



VULCAN MINE

Standard Operating Procedure Isolation and Tagging



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1. PURPOSE

The purpose of this procedure is to describe the requirements relating to:

- isolation and tagging;
- controlling the risk of an unplanned release of energy from plant, including, positively isolating the energy source;
- if an electrical or mechanical energy source is positively isolated testing for zero potential;
- taking plant out of service; and
- returning plant to service.

This procedure has been developed to ensure compliance with section 78 (1) of the CMSHR.

2. SCOPE

This procedure is applicable to all persons at the Vulcan Mine including employees, contractors, and visitors.

The controls within this procedure are mandatory.

3. DEFINITIONS

Authorised Person	A person who has the required competencies and who has been appointed by the Site Senior Executive to carry out a designated scope of duties.
CMSHA	Queensland Coal Mining Safety and Health Act (1999).
CMSHR	Queensland Coal Mining Safety and Health Regulation (2017).
CMW	Coal Mine Worker.
Competent Person	Competence for a task at a coal mine is the demonstrated skill and knowledge required to carry out the task to a standard necessary for the safety and health of persons. The CMW must be assessed as competent and authorised by the SSE or SSE delegate to perform the task.
GVM	Gross Vehicle Mass.
JHA	Job Hazard Analysis.
HV	High Voltage.
LV	Low Voltage.
OEM	Original Equipment Manufacturer.
SHMS	Safety and Health Management System.
SOP	Standard Operating Procedure.
SSE	Site Senior Executive.
SWP	Safe Work Procedure.
Take 5	Personal Risk Assessment.

4. PROCEDURE

4.1. General



VUL-SOP-078– Isolation and Tagging

Effective isolation and restoration are required for any work that has the potential to place personnel or equipment at risk from unexpected movement or the uncontrolled release of energy.

Some plant / equipment may have:

- Multiple energy sources. or
- Remote operation capability. or
- Some form of automatic operation. or
- Multiple isolation points. and
- May require the use of mechanical restraint devices to control energy e.g. chock, safety pin, sling, latch, etc

Energy comes in many forms and most plant and equipment has multiple energy sources, generally these energy sources can be classified as Primary and Secondary energies.

Typical examples of Primary energy are:

- Electrical energy - Batteries, electrical transmission lines, generator, static
- Chemical and Mechanical energy - Diesel Power, Acids,
- Stored energy - Compressed Air, Gas in Pressure Vessels / accumulators, and tanks (where stand alone, not connected to another source)
- Hydraulic Power - Fluid under pressure / Stored energy
- Nuclear energy - Radioactive Devices
- Infrared - Laser Devices

These energy sources may be isolated by valve closure, electrical switching, disconnecting Cables/pipelines or physical barriers. Generally, these Isolation points ensure Positive Isolation. These isolation points should be labelled or signed for ease of identification.

Typical examples of Secondary energy are:

- Mechanical or Stored energy - Springs
- Stored energy - Compressed Air, Gas in Pressure Vessels / accumulators and tanks connected to a primary energy source e.g. pump / motor etc
- Gravitational energy - Imbalanced machinery or elevated equipment, Suspended material in truck bodies or chutes
- Stored, Mechanical, Gravitational energy - Tension in a conveyor belt

After isolation of Primary energies, these Secondary sources may require securing, chocking, discharging, barricading, disconnection, clamping, pinning, valve closure or electrical switching.

Positive Isolation points are used to de-energise plant and equipment through the use of Personal Isolation Locks.

- They are used to prevent accidental or intentional operation of plant and equipment.
- They are not limited to electrical isolations and include mechanical separation, for example:
 - removing a section of pipe from a process and double-blocking and bleeding;
 - removal of drive belts, drive shafts, actuators, etc.;
 - removal of chutes, etc. to prevent engulfment or hazardous atmosphere

Any individual who may be in danger or at risk should plant/equipment be energised shall attach a Personal Isolation Lock to the Positive Isolation Point for the plant or equipment after the plant or equipment has been isolated and consider secondary energy sources.

4.2. Training and Competence

Coal Mine Workers shall only isolate to the level they are trained and competent. If any person is unsure whether they have the authority to isolate, do not isolate and contact their direct Supervisor for confirmation.



