

QGN 35 The Integration of Critical Controls into PHMPs for Coal Mines in Queensland.

Date

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Revision

3



Resources
Safety & Health
Queensland

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

- *Coal Mining Safety and Health Act 1999 (CMSHA)* ¹
- *Coal Mining Safety and Health Regulation 2017 (CMSHR)* ²

This Guidance Note has been issued by the Coal Inspectorate of Resources Safety and Health Queensland (**RSHQ**). In some circumstances, compliance with this Guidance Note may not be sufficient to ensure compliance with the requirements in the legislation. Guidance Notes may be updated from time to time.

To ensure you have the latest version, check the RSHQ website:

<https://www.business.qld.gov.au/industry/mining/safety-health/mining-safety-health/legislation-standards-guidelines> or contact your local [Inspector of Mines](#).

This publication has been compiled by the Coal Inspectorate of RSHQ

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1.0 Acknowledgements

This Guidance Note is based largely on the International Council on Mining and Metals (**ICMM**) document, Health and Safety Critical Control Management Good Practice Guide³ and the ICMM document Critical Control Management Implementation Guide.⁴ Some adjustments to wording, terminology and processes have been made to provide better alignment with the requirements of the CMSHA and the Queensland mining industry.

This Guidance Note has been reviewed by the Coal Mining Safety and Health Advisory Committee (**CMSHAC**). Coal Mining Organisations represented on the CMSHAC are the Australian Workers Union (**AWU**), Australian Manufacturers Workers Union, Mining and Energy Union, Electrical Trades Union, RSHQ and the Queensland Resources Council.

2.0 Purpose

The purpose of this Guidance Note is to provide guidance on how to take reasonable precautions and exercise proper diligence in the development and integration of critical controls into Principal Hazard Management Plans (**PHMPs**) and their subsequent implementation and maintenance.

Where a coal mine does not have existing critical controls then the information in this Guidance Note should be used to inform the identification, development, and integration of critical controls into PHMPs. Where a coal mine has existing critical controls, this Guidance Note should be used to review the effectiveness of their critical controls, to review compliance with the new provisions in legislation relating to critical controls and as a guide as how to adequately implement and maintain critical controls.

3.0 Scope

The information contained in this Guidance Note is applicable to persons who have obligations under the CMSHA for developing, implementing, and maintaining critical controls for Queensland coal mines.

The scope of this Guidance Note is limited to Principal Hazards, where the threshold for a Material Unwanted Event (**MUE**) is a multiple fatality, being more than 1 fatality. Should a Coal Mine Operator (**CMO**) determine the threshold for a MUE to be a single fatality then the guidance provided in this document could be adopted to assist in the management of single fatality hazards.

4.0 Legislation

The Queensland Coal Mining Board of Inquiry (2020) report ^{5,6} and industry's continued experience with incidents that have the potential for multiple fatalities provides evidence that controls for these incidents have not been effectively implemented and/or maintained. ^{12,13}

This has given rise to the amendments to the CMSHA via the Resources Safety and Health Legislation Amendment Act 2024⁷ (RSHLAA) as provided in Appendix 3.

The provisions relating to critical controls commence on 1 June 2025. These provisions have a one-year transition period, providing industry with a period of 1 year for implementation. As such, mines are required to comply with legislative requirements for critical controls by 1 June 2026.

5.0 Steps to integrate (implementing and maintaining) critical controls in PHMPs

The nine steps for developing, implementing, and maintaining critical controls are:

1. Planning
2. Identify all Principal Hazards and MUEs
3. Identify controls
4. Select the critical controls
5. Define critical control performance
6. Accountability and assigning responsibility
7. Verification
8. Critical control reporting and records
9. Response to inadequate critical control performance

The above process is iterative and on occasions may require revisiting a previous step to achieve the desired outcome.

The following sections provide further guidance on the nine steps, with examples where appropriate.

5.1 Step 1: Planning

Thorough planning for the development, implementation and maintenance of critical controls is essential for success and requires careful consideration for each step.

