

# **EXTRACTIVES: Developing a Ground or Strata Instability Principal Hazard Management Plan**

August 2015

**These interpretive guidelines help the Site Senior Executive develop a ground or strata instability principal hazard management plan.**

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01/

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**INTRODUCTION**

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## The principal hazard management plan sets a framework to ensure hazards and risks associated with ground or strata instability are controlled.

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### 1.1 WHY PRODUCE A PRINCIPAL HAZARD MANAGEMENT PLAN?

The Site Senior Executive (SSE) must ensure a process is in place to systematically identify the hazards, and assess the risks of harm to mine workers at a mining/tunnelling operation<sup>1</sup>.

If the hazard appraisal and risk assessment identifies ground or strata instability<sup>2</sup> as a principal hazard<sup>3</sup>, the SSE must ensure that a:

- > principal hazard management plan (PHMP) is developed
- > competent person completes a geotechnical assessment.

This is a requirement under the Health and Safety in Employment (Mining Operations and Quarrying Operations) Regulations 2013 (Regulations).

The PHMP must:

- > be specific to the mining/tunnelling operation
- > describe the principal hazard – ground or strata instability
- > describe the controls that will be implemented to manage the hazard and risks.

The PHMP is part of the mining/tunnelling operation's health and management system (HSMS).

### 1.2 WHO ARE THESE GUIDELINES FOR?

These guidelines are for the SSE at the mining/tunnelling operation, the mine operator and anyone else involved in preparing the PHMP.

### 1.3 HOW TO USE THIS DOCUMENT

This document is in four parts.

**Part 1** (this part) introduces the guidelines.

**Part 2** summarises the information that should be in the PHMP, including the minimum information required under the Regulations, and gives guidance to help with preparing the PHMP. The relevant regulations are reproduced in the appendix in part 4.

**Part 3** is a sample PHMP format with some example text that you can base your PHMP on. This is one example of how to produce your PHMP, not a template you must follow. You can use your own format as long as the PHMP meets the requirements of the Regulations.

**Part 4** reproduces the regulations that relate to the production of PHMPs.

### 1.4 WORKSAFE NEW ZEALAND TO REVIEW DRAFT PHMPs

You must submit the draft PHMP to WorkSafe New Zealand (WorkSafe) for review at least two months before a new mining/tunnelling operation commences. Attach the geotechnical assessments with the draft PHMP.

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<sup>1</sup> Mining operation as defined in s 19M and tunnelling operation as defined in s 19O Health and Safety in Employment Act 1992.

<sup>2</sup> The terms "ground" or "strata" can be used interchangeably. Ground instability is commonly used in metalliferous mining and strata instability in coal mining.

<sup>3</sup> A principal hazard is any hazard at a mining operation that could create a risk of multiple fatalities in a single accident or a series of recurring accidents.

**02/**

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**WHAT IS  
REQUIRED  
IN THE PHMP**

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## This section explains what information needs to be in your PHMP and gives guidance on how to develop it.

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The PHMP describes the principal hazard and sets out the controls used to manage it. Table 1 summarises the information that should be in the PHMP, including the minimum information required under the Regulations, and gives guidance to help with preparing the PHMP. See part 3 for a sample PHMP format.

You can reference other documents from the mine's HSMS in your PHMP, rather than reproducing details recorded elsewhere. Referenced documents must be available to mine workers and could include:

- > standard operating procedures (SOPs)
- > the geotechnical assessment
- > mine plans
- > risk assessments
- > training plans
- > principal control plans (PCPs)
- > forms
- > trigger action response plans (TARPs).

When referring to other documents, include the document reference number, title and date. For documents produced by a third party, such as geotechnical assessments, include the name of the author. You may wish to include tables summarising other documents you refer to. For example, a table summarising the results of the risk assessment, including hazards and controls.

**TABLE 1: WHAT IS REQUIRED IN THE PHMP**

WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP (SEE SAMPLE PHMP)
<b>Regulation 11 – Mine operator ensures sufficient resources</b>		
The mine operator must provide sufficient resources to allow the SSE to carry out his or her functions and duties.	State that the mine operator will provide sufficient resources to allow the PHMP to be developed, implemented, reviewed and kept current.	Section 2 – Resources required
<b>Regulation 25 – Mineworkers to comply with manager’s instructions</b>		
The mine operator must ensure that all mine workers comply with reasonable instructions given by the manager and any acting manager.	Describe the management process in place that ensures mine workers comply with reasonable instructions, clarifying roles and responsibilities.	Section 9 – Training
<b>Regulation 61 – Records and document control</b>		
The mine operator must make sure that the HSMS and various documents relating to it, including reviews and audits, are kept and can be accessed to be checked.	Describe the record management process including where documents are held, for how long and how to access them.	Section 12 – Records and document control
<b>Regulation 62 – providing HSMS documents to workers</b>		
The mine operator must provide the HSMS, including the PHMP, to all mine workers affected by it.	Describe how you will make the HSMS and PHMP available to mine workers. Describe how health and safety matters relating to the PHMP will be communicated to mine workers.	Section 8 – Communication
<b>Regulation 64 – Duty to provide instruction</b>		
The mine operator must ensure that mine workers are trained about the HSMS. A record of training must be kept.  Training should cover the use and maintenance of personal protective equipment (PPE).	Describe the training that will be provided for all people working at the mining operation, particularly those working underground. This may include training about the HSMS and content of the PHMP, induction training, and continuing workplace training. Details about who will deliver the training and the frequency of refresher training may also be included.	Section 9 – Training



WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP (SEE SAMPLE PHMP)
<p><b>Regulation 68 - What has to be in all PHMPs?</b></p> <p>Description of the principal hazard</p>	<p>Give details of the ground or strata instability principal hazard at your mining operation.</p> <p>Include background information about the mining operation to give context, such as:</p> <ul style="list-style-type: none"> <li>&gt; type of operation and mining method</li> <li>&gt; material extracted</li> <li>&gt; extraction method and machinery used.</li> </ul> <p>Briefly explain the geological setting and what impact it can have on ground conditions. For example, you could summarise the:</p> <ul style="list-style-type: none"> <li>&gt; seam/ore body and overburden/host rock being mined</li> <li>&gt; lithology</li> <li>&gt; stress regime</li> <li>&gt; geological structures or discontinuities</li> <li>&gt; nature and strength of roof and floor strata</li> <li>&gt; specific geological conditions (eg. seam rolls, alteration, weathering)</li> <li>&gt; geotechnical domains</li> <li>&gt; stratigraphic profile.</li> </ul> <p>Include geotechnical domain and contour maps.</p> <p>Note: Some information may already be available in other documents in the HSMS.</p>	<p>Section 1 – Introduction</p> <p>Section 3 – Mine overview</p> <p>Section 4 – Geological setting</p>
Description of risk assessments	<p>Describe how you:</p> <ul style="list-style-type: none"> <li>&gt; did the risk assessments for ground or strata instability</li> <li>&gt; involved a representative cross section of the workforce.</li> </ul>	Section 6 – Risk assessment
Risk assessment results	Give details of hazards and risks identified and identify the control measures to manage the risks.	Section 6 – Risk assessment.

WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP (SEE SAMPLE PHMP)
Description of control measures	<p>Describe the control measures used to manage ground and strata instability. Control measures are specific to your mine and the risks identified. They may include:</p> <ul style="list-style-type: none"> <li>&gt; monitoring and inspection</li> <li>&gt; hazard plans</li> <li>&gt; support plans</li> <li>&gt; TARPs</li> <li>&gt; mine design and planning</li> <li>&gt; manager's rules</li> <li>&gt; training.</li> </ul>	Section 7 – Control measures
Description of emergency preparedness	<p>Describe how your mine/tunnel is prepared for ground or strata instability emergencies.</p> <p>This section could be a reference to the emergency management PCP.</p>	Section 7 – Control measures
Roles, responsibilities and competencies	<p>List the holders of safety critical roles (statutory positions) and other personnel. Describe their roles and responsibilities for the preparation, implementation and control of the PHMP. Include their required competencies, where relevant. Information from the position description can also be included.</p> <p>Individuals can hold more than one role under the PHMP.</p> <p>Describe how their responsibilities will be carried out.</p> <p>Refer to Part 1 of the Regulations for safety-critical roles and certificate of competence (CoC) requirements.</p>	Section 15 – Roles and responsibilities
Description of PHMP review process in accordance with regulation 69	<p>Describe how you will review the PHMP, in accordance with Regulation 69, to make sure it remains suitable and effective. Include who will complete the reviews and when.</p>	Section 13 – Review
Description of PHMP audit process in accordance with regulation 70	<p>Describe the audit process you will follow. A competent, independent person must complete the audit. The audit determines whether:</p> <ul style="list-style-type: none"> <li>&gt; mine activities comply with the PHMP</li> <li>&gt; the PHMP is adequate and implemented correctly.</li> </ul>	Section 14 – Audit

WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP (SEE SAMPLE PHMP)
<b>Regulation 71 - PHMPs for ground or strata instability</b>		
<p>Geotechnical assessment, by a competent person, to determine the controls needed to safely operate the mine.</p> <p>Identification and explanation of:</p> <ul style="list-style-type: none"> <li>&gt; when and how ground or strata failure may occur</li> <li>&gt; methods used to avoid ground or strata failure, considering:               <ul style="list-style-type: none"> <li>- natural and geotechnical features</li> <li>- surrounding workings</li> <li>- proposed activities in the mine</li> <li>- size and geometry of underground mine openings.</li> </ul> </li> </ul>	<p>You need to make sure a competent person completes a geotechnical assessment.</p>	Section 5 – Geotechnical assessment
<p>The geotechnical assessment covers site characterisation, mining method, review of other operations, surrounding workings and other factors such as subsidence and ventilation requirements so that the likely failure mechanisms can be determined.</p> <p>The output will be a geotechnical model with geotechnical domains, showing volumes of rock with similar geotechnical properties. The assessment must use the appropriate design methodology (empirical, hybrid or analytical) and apply the appropriate factor of safety to determine the requirements for:</p> <ul style="list-style-type: none"> <li>&gt; support</li> <li>&gt; extraction sequence</li> <li>&gt; mine layout</li> <li>&gt; rock reinforcement required for excavations.</li> </ul> <p>Note: Other disciplines may also have input in the process, such as hydrologists or engineers.</p> <p>You should attach geotechnical assessments when submitting a draft PHMP to WorkSafe.</p>	<p>The geotechnical assessment covers site characterisation, mining method, review of other operations, surrounding workings and other factors such as subsidence and ventilation requirements so that the likely failure mechanisms can be determined.</p> <p>The output will be a geotechnical model with geotechnical domains, showing volumes of rock with similar geotechnical properties. The assessment must use the appropriate design methodology (empirical, hybrid or analytical) and apply the appropriate factor of safety to determine the requirements for:</p> <ul style="list-style-type: none"> <li>&gt; support</li> <li>&gt; extraction sequence</li> <li>&gt; mine layout</li> <li>&gt; rock reinforcement required for excavations.</li> </ul> <p>Note: Other disciplines may also have input in the process, such as hydrologists or engineers.</p> <p>You should attach geotechnical assessments when submitting a draft PHMP to WorkSafe.</p>	Section 5 – Geotechnical assessment

WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP
<p>Description of:</p> <ul style="list-style-type: none"> <li>&gt; support method modelling, testing and updating</li> <li>&gt; seismic activity monitoring, interpretation and analysis</li> <li>&gt; geotechnical data collection, analysis and interpretation</li> <li>&gt; ground and strata support maintenance</li> <li>&gt; allowance for higher standards of support in the future.</li> </ul>	<p>Describe the control methods identified by the geotechnical assessment. These will include controls addressing:</p> <ul style="list-style-type: none"> <li>&gt; design</li> <li>&gt; implementation of design</li> <li>&gt; monitoring</li> <li>&gt; training</li> <li>&gt; emergency preparedness</li> <li>&gt; response to ground control failure and incidents.</li> </ul> <p>Describe the equipment and procedures you will use. For example, how will you monitor seismic activity? How will the data be analysed and interpreted?</p> <p>You also need to describe how you will manage changes to control measures, for example replacing defective support.</p> <p>You should reference all procedures, standards, forms and TARPS needed to implement the controls.</p>	<p>Section 7 – Control measures</p>
<p>Clear directions and diagrams for support methods</p>	<p>Ensure the PHMP contains clear directions and diagrams for support methods.</p>	<p>Section 7 – Control measures</p>
<p><b>Regulation 118 – Installation of ground or strata support</b></p>		
<p>Keep people out of unsupported ground or strata and use temporary support during installation.</p>	<p>Describe the methods you will use to:</p> <ul style="list-style-type: none"> <li>&gt; keep people out of unsupported ground or strata</li> <li>&gt; implement temporary support when installing permanent support.</li> </ul>	<p>Section 7 – Control measures Manager's support rules</p>
<p><b>Regulation 119 – Ground or strata support</b></p>		
<p>Design and implement suitable ground or strata support for all working areas. Plans must be displayed and accessible for all mine workers.</p>	<p>Describe the ground or strata support methods for all working areas. These are specific to the ground instability risks identified in your risk assessment and geotechnical assessments.</p>	<p>Section 7 – Control measures</p>

WHAT DO THE REGULATIONS REQUIRE?	WHAT DO YOU NEED TO DO?	SUGGESTED SECTION OF THE PHMP
<p><b>Regulation 131 - What to do if ground or strata failure happens</b></p> <p>You must:</p> <ul style="list-style-type: none"> <li>&gt; inform relevant staff</li> <li>&gt; assess and investigate reports by mine workers</li> <li>&gt; review the ground or strata control design</li> <li>&gt; keep records of ground or strata control failures until at least 12 months after the mining operation is abandoned.</li> </ul>	<p>Describe steps to be taken following ground or strata failure that meets the requirements of regulation 131.</p> <p>You should reference the emergency management PCP, procedures, standards, forms and TARPs required to implement the steps and to identify responsible persons.</p>	<p>Section 11 - Ground failure accidents</p>

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**SAMPLE GROUND  
OR STRATA  
INSTABILITY PHMP**

## This section shows an example format and text that you can base your PHMP on.

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This is one example of how to produce your ground or strata instability PHMP, it is not a template you must follow. You can use your own format as long as the PHMP meets the requirements of the Regulations.