4.3. The 12 Step Isolation Process

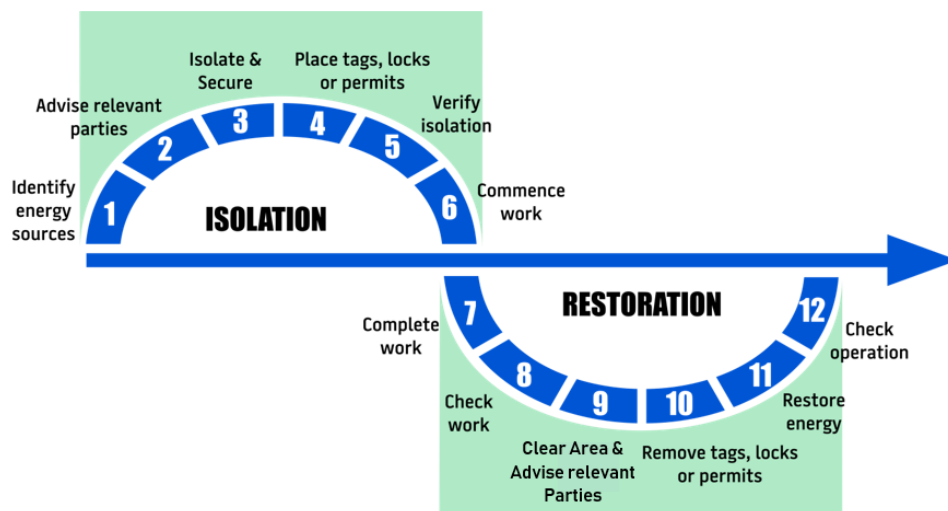


Figure 1 : Isolation Process



STEP	ACTION
1	Identify Energy Sources: 1. Identify all energy sources 2. Confirm isolation point/s for each energy source 3. Consider associated plant or equipment 4. Consider any secondary sources of energy 5. Determine type of isolation required
2	Advise Relevant Parties: 1. Advise Task Coordinator or Supervisor of isolation/s to be completed 2. Notify all people affected 3. If necessary, advise operators to allow for equipment to be left in a safe position
3	Isolate and Secure: 1. Prior to isolating, where necessary shed loads, bleed off stored hydraulic, pneumatic or gas pressure, secure, barricade or chock elevated equipment or material hang-up in chutes, truck bodies etc. 2. Isolate identified energy source/s 3. Confirm energy has been released (do not rely on visible indicators) 4. Do not use auxiliary devices, emergency stop buttons, or push buttons as an isolation point equipment 5. Ensure access to work area is restricted and appropriate signage in place to communicate the hazards.
4	Place Tags or Locks and Permits: 1. Place Tags and Locks, and use of Permits as per appropriate isolation type
5	Verify Isolation 1. All persons locking on should verify isolation has taken place, for example: 2. Check for presence of voltage 3. Attempt to start equipment 4. Check valves in pipelines are in the correct position 5. Opening valves in pipelines (depressurise) 2. Confirm secondary energy sources are secured/isolated 3. Do not assume someone else has verified isolation
6	Commence Work: 1. Carry out required tasks 2. Monitor work area for hazards 3. Ensure all persons entering and conducting work in the area have personal isolation in place as well.
7	Complete Work: 1. Complete all tasks related to the isolation 2. If work is incomplete at the end of the shift, remove Personal Lock, place "Out of Service" tag and advise Supervisor
8	Check Work: 1. Check all work has been carried out and ensure a safe work area e.g.; guards in place and secure 2. Attach an "Out of Service" tag if equipment is not safe or ready for service
9	Clear Area and advise relevant parties: 1. Check all persons working on equipment have completed their tasks and are clear of the area 2. Confirm area has been cleared 3. Rubbish removed, hoses rolled up, spares or replaced parts removed
10	Remove Locks and Permits: 1. Each person must remove his or her own personal Isolation lock. 2. Restoration steps as per relevant procedure for isolation type, e.g.; Single person/single shift, Multiple person/multiple shift, Group Isolation etc., sting
11	Restore Energy: 1. Advise all relevant parties 2. Restore energy
12	Check Operation: 1. Test run equipment 2. If equipment is not ready for service, re-isolate equipment placing Authorised Isolator Lock and "Out of Service" tag



4.4. Isolation Types

Isolation can be broken down into two main categories, Simple (Personal / Individual) Isolation and Complex (Group) Isolation.