The Site Senior Executive (**SSE**) should develop a documented plan for the development, implementation, and maintenance of critical controls. The development of a documented plan should include:

- The organisational context, the scope, the objectives and the timeline.
- A record of the threshold decided by the CMO that makes an unwanted event at the coal mine an MUE.
- Consideration of the amendments necessary to the Safety and Health Management System (SHMS) to integrate critical controls into a single SHMS at the mine site.
- How consultation and communication with affected Coal Mine Workers (**CMW**) will be managed for the integration of critical controls into PHMPs.
- The resources required to develop and implement the plan, including:
 - subject matter experts

- consultation with those workers who could be affected by a Principal Hazard, and
- the maintenance of the critical controls
- Responsibilities and delegations
- Competency/training needs
- The tools required to implement and maintain the critical controls, including:
 - Risk assessment/treatment tools (e.g. Broad-Brush Risk Assessment (BBRA) and Bowtie)
 - A control identification process
 - A critical control identification process
 - A Critical Control Information Summary Sheet template, and
 - Critical control auditing and critical control workplace monitoring.

5.2 Step 2: Identify all Principal Hazards & MUE's

This step is to identify all the principal hazards and MUE's that exist at the coal mine, recognising that the prescribed Principal Hazards listed in CMSHR are not exhaustive. Each CMO and SSE for a coal mine have the obligation to identify any additional Principal Hazards that may exist. Examples of additional Principal Hazards, drawn from industry feedback, that should be considered are in Appendix 2.

Identification of all Principal Hazards and MUEs usually takes the form of a BBRA. The main output of the BBRA should be a list of Principal Hazards and MUEs.

If an MUE can be eliminated by improving the design of coal mining operations, an assessment should be carried out to determine whether to do so.