The example text is:

- > illustrative only
- > not provided for all parts of the PHMP
- > not specific to any individual mine or tunnel.

The example text refers to other documents that are part of a mine or tunnel's HSMS, for example risk assessments or PCPs. These are referred to in the example text by *<ref>document title*. Include the document reference number and the title whenever you refer to other documents in your PHMP.

You need to make sure that your PHMP is specific to the conditions at your mine or tunnel, as identified by your risk assessment and geotechnical assessment.





# XXXX MINE/TUNNEL

## GROUND (OR STRATA) INSTABILITY PRINCIPAL HAZARD MANAGEMENT PLAN

that forms part of the  
**Health and Safety Management System**

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**Document Number:** XXXX-HSMS-PHMP-001

**Document Owner:** Site Senior Executive

**Approval:** Site Senior Executive

Signed: *John Smith*

**Date:** 10/10/2014

### **Document control**

VERSION	VERSION DATE	PREPARED BY	REVIEWED BY	APPROVED BY
1	DD/MM/2012	Name, <insert title>	Name, <Geotechnical expert>	Jane Black, SSE
2	10/10/2014	Name, <insert title>	Name, <Geotechnical expert>	John Smith, SSE

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# 1 Introduction

## 1.1 PURPOSE OF THE GROUND OR STRATA INSTABILITY PHMP

The Ground or Strata Instability Principal Hazard Management Plan (PHMP) forms part of the XXXX Mine/Tunnel's Health and Safety Management System. It provides a framework for the systematic and proactive management of the principal hazard of ground or strata instability at XXXX Mine/Tunnel.

The PHMP addresses the assessed risks of ground or strata instability, for each phase of the mining/tunnelling operation and each part of the underground mining/tunnelling operation, at XXXX Mine/Tunnel. Refer to the <ref> Risk Assessment for Strata or Ground Instability completed on date, at Appendix A.

The PHMP refers to the systems, standards, procedures and methods used to effectively manage and control ground or instability hazards in and around the underground mine workings/tunnel. These may be in other documents, which are in Appendix B.

## 1.2 WHO DOES THE PHMP APPLY TO?

The PHMP applies to all personnel employed in any capacity at the mine/tunnel and visitors to XXXX Mine/Tunnel.

See Section 15 Roles and Responsibilities for the specific roles and responsibilities in relationship to the preparation, implementation and control of the PHMP.

# 2 Resources required

The mine/tunnelling operator of XXXX Mine/Tunnel will supply all necessary resources to ensure that the PHMP is fully implemented.

# 3 Mine overview

Insert content.

# 4 Geological setting

Insert content.

# 5 Geotechnical assessment

XXXX, who is a competent person, has conducted the geotechnical assessment(s).

The geotechnical assessment determines suitable designs for ground support required to conduct mining/tunnelling safely, including:

- pillar sizes (including barrier pillars)
- ground support of excavations for all stages of the operation
- mine layout
- extraction/stope design
- monitoring requirements for all stages of excavation.

Refer to Appendix B for the geotechnical assessment(s).

The ground support design process in the geotechnical assessment defines and addresses the:

- geotechnical characterisation of the mine area including lithology, geological structure, depth, virgin stress, mining-induced stress, groundwater, rock strength, rock mass properties, geotechnical domains, depth
- circumstances under which ground failure may occur (ie definition of the potential failure mechanisms)
- location and influence of surrounding workings, including abandoned or previously excavated workings
- excavation activities to be carried out at the operation (eg development, extraction/stoping)
- excavation size and geometry
- expected seismic activity and an assessment of the need for seismic activity monitoring
- required life of excavation.

Design verification of ground and ground support behaviour required by the geotechnical assessment will be done. If the verification shows ground and ground support behaviour outside of the expected range the geotechnical assessment must be updated.

The geotechnical assessment specifies design guidelines for mines and roadways for new panels. New panel design must follow <ref> Mine Design Guidelines.

Geological conditions for new panels must be reviewed. If the review shows geological conditions outside the range expected from the design process of the geotechnical assessment, the geotechnical assessment must be updated. A competent person must update the assessment to determine the level of ground or strata support required to conduct the mining operation safely.

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Assumptions in the geotechnical assessment must be reviewed to check their continued validity (eg the ground conditions excavated are within expected limits). This is done during the PHMP review (see Section 13).

## 6 Risk assessment

### 6.1 RISK ASSESSMENT METHODOLOGY

All risk assessments for ground or strata instability must be completed according to the risk assessment process described in the XXXX's *Health and Safety Management plan*.

A representative cross-section of the workforce, including mine/tunnel workers, the site health and safety representative and the competent person who completed the geotechnical assessment, were involved.

The risk appraisal identifies hazards associated with ground or strata instability that could lead to potential harm. Risks are assessed and controls identified.

### 6.2 RISK ASSESSMENT RESULTS

A risk appraisal and risk assessment for ground or strata instability were completed on (dd/mm/yy). The following table summarises the results of the risk assessment, which are attached as Appendix A.

GROUND OR STRATA INSTABILITY HAZARDS AND RISKS ASSESSED	CONTROL MEASURES THAT ADDRESS THE RISKS (SEE SECTION 7 CONTROL MEASURES)
<b>Failure of the design of mine layout and ground support requirements</b>	
Less than adequate (LTA) estimation of geological conditions	Geotechnical assessment Estimation of geology Hazard plans
LTA estimation of the stability of roadways	Geotechnical assessment
LTA design of primary support measures	Support design
LTA design of extraction/stoping geometry	Extraction/stoping design
Failure to assess effect of change to strata support or mine design	Change management
Failure to validate design of strata support	Design verification
LTA support in installation of ground support according to SOPs	Insert content
<b>Failure in implementation of design</b>	
LTA response to change in ground conditions in development roadways	TARPs
LTA response to change in ground conditions during extraction/stoping	TARPs
LTA communication of expected ground conditions	Hazard status information
Failure to respond to change in ground conditions due to inadequate communication of ground control requirements	Insert content

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GROUND OR STRATA INSTABILITY HAZARDS AND RISKS ASSESSED	CONTROL MEASURES THAT ADDRESS THE RISKS (SEE SECTION 7 CONTROL MEASURES)
LTA equipment operability	Insert content
Equipment not fit for purpose	Insert content
Changes to plant or equipment are not communicated to relevant people	Insert content
Personnel are not competent to operate plant or equipment	Insert content
Acquisition and storage of strata control materials (eg resins and bolts) that are not fit for purpose create additional ground instability hazards	Insert content
Changes to materials are not communicated to relevant people, or people are not competent in their use	Insert content
Changes in ground control hazards are not communicated to relevant people	Insert content
Personnel are not competent in identifying and controlling hazards related to ground instability	Insert content
LTA development of work procedures (SOPs)	Insert content
<b>Failure in monitoring undertaken</b>	
LTA recording of geological conditions	Geology inspections
LTA monitoring of the stability of roadways	Geology inspections Statutory inspections Deformation monitoring
LTA monitoring of the installation of supports as per support plans	Insert content
LTA monitoring of the effectiveness of ground support measures	Geology inspections Deformation monitoring Design verification Bolt encapsulation testing
LTA monitoring of the installation of supports as per support plans	Geology inspections
LTA seismic monitoring	Seismic monitoring
LTA monitoring of the integrity of ground support	Ground support integrity
LTA monitoring of the installation of supports as per support plans	Insert content
LTA monitoring of pillar load	Insert content

