risks. To ensure participation:

- new roles have been created to support worker health and safety
- all workers underground are required to have adequate training, supervision, and participation in health and safety systems
- health and safety documentation standards have been improved.

Worker participation initiatives will be in place when regulations come into force.

Enforcement strategy

The Ministry's High Hazards Unit is responsible for executing the enforcement strategy. The High Hazards Unit will provide independent assurance that:

- hazards having the potential to cause major accidents and affect structural integrity of mines are properly managed through the PHMPs and PCPs
- occupational health and safety hazards are being properly managed through the SSE and other officers and with appropriate documentation
- emergency evacuation processes (including documentation) are in place
- worker participation in health and safety is occurring at specified levels and that it is documented.

This will be done by scrutinising the mine operations prior to commencement and during operation; challenging the mine operators' approach and documentation where required; challenging the commitments made by the mine operators; and rejecting safety approaches where there are serious shortcomings. The union health and safety representative and the independent advisory board will also contribute to this process.

Qualified mine inspectors will be used to monitor compliance with legislation and on-going implementation and compliance with documentation required for PHMPs and PCPs and ensuring other health and safety systems are functioning at the required level. For example, they will check that SSEs are providing correct documentation, evacuation drills have been carried effectively, and worker participation processes have been developed.

The scope of the planned inspections will be informed by:

- the type of mine, tunnel or quarry being visited
- the commitments and responses made during previous inspections
- the outcomes of any incidents and investigations that have occurred since the last inspection
- the functioning of the documentation process for employee participation and the management of hazards
- input from relevant stakeholders.

The scope of the inspection will be developed by the inspector leading the inspection. This will be agreed in consultation with the Chief Inspector as a part of the inspection planning process.

Where a major change occurs in the focus of the inspection, this should be discussed with the Chief Inspector where practicable. If other issues are noted by inspectors, these may also be taken into consideration, even though they may fall outside the original scope.

Inspection teams will usually consist of at least two inspectors. Inspections will prioritise those areas of each mine, tunnel or quarry that generate a significant portion of the risk associated with an activity, and those control measures that have the most influence on risk.

The High Hazard Unit has the resources and expertise to ensure consistent standards are maintained.

1.10. Monitoring, evaluation and review

Monitoring, evaluation and review require consistent attention to enable durable regulatory standards in high hazard industries. For this to occur, a tripartite advisory group[5] is proposed to provide strategic oversight of the new regulatory regime (similar to the Queensland and New South Wales model). Such a group would have an advisory role to the regulator.

We expect the tripartite advisory group to be involved in a review to be carried out at five yearly intervals after the commencement of the new regulations.[6] The review must include effectiveness assessments of the overall health and safety management system including:

- PHMP, PCP, and specific controls developed to manage hazards
- worker participation and contribution to health and safety
- the regulator to bring about health and safety improvements
- the SSE and ventilation officer contributing to hazard management
- the documentation processes required to build a health and safety culture.

As part of any review, consideration will be given to the number of near misses and minor accidents reported. Also, consideration should be given to any conclusions from investigations into major accidents overseas in comparable jurisdictions.

The tripartite advisory group will be an advisory panel to the proposed new agency and will not need legislative status.

A separate body is also proposed for emergency preparedness. This requires a multi-agency approach including the Police, Fire and Mines Rescue. This will enable decisions to be made on the types of emergency training exercises that could take place in New Zealand in any one year.

The reviews must be completed within six months or in a period that the Minister of Labour allows.

A report on the review must be made available to the Minister of Labour.

The review will be funded out of the Ministry's baselines and will assist in ensuring that year-to-year budget pressures do not erode regulatory oversight and standards over time.

[5] The so called three pillars approach involving the employer/duty holder, worker involvement, and active regulator.

[6] Five years has been chosen as a preferred timetable since it is in line with current best practice.