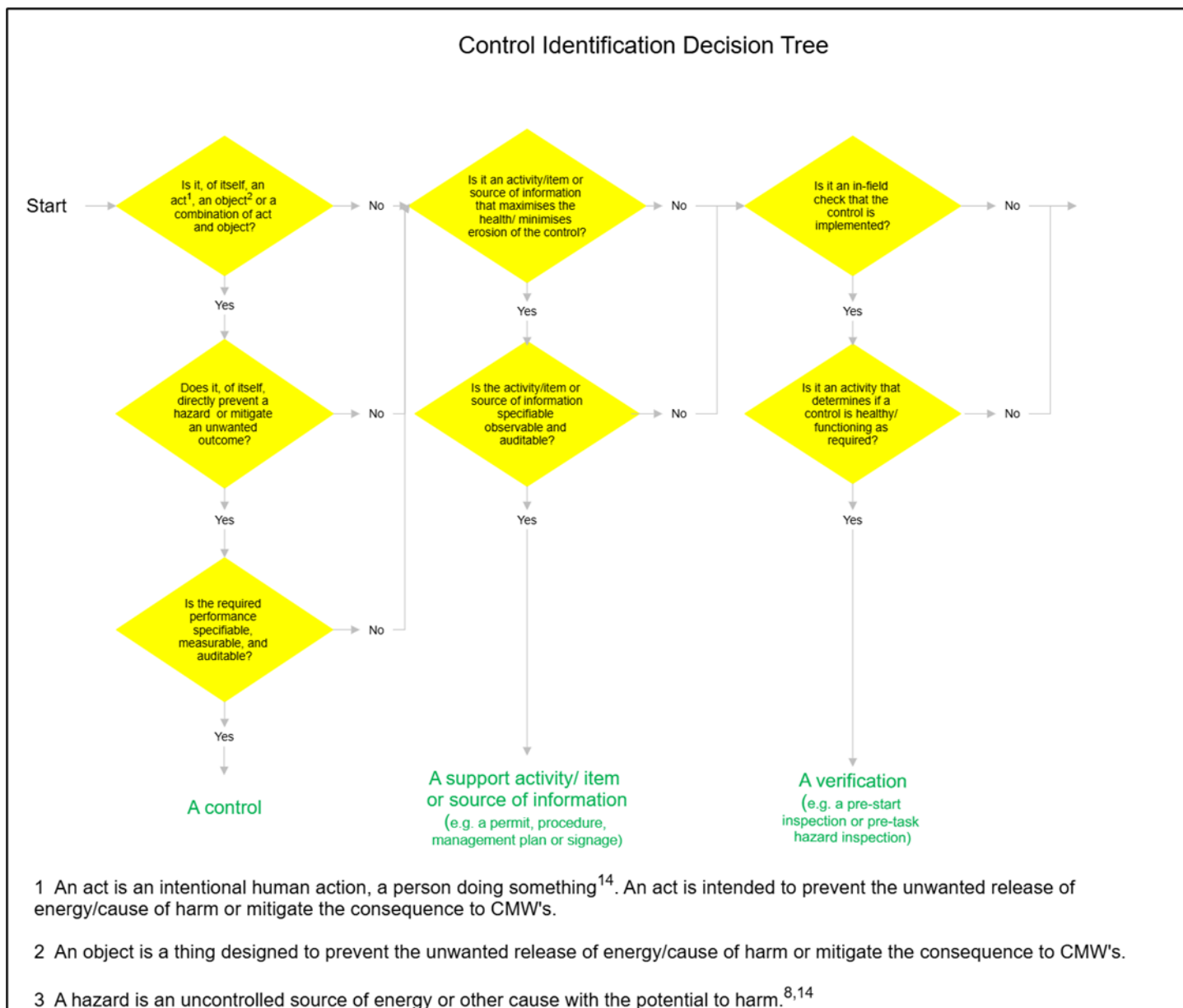
5.3 Step 3: Identify Controls

Having completed Step 2, the SSE should undertake/review issue specific risk assessments for each Principal Hazard and MUE. The purpose is to better understand failure pathways, controls (both preventative and mitigative), the effectiveness of these controls and the overall risk of the principal hazard and MUE.

The issue-specific risk treatment methodology suggested by the ICMM ^{3,4} is the Bowtie Analysis. The SSE may use other recognised methodologies in the development of PHMPs, and identification of critical controls.

Regardless of the methodology used, consequence and likelihood (the risk) should be assessed for each MUE, having consideration for the effective implementation of the identified controls.

The Control Identification Decision Tree below, drawn from the ACARP Report (C25036)¹⁴, provides coal mines with guidance on what is a control and assists in differentiating controls from support activities/items/sources of information and verification activities.



Industry experience suggests that it is possible to identify a number of plans, processes and tools that can be inappropriately classified as controls.⁹ This can lead to unnecessarily complex risk assessments that dilute mine site attention and resources.¹⁰

The below explains how to use the Control Identification Decision Tree.

Underground example - Ground or Strata Failure

One of the controls could be the excavation of roadways (bords) to the approved design. The 'act' is the CMW excavating the roadways (bords) to the approved design. The procedures and approved mining sequence and plans are 'sources of information.' The lasers and tape measures used by ERZCs to confirm drivage alignment and compliance are a 'supporting tool.' The workplace monitoring that the CMW's and ERZCs do are 'verification activities'. The survey scans to check the final excavation against the design is a 'verification'.

Surface example - Ground or Strata Failure

One of the controls could be the excavation of the highwall to the approved design. The 'act' is the CMW excavating the highwall to the approved design. The procedures and approved dig plans are 'sources of information'. The rangefinders used by Mining Supervisors/OCE's to confirm design compliance are a 'supporting tool'. The workplace