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GROUND OR STRATA INSTABILITY HAZARDS AND RISKS ASSESSED	CONTROL MEASURES THAT ADDRESS THE RISKS (SEE SECTION 7 CONTROL MEASURES)
LTA monitoring of excavation dimensions	Insert content
LTA documentation of monitoring results	Insert content
LTA communication of monitoring results	Insert content
LTA analysis and review of monitoring results	Insert content
LTA workplace observations	Insert content
<b>Failure in training of mineworkers</b>	
LTA training of mine workers in ground instability hazard identification	Training
LTA training of mine workers in support installation theory	Training
LTA training of mine workers in support installation SOPs	Training
<b>Failure in emergency response and recovery</b>	
LTA emergency response to a ground control failure	Emergency preparedness
LTA recovery from ground control failure	Emergency preparedness
<b>Inappropriate response to ground control incidents and failure</b>	
LTA response to ground control incidents and failure	Response to ground control incidents and failure

## 7 Control measures

This section discusses the controls to manage ground or strata hazards identified in the risk assessment.

### 7.1 DESIGN

#### **Geotechnical assessment**

Refer to Section 5 Geotechnical assessment

#### **Estimation of geology**

Likely geological conditions are predicted using data from the following sources:

- surface exploration holes
- seismic, magnetic surveys
- geological mapping process, including extrapolation of features, to be performed according to <ref> *Geological Mapping of Roadways*
- geotechnical characterisation – refer to Section 5 Geotechnical assessment
- tell-tales and extensometer monitoring.

All information is stored in the geological database.

#### **Hazard plans**

Hazard plans will be developed for roadway development and extraction/stopping according to the following procedures:

- <ref> *Compilation of Development Hazard Plans.*
- <ref> *Compilation of Extraction/stopping Hazard Plans.*

#### **Support design**

Refer to Section 5 Geotechnical assessment.

#### **Pillar design**

Refer to Section 5 Geotechnical assessment.

#### **Extraction/stopping design**

Refer to Section 5 Geotechnical assessment.

#### **Mine design changes**

Mine design changes will use the <ref> *Modification to Mine Plan* form.

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### **Permit to mine**

The permit to mine is developed by the technical team and authorised by the mine manager. The permit will enable mining to proceed in a specified area/panel, under a specified minimum support regime (Manager's support rules) and specified mine design. The permit to mine will be developed according to <ref> Permit to Mine Process.

A hazard plan must be developed for each permit to mine.

The permit to mine process includes a review of the expected geological conditions for the relevant area. If the review shows geological conditions outside of the expected range in the design process of the geotechnical assessment, the geotechnical assessment must be updated. A competent person must update the assessment to determine the level of ground or strata support required to conduct the mining operation safely.

### **Manager's support rules**

The manager's support rules specify the minimum ground support requirements for individual sections of the mine, as determined by a geotechnical assessment.

The support rules show the ground support requirements, with clear directions and diagrams, on support plans. The support rules must be authorised by the mine manager or their delegate before use.

Ground support in development panels is implemented using the Manager's support rules and a ground control TARP specific to that panel.

Support rules are provided separately for secondary support for roadways prior to the commencement of extraction/stoping.

Support plans for non-standard driveage must be developed based on design outcomes from a geotechnical assessment.

Support plans must be developed in accordance with <ref> Specification of Support Rules.

Support plans must be displayed in locations readily accessible to all mine workers, including:

- relevant crib rooms
- relevant mining section (eg on the continuous miner or jumbo).

The following statements will be included on support plans.

**No person may enter an area that is not supported in accordance with the support rules, unless installing or supervising support installation, when temporary support must be used.**

**Nothing in this support plan prevents a mine worker from installing higher standards of supports than those specified.**

See Appendix C – Support plans and TARPs.

### **Mine scheduling**

Scheduling of the mine's activities must take into account the management of ground instability hazards (eg slowing development rates to reflect mining through structured zones).

### **Change management**

Insert content

### **Design verification**

Insert content

### **Control measure**

Insert content

## **7.2 IMPLEMENTATION OF DESIGN**

### **Trigger action response plans (TARPS)**

TARPs have been developed for each stage of mining (eg development, extraction/stoping, monitoring of existing roadways). TARPs are used in conjunction with the manager's support rules and must be displayed together. TARPs and manager's support rules are attached as Appendix C.

Use <ref> Remedial Support Notice to communicate remedial support requirements triggered by TARPs. See Appendix C – Support Plans and TARPs.

### **Hazard status information**

Information about current and anticipated ground conditions must be updated and communicated to the crews regularly. This information includes hazard plans, geological mapping reports and shift handover communication. All mine workers must be trained in identifying ground instability hazards, as described in Section 9 Training.

### **Other control measures identified in the risk assessment**

Insert content

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### 7.3 MONITORING OF GROUND BEHAVIOUR

Monitoring includes quantitative use of devices to measure the deformation of strata. It also includes qualitative observations by persons in general and persons with specific responsibilities to inspect ground conditions.

The data obtained from monitoring is reviewed as part of the geotechnical assessment review for each element of design. The frequency of monitoring, testing, updating of the ground or strata support methods and required response should be as specified in the relevant support plan or TARP.

#### **Geology inspections**

Collect, analyse, interpret and communicate relevant geotechnical data for the excavations according to <ref> *Geological Mapping of Roadways*.

#### **Statutory inspections**

The mine/tunnel's *Inspection management plan* <ref> determines the regime for inspections required under the Regulations. It includes a process for communicating any conditions in the mine that need remedial action.

#### **Deformation monitoring**

Deformation monitoring is determined by the geotechnical assessment (see Section 5) and uses the following instrumentation:

- tell-tales
- extensometers
- convergence poles
- stress cells
- any other instrument that is appropriate or practical.

Ground deformation monitoring data collection, analysis and interpretation will follow the process in <ref> *Ground instability monitoring*.

#### **Bolt encapsulation testing**

Bolt encapsulation tests must be done according to the relevant section's TARP. Testing involves measuring the length of encapsulation by removing the nut and washer from the bolts and inserting a piece of wire up the hole. This is done after installing the bolt but before tightening the nut.

#### **Seismic activity monitoring**

Insert content

#### **Ground support integrity**

Insert content

#### **Other control measures**

Insert content

### 7.4 TRAINING

See section 9 – Training.