4.4.1. Simple Isolation

A simple isolation is for tasks where there are:

- Six or fewer persons working under a Personal Isolation AND six or less isolation points; or
- 12 or fewer persons working under a Personal Isolation on mobile equipment.

Each worker involved with the task must secure their personal Isolation Locks to each isolation point and be trained and assessed as competent in the plant isolation requirements. Training should refer to plant operating requirements and Check Original Equipment Manufacturer (OEM) recommendations and warnings. Determine how each hazardous energy source is to be isolated and controlled.

Every person isolating in a simple isolation must test for verification that the equipment is isolated.

Mobile equipment is defined as self-propelled mobile equipment which is not connected to any other system or fixed energy source. This may include but is not limited to light vehicles, haul trucks, dozers, loaders, and excavators. See 0 Isolation Process Selection below.

4.4.2. Complex Isolation

The complex isolation process is for tasks where there are:

- two or more isolation points and more than six personnel; or
- more than six isolation points.

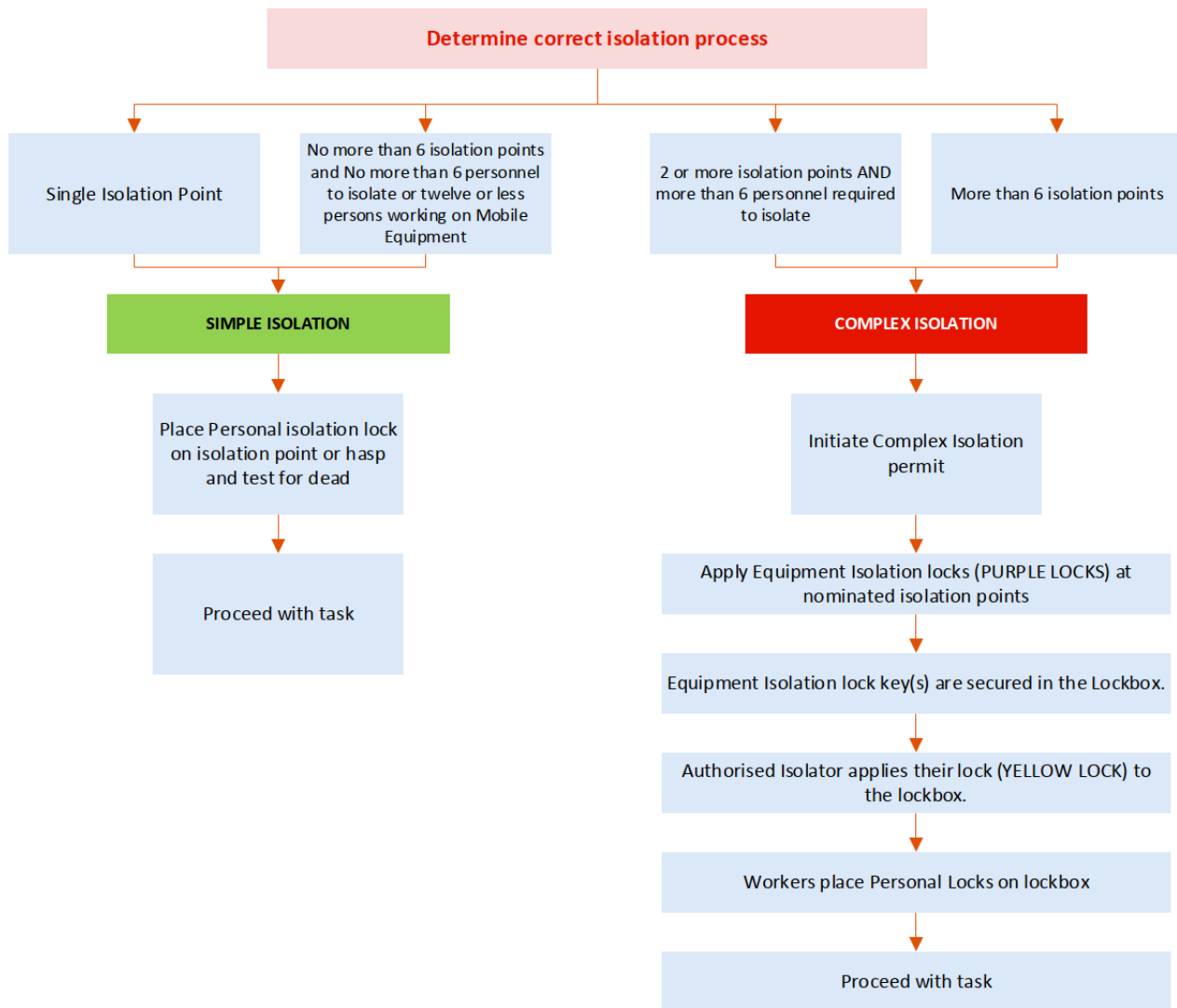
Each isolation point must be controlled by the authorised isolator by applying purple equipment isolation locks to all plant or equipment isolation points. The key for the equipment isolation locks must be placed in the lockbox and secured with a yellow authorised isolator's lock. The approved documentation must be attached to the lockbox.