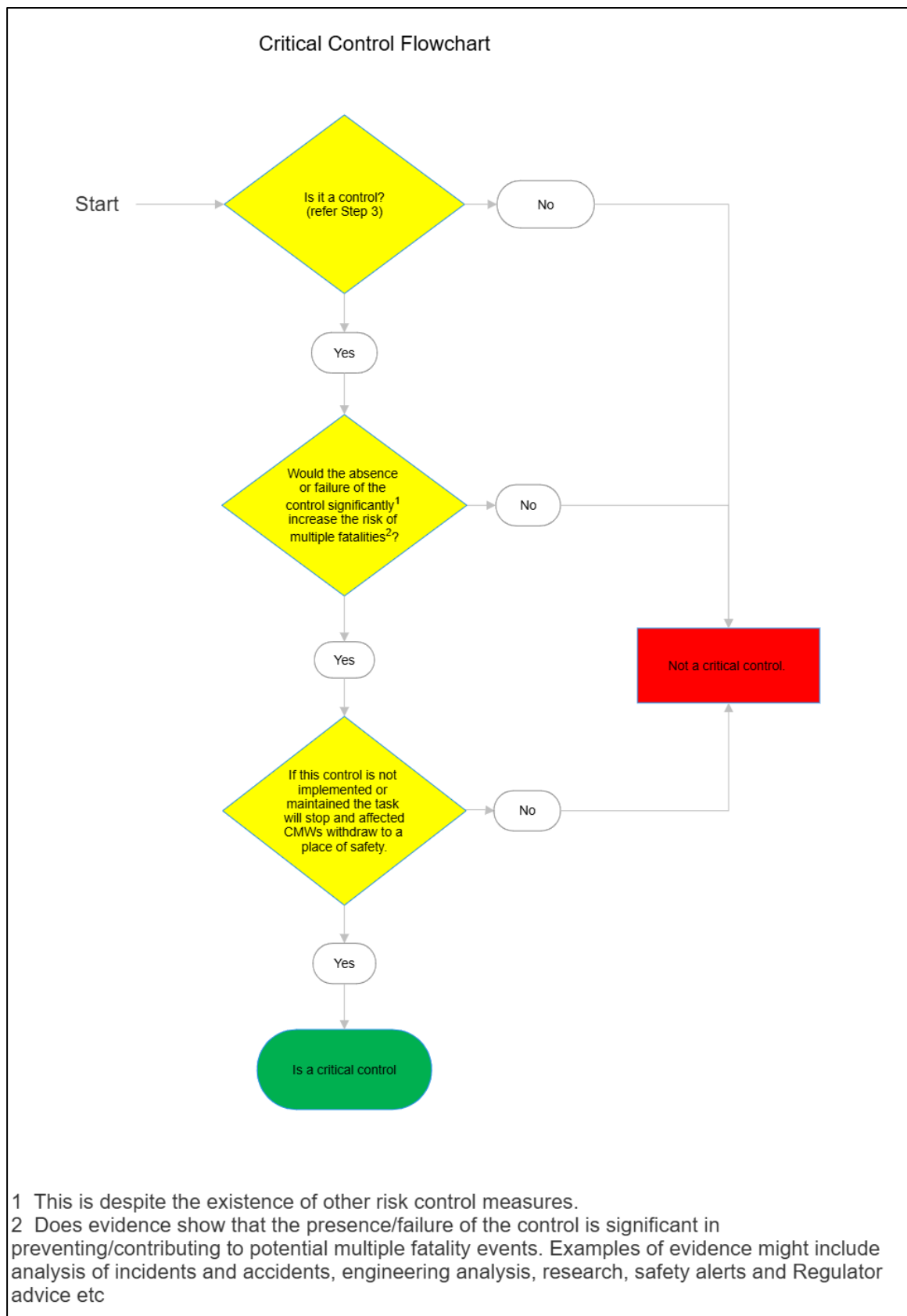
monitoring that the CMW's and Supervisors/OCE do are 'verification activities'. The survey scans to check the final excavation against the design is a 'verification'.

5.4 Step 4: Select the Critical Controls

This step is to determine which controls are critical controls to prevent or mitigate the consequences of an MUE.

The Critical Control Flowchart¹⁵, may assist coal mines in the identification of controls which are critical to the prevention of an MUE or mitigate the consequence of the MUE.

In selecting critical controls, care should be taken to ensure that the selected critical controls are the right control to prevent an MUE or mitigate the consequence of the MUE.



5.5 Step 5: Define Critical Control Performance

This step is to define the critical control information that should be recorded in a PHMP.

Recent studies have identified that this step is often the weakest area of the hazard management process¹⁰, largely due to the loss of important context and information due to the time gap between risk assessment and verification tool development.

To bridge this information gap, critical control information is required to be recorded on a Critical Control Information Summary Sheet^{3,4,10} (or similar) and included in the PHMP. The Critical Control Information Summary Sheet^{3,4,10} (or similar) for each critical control should include the following information:

1. Name of the PHs or MUEs the critical control relates to.
2. MUE owner
3. Name of the critical control.
4. What are the specific objectives related to the PHs or MUEs? (**Objectives**)
5. What are the Critical Control Performance Requirements to meet the Objectives? (**Critical Control Performance Requirements**)
6. What are the support activities that enable the critical control?
7. What is the verification activity to check if the critical control has been implemented and maintained?
8. Role that conducts the verification and the frequency of the verification (By whom and frequency)
9. What is the target performance for the critical control? (**Target Performance**)
10. What is the critical control performance trigger? (**Performance Trigger**)

The Performance Trigger is the point at which the critical control has not been implemented or maintained. At this point the workplace is taken to be “dangerous” for the purposes of s273 CSHA.

An underground and surface mine example of a Critical Control Information Summary Sheet, adapted from the ICMM Critical Control Management - Implementation Guideline ⁴, is provided in Appendix 1.

5.6 Step 6: Accountability and Assigning Responsibility

This step is to define the accountabilities and assign responsibilities for actions required to develop, implement and maintain critical controls at a coal mine.

The SSE must develop and implement the SHMS for their coal mine (which includes PHMPs which, in turn, includes critical controls; s42(c) CSHA).