### 7.5 EMERGENCY PREPAREDNESS

Emergency preparedness and response to ground or strata instability at XXXX Mine/ Tunnel will be managed in accordance with the <ref> *Emergency Management Principal Control Plan*.

### 7.6 RESPONSE TO GROUND CONTROL INCIDENTS AND FAILURE

See Section 11 Ground failure accidents.

## 8 Communication

All persons affected by the requirements of the PHMP shall have access to a current version, and other associated plans or documents, via the mine's document control system and/or in hardcopy.

The mine/tunnel's control room is staffed by competent operators 24 hours per day, 7 days per week. These individuals are responsible for managing communications between the surface and underground personnel during each shift.

Communication of any ground control-related information to the mine/tunnel's personnel may be by one or more of the following methods:

- toolbox talks
- monthly communications meetings
- memorandums
- letters
- e-mails
- hard copy of the PHMP and associated documents.

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## 9 Training

All training must ensure that all mine workers know they must comply with all reasonable instructions given by the manager and any acting manager.

All new personnel carrying out work at XXXX mine/tunnel must complete ground control induction training before starting work. The induction training contains site-specific knowledge including:

- ground control hazards and their identification
- introduction to support plans and TARPs
- awareness of the contents of the PHMP
- roles and responsibilities in the PHMP
- location of the PHMP and associated documentation (including how to access the PHMP and associated documentation)
- awareness that no person may enter an area that is not supported in accordance with the support rules (in force at the time of provision of the support), other than to install or supervise the installation of support, when temporary support must be used
- how to use and maintain PPE.

The trainer must provide a hard copy summary of the induction training material to mine workers.

Statutory personnel must be trained in additional aspects they need to be competent in, such as use of monitoring devices and auditing of installed supports.

Control room operators must be trained on their responsibilities for TARPs.

Persons installing ground support and ground support monitoring devices must be trained in basic support installation theory and the relevant SOPs.

All personnel must have ongoing training as required, including refresher training.

The geotechnical engineer and geologist will provide on-the-job coaching during their routine panel inspections. Records of on-the-job coaching shall be kept.

The trainer keeps records of individual training, and assists in coordination of training and ensuring training programmes remain up-to-date.

Training must be delivered by competent trainers and assessors, in a way that ensures all the information is understood by personnel.

## 10 Corrective action

Non-compliance with this PHMP must be documented. It may be identified during:

- audits
- reviews
- inspections
- incident and hazard reporting.

Corrective actions must be identified to address non-compliances. These actions must be:

- documented
- assigned to the appropriate personnel at the mine, with an agreed completion date
- closed off when completed.

Revisions to the PHMP may be made, if required, and approved by the SSE.

## 11 Ground Failure Accidents

Insert content

## 12 Records and Document Control

Records must be kept as described in <ref> Document Control to comply with the requirements of regulation 61.

Records supporting the design, assumptions and implementation of the PHMP must be kept, including:

- all documentation, drawings and reports relevant to the mine and ground support design
- a record of the manager's support rules and TARPs implemented
- records of equipment, design drawings, modifications, and compatibility trials related to the PHMP
- revisions of the PHMP and associated documents
- risk appraisals and risk assessments relevant to the PHMP, SOPs and associated mine operating procedures (MOPs).

Records demonstrating compliance with the PHMP and the effectiveness of the PHMP shall be kept, including:

- incident and near miss reports pertaining to ground instability
- ground instability incident investigation reports
- results of inspections carried out in accordance with the PHMP
- audits (see Section 14) conducted in accordance

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- with regulation 70 and any other PHMP requirement
- records of reviews of the PHMP and associated procedures
- training records.

Document control shall be carried out according to the mine's document control procedure <ref> Document control. The procedure requires that:

- the PHMP and related documents are located where they are accessible to all personnel
- all material related to the PHMP and distributed for use underground, is clearly readable in restricted underground light
- the PHMP and related procedures, have unique identifiers, review status, revision dates, and page numbers
- the authorised person approves the PHMP and related procedures
- all relevant persons have a copy of the current version of the PHMP and related procedures
- obsolete copies of the PHMP are removed from the workplace.

The mine operator shall provide records of any review of the PHMP to an inspector or health and safety representative, if requested.

### 13 Review

The SSE must review the PHMP at least every two years, from last approval by the SSE, to ensure it remains suitable, adequate and effective.

The review process must address compliance and any requirement for changes to the elements of the PHMP. This should include a:

- review of the risk assessment for ground or strata instability
- review of all other aspects of the PHMP.

All reviews and revisions must be documented and filed in the mine's record system and kept until at least 12 months after the mining operation is abandoned.

### 13.1 EVENT BASED REVIEW

The PHMP will be reviewed after any of the following:

- an accident related to ground control
- material change in:
  - the management structure
  - plant used or installed that could affect ground control
  - mining process or method
  - mining conditions
- audit or other evidence indicates a deficiency in the management of ground control hazards
- a site health and safety representative or industry health and safety representative requests a review
- the mining operation has been suspended, but before the mining operation recommences
- any other event defined in the PHMP.

### 14 Audit

A competent, independent, external person must review the PHMP at least every three years from the date it was approved by the SSE. The audit determines whether the mine activities conform to the PHMP, and whether the arrangements in the PHMP are adequate and correctly implemented.

The external audit may involve desktop and site verification examining adequacy and implementation of the PHMP, and compliance against it.

Where hazard control largely depends upon operator knowledge, skill and application, external audits may cover the following:

- quality and supply of consumables
- suitability and operation of drilling equipment
- selection of support regime
- knowledge and application of manager's support rules
- knowledge and application of TARPs
- strata support installation
- deformation monitoring and interpretation
- ground condition observation skills and application.

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The mine operator must act on the audit findings through the corrective action process, and review mechanisms if required.

Records of all audits of the PHMP must be documented and filed within the mine’s record system and kept for at least 12 months from the date on which the mining operation is abandoned.

## 15 Roles and responsibilities

The roles, responsibilities and competencies of all the key persons responsible for the development, implementation, maintenance, and control of this PHMP are listed below.

Individuals can hold more than one role under the PHMP.

### 15.1 SITE SENIOR EXECUTIVE (STATUTORY POSITION)

The site senior executive must:

- ensure there is an approved PHMP for ground or strata instability
- ensure all persons are assessed as being competent in their area of responsibility under the PHMP by <describe method>
- ensure that the PHMP is reviewed in accordance with the requirements of section 13.

Required competencies:

- a)
- b)
- c)

The mine operator must ensure the SSE has sufficient resources and authority to perform his or her functions, duties, and powers under the Act and Regulations.

### 15.2 MINE MANAGER (STATUTORY POSITION)

The mine manager must:

- ensure compliance with PHMP by<describe method>
- authorise changes to the PHMP, permit to mine, manager’s support rules, and TARPs
- authorise personnel to operate roof support equipment and remedial support

- review and sign the statutory shift reports
- ensure all mine workers receive training in the PHMP and have access to the current version of the PHMP
- co-ordinate audits of the PHMP, including the effectiveness of training and application of procedures
- co-ordinate the investigation of any ground instability and ensure such instability is stabilised
- maintain all health and safety records.