Roles and responsibilities for critical controls must be recorded in the respective PHMPs and documented in the Management Structure. These roles include but are not limited to:

- the relevant person prescribed in the approved Management Structure with the overall responsibility for managing the risk of the MUE (e.g. MUE Owner),
- conducting auditing activities,
- conducting workplace monitoring activities,
- determining the effectiveness of critical controls by collating, reviewing and analysing information from auditing activities, workplace monitoring and relevant incidents, and
- reporting relevant information.

In developing, maintaining and documenting the Management Structure the SSE should refer to Recognised Standard 22¹¹, including the competencies required to carry out the above roles.

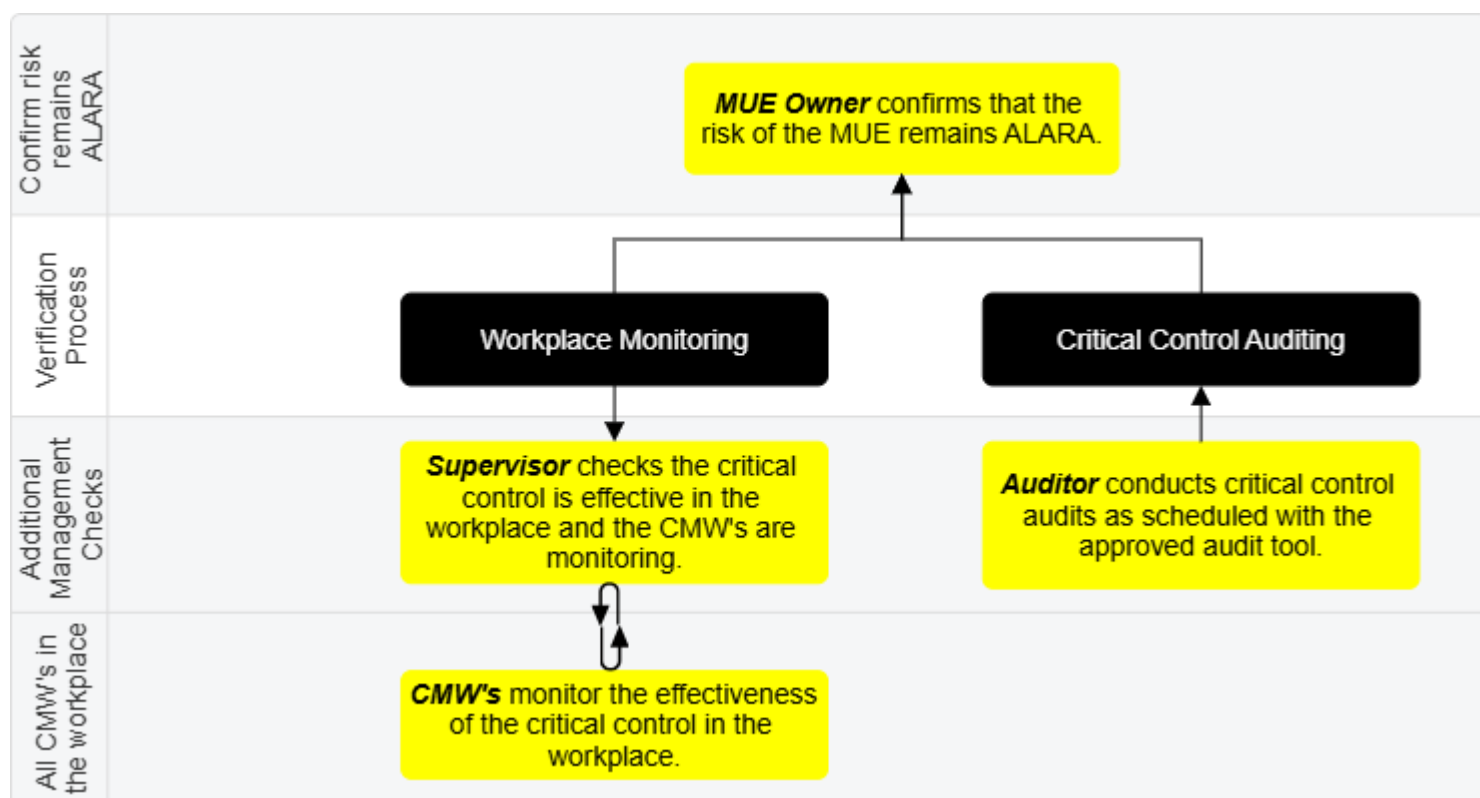
5.7 Step 7: Verification

This step is to verify that a critical control has been properly implemented and is being maintained. Verification is an essential component of the maintenance of critical controls. If steps are not taken to verify a critical control, then the critical control can erode to the point at which the control is not implemented or maintained. At this point the workplace is taken to be “dangerous” for the purposes of s273 CMSHA.

Verification for each critical control consists of two separate processes, being:

- workplace monitoring, and
- critical control auditing.

The below diagram shows the relationships between roles and the verification processes.



a) Workplace Monitoring

Details on how workplace monitoring is conducted and recorded should be documented in the SHMS. (s94 CMSHR)

Workplace monitoring requires examination of the work area by CMWs to confirm critical controls are still effective at reducing the risks of or mitigating the consequences of an MUE. This monitoring should be done prior to starting a task and during the performance of the task.

Monitoring relies on CMWs being able to:

- understand the Critical Control Performance Requirements
- confirm that the critical control is available in the workplace across all risk exposures and is reliably controlling the hazard using the Critical Control Target Performance for the critical control

- take the appropriate actions to correct any erosion of the critical control before it reaches the Performance Trigger, and
- take the appropriate actions when a critical control has not been implemented or maintained

The above information should be detailed in the Critical Control Summary Information Sheet (or similar) for each critical control. (Refer Appendix 1 for examples)

Workplace monitoring also requires the supervisor responsible for the work area or task being completed to monitor the critical controls to check that they remain effective in preventing the MUE or minimising the consequence of the MUE and that CMWs are carrying out their workplace monitoring obligations as required under the SHMS. (s16A CMSHR).

b) Critical Control Auditing

The SSE must establish a way that measures, monitors and evaluates the performance of critical controls to ensure that critical controls are implemented and maintained (s62(5)(e) CMSHA).

The program for the audit of critical controls should include:

- where the audit for each critical control needs to be conducted
- when the audit for each critical control should to be conducted
- how frequently each critical control audit should be conducted
- what needs to be audited for each critical control

The CMO should audit and review the effective implementation and maintenance of critical controls to ensure the risk to persons from coal mining operations is at an acceptable level. (s41(1)(g) CMSHA)

The Officers of the corporation and CMO should use the information from critical control audits to understand the total workload required to effectively implement and maintain critical controls at the coal mine and to ensure that sufficient resources are made available.

5.8 Step 8: Critical Control Reporting and Recording

This step is to report on and record findings of critical control verifications which are necessary components to implementing and maintaining critical controls.

Workplace Monitoring:

The SHMS should provide instruction to all CMWs on how and when workplace monitoring is recorded and reported.

Audits:

On completion of an audit of a critical control there should be communication between the auditor and the MUE Owner. The purpose of this communication is to allow the MUE Owner to review the quality of the completed audit.

Where there is insufficient evidence to support the initial audit findings, the MUE Owner should reject the audit. A rejected audit will require the Auditor to complete the audit to the required quality.

When the MUE Owner is satisfied that the evidence supports the findings, then the MUE Owner should approve the audit. Audits should include corrective actions where applicable. A key consideration for corrective actions is whether better controls potentially exist and should be implemented (e.g., by eliminating the risks of the MUE entirely by changing operations)

The audit, supporting evidence and corrective actions become part of the Mine Record.

Officers of the Corporation, the CMO and SSE should regularly review the outcomes of critical control audits to confirm that the risk of operations remain at an acceptable level (being within acceptable limits and as low as reasonably achievable (s29 CMSHA)).

The SHMS should provide for the results of critical control audits to be systematically reported to all persons who may be affected by the relevant MUE or have responsibilities to implement and maintain critical controls either in the SHMS or under law.

Where a corporation has obligations under the CMSHA and the results of critical control audits are relevant to discharging those obligations, the corporation should ensure that there are appropriate processes for these results to be provided to officers of the corporation so that they can exercise due diligence and ensure that the corporation complies with its obligations.

5.9 Step 9: Response to Inadequate Critical Control Performance

This step details the actions required if critical controls have been identified as not meeting the Target Performance.

A critical control that does not meet the Target Performance is unable to achieve its Objective and should trigger a response which is designed to protect CMWs until the critical control is returned to Target Performance.