Required competencies:

- a)
- b)
- c)

### 15.3 UNDERVIEWER OR SUPERVISOR (STATUTORY POSITION)

The underviewer or supervisor must:

- complete a *Shift Statutory Report*, as required by regulation 221
- coordinate the implementation of the PHMP at the mine
- ensure that people under their charge are trained in their responsibilities under this PHMP by <describe method>
- ensure there is an adequate stock of support materials available at the mine by <describe method>
- coordinate with the geotechnical engineer and mine manager to rectify any unacceptable ground instability
- ensure that roof support equipment is performing to the required specifications by <describe method>
- co-ordinate remedial ground support in conjunction with the geotechnical engineer
- ensure ground control issues are addressed at the daily and weekly planning meetings by <describe method>
- discuss mining conditions and associated ground instability action plans with deputies/ shift bosses during shift
- communicate to the deputy any changes to the strata support design, manager’s support rules and TARPs

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- ensure that all roadways in the mine are kept on line and driven.

Required competencies

- a)
- b)
- c)

#### 15.4 COAL MINE DEPUTY

[The equivalent position in a metalliferous mining operation is the shift boss.]

The coal mine deputy must:

- take action to rectify any potential for failure of the ground according to the relevant TARP and report immediately to the underviewer
- notify the underviewer of any change to the mining horizon, grade or width that will affect roadway stability and start remedial action to ensure stability is maintained according to the relevant TARP
- notify the underviewer of any actual or suspected unplanned fall of rock
- follow the daily production plan and respond in accordance with TARPs
- ensure that abnormal roof movement in their area of responsibility is investigated according to the relevant TARP
- ensure their workers have a working knowledge of their roles and responsibilities under the plan by <describe method>
- ensure the installation of roof support is carried out as per SOPs, support plans and appropriate work instructions by <describe method>
- install geotechnical monitoring devices as defined by the relevant manager’s support rules
- carry out alternative monitoring as required or as directed by a senior mining official
- take readings from ground control monitoring devices in accordance with the frequency set out in the <ref> *Ground instability monitoring* and report readings on the *Section Shift Report* <ref>
- record all geologic anomalies experienced during mining and report on the *Section shift report* <ref>

- review hazard plans in the crib room with the crews at least weekly:
  - the crew must sign off completed reviews
  - attach the sign off sheet to the *Section shift report* <ref>
- review manager’s support rules and TARPs with the crews when changes are made to the documents or when a new panel starts.
  - the crew must sign off that the review has been done
  - attach the sign off sheet to the *Section shift report* <ref>
- review panel sequence plan at the start of the shift with the crews
- review sequence plan in the daily plan at the start of each shift and inform mine workers of any hazards associated with predicted changes to the mining conditions due to geological anomalies
- record the nature and locations of any abnormal failure of the ground surrounding the mined area, (eg slabbing of the roof strata outbye of the miner rigs, guttering, floor heave, rib spall) in the *Section shift report* <ref>.

Required competencies:

- a)
- b)
- c)

#### 15.5 MINE WORKER

The mine worker must:

- install all ground support in accordance with the relevant manager’s support rules
- install ground control monitoring devices in accordance with work instructions and procedures
- install all roof support materials as per the manufacturer’s specifications and mine site work instructions and procedures
- notify the underviewer of any actual or suspected unplanned fall of rock
- report damaged ground monitoring devices to the coal mine deputy (or shift boss)

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- inform the deputy of the nature and locations of any geological abnormalities that may impact on mining conditions (faults, dykes, rolls, joints, etc) and respond according to the relevant TARP
- inform the deputy of any abnormal failure of the ground surrounding the mined area, (slabbing of the roof strata outbye of the miner rigs, guttering, floor heave, rib spall, etc) and respond according to the relevant TARP
- inform the coal mine deputy of any failure of installed ground support or defective equipment
- report any abnormal or unusual condition to the coal mine deputy and/or the underviewer as soon as possible
- be aware of the current version of the PHMP.

Required competencies:

- a)
- b)
- c)

#### 15.6 GEOTECHNICAL ENGINEER

The geotechnical engineer must:

- document the mine manager's rules and TARPs
- ensure records pertaining to the plan are maintained and reviewed as required by the PHMP
- prepare internal audit/inspection tools
- complete the geotechnical assessment (or ensure a competent person completes it)
- ensure that the geotechnical assessment is updated before major ground control changes are implemented
- review and sign off on all major changes to the mine design layout <ref> *Modification to mine plan*
- investigate abnormal geological conditions and failure of ground support according to Section 11 Ground failure accidents
- ensure deformation monitoring devices are installed in accordance with the relevant SOPs by doing an audit of installation at least every 3 months
- take readings from ground control monitoring devices in accordance with the monitoring frequency set out in the <ref> *Ground instability monitoring*

- review and analyse monitoring results in accordance with <ref> *Ground instability monitoring*
- advise the underviewer/supervisor of the need for any remedial support as determined during inspections
- develop appropriate ground control training material
- ensure that roof support materials are performing to the required specifications by completing/arranging ground support installation audits at least every three months.

Required competencies

- a)
- b)
- c)

#### 15.7 GEOLOGIST

Insert content

#### 15.8 MINING ENGINEER

Insert content

#### 15.9 MINE SURVEYOR (STATUTORY POSITION)

Insert content

#### 15.10 TRAINER

Insert content

#### 15.11 MECHANICAL SUPERINTENDENT

Insert content

#### 15.12 ANY OTHER ROLE REQUIRED UNDER THE PHMP

Insert content

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## 16 Definitions

TERM	
<b>accident</b>	An event that causes any person to be harmed, or in different circumstances might have caused any person to be harmed.
<b>competent person</b>	A person who— (a) has the relevant knowledge, experience, and skill to carry out a task required or permitted by these regulations to be carried out by a competent person; and (b) has— (i) a relevant qualification evidencing the person’s possession of that knowledge, experience, and skill; or (ii) if the person is an employee, a certificate issued by the person’s employer evidencing the person’s possession of that knowledge, experience, and skill.
<b>exploration</b>	Any pre-mining technique used to evaluate the mining area, may include boreholes, seismic methods, magnetic surveys.
<b>extensometer</b>	A device for measuring roof movement at several selected points.
<b>geotechnical</b>	Parameters associated with geology and mining interaction.
<b>hazard</b>	An activity, arrangement, circumstance, event, occurrence, phenomenon, process, situation, or substance (whether arising or caused within or outside a place of work) that is an actual or potential cause or source of harm. Includes— (i) a situation where a person’s behaviour may be an actual or potential cause or source of harm to the person or another person; and (ii) without limitation, a situation described in subparagraph (i) resulting from physical or mental fatigue, drugs, alcohol, traumatic shock, or another temporary condition that affects a person’s behaviour.
<b>hazard plans</b>	A series of plans usually produced by the mine geologist which display information on the seam/ore body, ground conditions, geological features, geotechnical and other strata control related hazards. It shows the interaction of possible mining hazards with intended mine workings.
<b>manager’s support rules</b>	The minimum level of ground support that must be installed at nominated places in the mine.
<b>mining induced stress</b>	Abutment loading or stress transferred onto the roadway by adjacent secondary extraction/stopping activities. Information is gathered to determine the location, magnitude and timing of these abutment loads.
<b>primary support</b>	Ground support installed as part of the development mining cycle that is capable of withstanding the virgin stress and stresses induced by the development operation.
<b>remedial support</b>	Additional support that is installed to maintain an acceptable roadway in response to instability.
<b>secondary support</b>	The support (typically long tendon or standing support) installed to control secondary abutment from adjacent mining operations.