Responses should be approved by the relevant person prescribed in the approved Management Structure. These responses should be documented and should, if the Performance Trigger is triggered, include requirements for all persons exposed to the danger to withdraw to a place of safety. (s273 CMSHA)

In responding to the failure to implement or maintain a critical control, the appropriate person under the approved Management Structure should look to other relevant documents in the SHMS for additional actions. These include:

- The reporting process/ requirements
- The investigation process/ requirements
- The review of the risk assessment and the PHMP
- Implementation of corrective actions, and
- The communication requirements

The SHMS should specify how, information about the failure to implement or maintain the critical control occurred and the corrective actions approved to ensure that the risk of the MUE is controlled, is to be communicated to CMWs.

Communicating this information to affected CMWs must be undertaken in a manner that allows the CMW to make an informed decision as to whether undertaking future work exposes the CMWs to an unacceptable level of risk.

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Appendix 1: Critical Control Information Summary Sheet Examples

The following examples are provided to give the reader an understanding of the methodology for the use of the Critical Control Information Summary Sheets. These examples are not to be used by industry without having consideration for the mines specific circumstances.

| Critical Control Information Summary Sheet ^{3,4} | | | | | 2 | MUE Owner |
|---|--|--|--|---|--|-------------------------------|
| 1 | Name of the PH? Name of MUE | Methane Methane ignition on the Longwall | | | | Underground Mine Manager |
| 3 | Name of the critical control? | Sharp picks on shearer | | | | |
| 4 | What are the specific Objectives for the Critical Control? | To reduce the risk of ignition of flammable mixture by reducing the friction between the shearer and rock. | | | | |
| 5 | What are the critical control performance requirements to meet the Objectives? | 6 | What are the <i>support activities</i> that enable the critical control? | 7 | What is the <i>verification activity</i> to check if the critical control has been implemented and maintained? | 8 By Whom and frequency? |
| | Picks meet the acceptable pick profile template, between markers 3 and 5. Picks outside this range are replaced. | | A template of acceptable pick profile is developed | | Picks inspected against the template | CMW At prestart inspection |
| | The quartz content of the stone layer above the coal seam is within the range modelled for the mining area. | | Stone samples are taken as determined by geotechnical advice | | Quartz content of the stone is consistent with historical averages | Geologist Weekly |
| | | | Regular review of quartz content of layer above coal seam. | | Review of quartz content inspection record weekly | Geologist Weekly |
| | | | | | Critical Control Audit of pick replacement and quartz content of the rock. | Undermanager Monthly |
| 9 | What is the target performance for critical control including target range (as appropriate)? | Picks meet the acceptable pick profile template, between markers 3 and 5. Picks outside this range are replaced. | | | | |
| 10 | What is the critical control performance trigger? | Greater than 10 picks are outside of target performance | | | | |
| Critical Control Information Summary Sheet ^{3,4} | | | | | 2 | MUE Owner |

| | | | | | | | | |
|----|---|--|---|---|--|---|-----------------------------|----------------------|
| 1 | Name of the PH? Name of MUE | Surface Mine Gravity (Ground/Strata Failure) Ground/strata failure | | | | | | Surface Mine Manager |
| 3 | Name of the critical control? | Angle of repose for low-wall. | | | | | | |
| 4 | What are the specific objectives for the Critical Control? | To reduce the risk of low-wall failure. | | | | | | |
| 5 | What are the critical control performance requirements to meet the objectives? | 6 | What are the <i>support activities</i> that enable the critical control? | 7 | What is the <i>verification activity</i> to check if the critical control has been implemented and maintained? | 8 | By Whom and frequency? | |
| | Angle of repose for low-wall is an engineered design. Low-wall is less than 35 degrees for material type A and less than 37 degrees for material type B. | | Geotechnical assessment that informs a matrix of acceptable material type vs. water make vs. angle of repose is developed | | Material type vs. water make vs. angle of repose acknowledgement in OCE reports | | OCE Shiftly | |
| | | | Inspection of low-wall stability is carried out | | Visual inspection of the low-wall | | Tech Services Mgr Weekly | |
| | Movement of the low-wall remains within the design performance | | Radar is installed and monitoring the low-wall. | | Check ground movement against TARP levels | | OCE Shiftly | |
| 9 | What is the target performance for critical control including target range (as appropriate)? | Angle of repose for low-wall is not less than 35 degrees for material type A and not less than 37 degrees for material type B. | | | | | | Surface Mine Manager |
| 10 | What is the critical control performance trigger? | Angle of repose for low-wall is 35 degrees or greater for material type A and 37 degrees or greater for material type B, indicate that angle of repose is beyond threshold condition | | | | | | Surface Mine Manager |

Appendix 2: Potential Principal Hazards

Additional principal hazards that may be present at a coal mine, drawn from industry feedback, include the below.