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TERM	
<b>stress environment</b>	The magnitude and direction of stresses acting on an underground excavation arising from the <i>in-situ</i> stress in the rock and the stress induced by the mining of adjacent excavations.
<b>support plans</b>	Plans showing the minimum support to be installed.
<b>tell-tale</b>	A simple device using wires, that measures roof movement at two or four points in the roof.
<b>trigger action response plan (TARP)</b>	A first response plan to strata deterioration designed to prevent a risk from escalating by describing predetermined triggers, actions and responses to be followed by mine personnel. The aim is to re-establish normal mine conditions. Worsening conditions in the mine may require evacuation of the mine.
<b>trigger level</b>	Measured or observed changes from normal conditions that reach a specified level and require initiation of predetermined actions.
<b>unsupported roof</b>	Mine roof strata that is not supported by primary and/or secondary support or temporary support.
<b>virgin stress</b>	The <i>in-situ</i> stress at a point resulting from the weight of the overlying strata and tectonic forces. This stress is defined by measuring the stress magnitude in three component directions – vertical and two horizontal.

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## 17 Appendices

### 17.1 APPENDIX A – RISK ASSESSMENT FOR GROUND OR STRATA INSTABILITY

Risk Assessment for Ground or Strata Instability

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UNCONTROLLED DOCUMENT WHEN PRINTED



## 17.2 APPENDIX B ASSOCIATED DOCUMENTS

### **Geotechnical Assessments**

Company/Consultant Name, *XXXX Mine Feasibility Study, date of report*

Company/Consultant Name, *XXXX Mine Geological and Geotechnical information, date of report*

Company/Consultant Name, *Geotechnical Assessment of proposed mains development at XXXX Mine, date of report*

Company/Consultant Name, *Geotechnical Assessment of proposed extraction area XYZ at XXXX Mine, date of report*

Company/Consultant Name, *Mine Design Guidelines for XXXX Mine, date of report*

### **Management Plans**

<ref> *Health and Safety Management Plan*

<ref> *Emergency Management Principal Control Plan*

<ref> *Inspection Management Plan*

### **Mine Operating Procedures (MOP)**

<ref> *Document Control*

<ref> *Geological Mapping of Roadways.*

<ref> *Ground Instability Monitoring*

<ref> *Specification of Support Rules*

<ref> *Mine Design Guidelines*

<ref> *Compilation of Development Hazard Plans*

<ref> *Compilation of Extraction/Stoping Hazard Plans*

<ref> *Permit to Mine Process*

### **Standard Operating Procedures (SOP)**

#### **Forms**

<ref> *Shift Statutory Report*

<ref> *Section Shift Report*

<ref> *Modification to Mine Plan*

<ref> *Remedial Support Notice*

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**17.3 APPENDIX C – SUPPORT PLANS AND TARPS**

SAMPLE

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**APPENDIX -  
REGULATIONS**

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## This section shows the relevant regulations from the Health and Safety in Employment (Mining Operations and Quarrying Operations) Regulations 2013.

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### **Regulation 11**

#### ***Mine operator must ensure the site safety executive has sufficient resources***

The mine/tunnel operator must ensure that the site senior executive has sufficient resources and authority to perform his or her functions, duties and powers under the Act and these regulations.

### **Regulation 25**

#### ***Mine operator must ensure workers comply with instructions of manager or acting manager***

The mine operator or, as the case may be, the quarry operator or alluvial mine operator must ensure that, in order to ensure compliance with the Act and these regulations, all mine workers comply with all reasonable instructions given by—

- (a) the manager; and
- (b) any acting manager.

### **Regulation 58**

#### ***Periodic review of health and safety management system***

The site senior executive must ensure that the health and safety management system is reviewed and, if necessary, revised—

- (a) not later than 12 months after the date on which the mining operation begins; and
- (b) at least every 3 years after the date of the first review.

### **Regulation 59**

#### ***Additional reviews of health and safety management system***

The site senior executive must ensure that, in addition to any review required under regulation 58, the health and safety management system, or, as the case may be, any relevant part of it, is reviewed and, if necessary, revised—

- (a) before a significant or material change is made to the mining operation
- (b) if a notifiable accident occurs in the mining operation
- (c) if an audit of the health and safety management system, or any part of it, indicates a deficiency in the management of hazards in the mining operation
- (d) if there is evidence that a hazard in the mining operation is not adequately controlled by the measures outlined in the system
- (e) if a site health and safety representative or industry health and safety representative requests the review
- (f) if and when the mining operation is suspended
- (g) if the mining operation has been suspended, before the mining operation recommences.

## Regulation 61

### *Maintenance of records of health and safety management system*

- (1) The mine operator must ensure that the following records are kept:
  - (a) the current version of the health and safety management system;
  - (b) any previous versions of the health and safety management system that applied in the preceding 7 year period;
  - (c) records of all reviews and audits of the health and safety management system, or any part of it, that have been conducted in the preceding 7 year period;
  - (d) records of any risk appraisal carried out to identify principal hazards at the mining operation as required by regulation 66(1)(a).
- (2) The mine operator must ensure that the records referred to in subclause (1) are maintained in such a way that—
  - (a) the current version of the health and safety management system can be clearly identified; and
  - (b) every previous version of the health and safety management system required to be kept is kept as it was while it was current and shows the period during which it was current.

## Regulation 62

### *Providing health and safety management system documentation to mine workers*

- (1) The mine operator for a mining operation must ensure that, before a mine worker commences work at the mining operation,—
  - (a) the mine worker is given a written summary of the health and safety management system for the mining operation; and
  - (b) the mine worker is informed of the right to access the current version of the health and safety management system.
- (2) The mine operator must ensure that the current version of the health and safety management system is readily accessible by a mine worker at the mining operation.
- (3) The mine operator must ensure that a mine worker is given access to—
  - (a) the current versions of the principal hazard management plans that are relevant to the work the mine worker is to carry out; and
  - (b) the current versions of the principal control plans that are relevant to the work the mine worker is to carry out; and
  - (c) the current versions of any other plans or documented processes for the management of hazards that are relevant to the work the mine worker is to carry out.
- (4) If the health and safety management system is revised under subpart 4, the mine operator must ensure that each mine worker at the mining operation is made aware of any revision that is relevant to work being carried out by that mine worker.

## **Regulation 64**

### ***Duty to provide instruction***

The mine operator for a mining operation must ensure that mine workers at the mining operation are provided with suitable instruction in relation to the health and safety management system before commencing work and that a record of this instruction is kept.