Underground coal mines

| Principal Hazards in Underground Coal Mines | MUE |
|---|---------------------|
| Gravity – (Structural Failure) | Structural Collapse |

Surface coal mines

| Principal Hazards in Surface Coal Mines | MUE |
|---|---------------------|
| Emergency response failure | Common in all MUEs |
| Stored Fluids / Dams / Aquifers | Inrush / Flooding |
| Gravity – (Structural Failure) | Structural collapse |

Appendix 3: Legislation Amendments

The Resources Safety and Health Legislation Amendment Act 2024⁷ amended the CMSHA, to include the following changes below as highlighted in ***bold italics*** font. This becomes legislation on 1 June 2025.

Schedule 3 (Dictionary)

critical control means a risk control measure for a coal mine -

(a) that is critical to -

(i) prevent a material unwanted event at the coal mine; or

(ii) mitigate the consequences of a material unwanted event at the coal mine; and

(b) the absence or failure of which would significantly increase risk despite the existence of other risk control measures.

material unwanted event (MUE), at a coal mine, means an unwanted event in relation to which the potential or real consequence to safety or health exceeds a threshold defined by the coal mine operator as warranting the highest level of attention

30 How is an acceptable level of risk achieved

(2) This Act provides that the systems should incorporate risk management elements and practices appropriate for each coal mine to—

(a) identify, analyse, and assess risk; and

(b) avoid or remove unacceptable risk; and

(c) monitor levels of risk and the adverse consequences of retained residual risk; and

(d) provide for critical controls

(e) investigate and analyse the causes of serious accidents and high potential incidents with a view to preventing their recurrence; and

(f) review the effectiveness of risk control measures, and take appropriate corrective and preventive action; and

(g) mitigate the potential adverse effects arising from residual risk.

47A Obligation of officers of corporations

(1) If a corporation has an obligation under this Act, an officer of the corporation should exercise due diligence to ensure the corporation complies with the obligation.

(2) An officer of a corporation may be convicted or found guilty of an offence under this Act relating to an obligation of the officer whether or not the corporation has been convicted or found guilty of an offence under this Act relating to an obligation of the corporation.

(3) In this section, due diligence includes taking reasonable steps—

(a) to acquire and keep up-to-date knowledge of mine safety and health matters; and

(b) to gain an understanding of the nature of coal mining operations at a coal mine and generally of the hazards, risks ***and critical controls*** associated with those operations; and

- (c) to ensure the corporation has available for use, and uses, appropriate resources and processes to eliminate or minimise risks to safety and health from work carried out as part of coal mining operations; and
- (d) to ensure the corporation has appropriate processes for receiving and considering information regarding incidents, hazards, risks **and critical controls** and responding in a timely way to that information; and
- (e) to ensure the corporation has, and implements, processes for complying with any obligation of the corporation under this Act; and
- (f) to verify the provision and use of the resources and processes mentioned in paragraphs (c) to (e).

62 Safety and health management system

- (5) The safety and health management system should be adequate and effective to achieve an acceptable level of risk by—
 - (a) defining the coal mine operator's safety and health policy; and
 - (b) containing a plan to implement the coal mine operator's safety and health policy; and
 - (c) stating how the coal mine operator intends to develop the capabilities and support mechanisms necessary to achieve the policy; and
 - (d) including principal hazard management plans and standard operating procedures; and **(da) identifying critical controls**; and
 - (e) containing a way of—
 - (i) measuring, monitoring and evaluating the performance of the safety and health management system; and
 - (ii) taking the action necessary to prevent or correct matters that do not conform with the safety and health management system; and
 - (f) containing a plan to regularly review and continually improve the safety and health management system so that risk to persons at the coal mine is at an acceptable level; and
 - (g) if there is a significant change to the coal mining operations of the coal mine—
 - containing a plan to immediately review the safety and health management system so that risk to persons is at an acceptable level.

63 Principal hazard management plan

- (1) A principal hazard management plan should—
 - (a) identify, analyse and assess risk associated with principal hazards; and
 - (b) include standard operating procedures and other measures to control risk; and
 - (c) include critical controls**