## **Regulation 66**

### ***Site senior executive responsible for identifying principal hazards and having principal hazard management plan***

- (1) The site senior executive must—
  - (a) carry out an appraisal of the mining operation to identify principal hazards at the mining operation; and
  - (b) ensure there is a principal hazard management plan for each principal hazard identified.

## **Regulation 68**

### ***Content of principal hazard management plans***

Each principal hazard management plan must include the following:

- (a) a statement as to the nature of a principal hazard addressed by the principal hazard management plan
- (b) a description of how all risk assessments will be conducted in relation to the principal hazard
- (c) the results of any risk assessment completed in respect of the principal hazard
- (d) a description of the control measures to be implemented to manage the principal hazard and the risk of harm it presents to the health and safety of mine workers
- (e) a description of how any specific requirements or duties in the regulations that apply to the principal hazard will be complied with
- (f) a description of the emergency preparedness for the principal hazard
- (g) a description of the roles and their corresponding responsibilities under the principal hazard management plan, including the competencies required to carry out the roles and the details of the responsibilities
- (h) a statement of the periodic review of the principal hazard management plan's continued suitability and effectiveness in managing the principal hazard and the risks related to the hazard at the mining operation, in accordance with regulation 69
- (i) a description of the audit programme in accordance with regulation 70
- (j) any other matter required by these regulations in relation to particular principal hazards.

## **Regulation 69**

### ***Review and revision of principal hazard management plans***

- (1) In addition to the requirements of regulation 58, the site senior executive must ensure that each principal hazard management plan is reviewed at least once every 2 years after the date the principal hazard management plan is approved by the site senior executive.

- (2) In addition to the requirements of regulation 59, the site senior executive must ensure that a principal hazard management plan is reviewed after—
  - (a) the occurrence of an accident at the mining operation involving a principal hazard that it was intended to manage:
  - (b) a material change in the management structure at the mining operation that may affect the principal hazard management plan:
  - (c) a material change in plant used or installed at the mining operation that may affect the principal hazard management plan:
  - (d) the occurrence of any other event as provided in a principal hazard management plan as requiring a review of the plan.
- (3) Any review of a principal hazard management plan under subclause (1) must include—
  - (a) a review of the risk assessment in relation to the relevant principal hazard; and
  - (b) a review of all other aspects of the principal hazard management plan.
- (4) In addition to the requirements of regulation 61, the mine operator must ensure that records of all reviews and revisions of principal hazard management plans are kept for at least 12 months from the date on which the mining operation is abandoned.
- (5) The mine operator must, on request, provide records relating to a review of a principal hazard management plan to an inspector or a site health and safety representative.

## **Regulation 70**

### ***Audits of principal hazard management plans***

- (1) The mine operator must engage, and pay for, a competent person to carry out an independent external audit of all principal hazard management plans, ensuring that—
  - (a) external audits are carried out once every 3 years after the date the principal hazard management plan is approved by the site senior executive.; and
  - (b) the external auditors are independent of the mining operation.
- (2) In addition to the requirements of regulation 61, the mine operator must ensure that records of all audits of principal hazard management plans are kept for at least 12 months from the date on which the mining operation is abandoned.

## **Regulation 71**

### ***Principal hazard management plans for ground or strata instability***

- (1) Following the identification of ground or strata instability as a principal hazard at a mining operation, the site senior executive must ensure that a geotechnical assessment is completed by a competent person to determine the level of ground or strata support required to safely conduct the mining operation.
- (2) A principal hazard management plan in relation to ground or strata instability must, at a minimum, address the following:
  - (a) circumstances under which ground or strata failure may occur at the mining operation; and

- (b) ways in which potential ground or strata failure could be avoided through the design of suitable ground or strata support methods that must have regard to—
  - (i) the characteristics of the area to be supported, including natural and geotechnical features
  - (ii) the surrounding workings, including abandoned or previously excavated workings
  - (iii) the activities to be carried out, including proposed activities
  - (iv) in relation to underground mining operations and tunnelling operations, the size and geometry of the openings in the underground workings; and
- (c) suitable ground or strata support methods that are able to be implemented by means of clear directions and diagrams; and
- (d) continuous modelling, testing, and updating, where required, of the ground or strata support methods; and
- (e) appropriate equipment and procedures to monitor, record, interpret, and analyse data about seismic activity and its impact on the mining operation; and
- (f) collection, analysis, and interpretation of relevant geotechnical data, including monitoring of openings and excavations, where appropriate; and
- (g) maintaining the integrity of ground or strata support, including, for example, by replacing defective supports; and
- (h) allowing for higher standards of support to be installed (for example, more support installed at more frequent intervals) than that required by the principal hazard management plan.

## **Regulation 118**

### ***Installation of ground or strata support***

The mine operator must ensure that—

- (a) no person enters an area of the mining operation that has unsupported ground or strata unless that person is installing or supervising the installation of ground or strata support; and
- (b) where any mine worker who is installing or supervising the installation of ground or strata support will be exposed to a hazard associated with unsupported ground or strata, temporary support is provided to protect that mine worker from the hazard.

## **Regulation 119**

### ***Obligations relating to ground or strata support***

The manager must ensure—

- (a) that suitable ground or strata support methods are designed and implemented for all working areas, in accordance with regulation 118; and
- (b) that plans showing the ground or strata support arrangements put in place are displayed in locations readily accessible to all mine workers.



**Regulation 131*****Steps to be taken following ground or strata failure***

- (1) The mine operator must ensure that,—
  - (a) in the case of an underground coal mining operation, the underviewer is made aware of any actual or suspected unplanned fall of rock or coal; or
  - (b) in the case of an underground metalliferous mining operation, the supervisor is made aware of any actual or suspected unplanned fall of rock or coal.
- (2) Without limiting the requirements of section 7(2) of the Act or regulation 228, the mine operator must ensure—
  - (a) that every report by a mine worker about an unplanned fall of rock or coal is assessed to determine whether the fall of rock or coal could have resulted in serious harm to a mine worker had the circumstances been different; and
  - (b) if the fall of rock or coal could have resulted in serious harm to a mine worker had the circumstances been different, that an investigation is carried out.
- (3) If the investigation reveals that the cause of the ground or strata control is attributable, in part or in full, to a ground or strata support design fault, the mine operator must ensure that the design is reviewed by a competent person who—
  - (a) is independent of the mining operation; and
  - (b) was not involved in the development of the original ground or strata design.
- (4) In addition to the requirements of regulation 61, the mine operator must ensure that the records of any ground or strata failure that caused or had the potential to cause serious harm to any person (including records of the investigation into the causes of the failure) are kept at least until the date that is 12 months from the date on which the mining operation is abandoned.

**Notes**

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**WorkSafe New Zealand**

Level 6  
86 Customhouse Quay  
PO Box 165  
Wellington 6140

Phone: +64 4 897 7699

Fax: +64 4 415 4015

0800 030 040

[www.worksafe.govt.nz](http://www.worksafe.govt.nz)

[@WorkSafeNZ](https://twitter.com/WorkSafeNZ)

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