All personnel working under the issued permit must ensure their Personal Isolation Lock is attached to the Lockbox prior to commencing work. The yellow Authorised Isolator Lock must be attached prior to all and/or any Personal Isolation Locks being applied to the Lockbox.

Personal Isolation locks must not be applied on the Isolation point(s) during a Complex Isolation, and must only be applied to the Lock Box. It requires a VUL-FRM-19-07-Group Isolation Permit. See 0 Isolation Process Selection below.



4.4.3. Isolation Process Selection



4.4.4. Electrical Isolations

Extra low voltage isolations shall be conducted by trained and competent personnel for de-energisation of extra low voltage systems e.g. vehicle systems, Voltage a)50V or less a.c. r.m.s; or b)120V or less ripple-free d.c..

All isolations exceeding extra low voltage isolation and testing for de-energised state must be performed by an appointed electrical worker.

4.4.5. Key Roles

Simple Isolator

Simple Isolators are approved to carry out simple isolations where it is practical for the worker to personally isolate the equipment, and the worker is competent to do so.

Simple Isolators are responsible for:

- personally isolating equipment that they are required to work on as part of the Simple Isolation Process; and
- isolating equipment using fit for purpose isolation equipment, i.e. locks, hasps, chains, cables, valve lockout devices, etc.



Authorised Complex Isolator

Complex Isolators are persons approved to implement complex / group isolations. Complex Isolators must be authorised as per VUL-ATN-17-Complex Isolator.

Complex Isolators are responsible for:

- Isolating equipment using only fit for purpose isolation equipment, i.e. locks, hasps, chains/cables, valve lockout devices, etc.;
- Ensuring they only isolate energy sources that they are authorised to isolate in their area of knowledge;
- Ensuring all sources of hazardous energy have been eliminated or controlled, and locked as part of a complex isolation, prior to making equipment available to be worked on;
- Ensuring that the applied complex / group isolations are clearly documented on a VUL-FRM-19-07-Group Isolation Permit.
- Informing the shift supervisor when the isolation process is completed;
- Informing the relevant personnel when compliance to the Group Isolation Process is not feasible (e.g. positive isolation is not achievable); and
- Communicating with the relevant area owner prior to isolating equipment integral to production – including standby equipment.

Verifying Effectiveness of Isolation

Any person who places a Personal Isolation Lock, and before commencing work, must ensure the effectiveness of isolation has been verified and the equipment is “tested for dead”.

When “testing for dead”, the person applying the isolation must be appropriately trained in isolating that energy source, including how stored energy sources are dissipated.

Some methods for testing for dead are:

- Attempt to start the equipment in each mode of operation to ensure that no unexpected energy source is available.
- Electrician tests for electrical energy.
- Pressure is released; all valves are seated against working pressure.
- All drains are fully open, and the expected volume has drained, the drain valve remains clear and the flow has stopped. Drain valves demonstrating proof of isolation must remain open for the duration of the isolation.

In the event a person is concerned that the “test for dead” has NOT been completed they must report the concern to their supervisor.

4.4.6. Equipment under Test

The Equipment Under Test process is to be used when equipment needs to be energised for the purposes of testing, maintenance, calibration, or commissioning.

An Equipment under Test board must be erected in a visible location close to the equipment undergoing the test. Barriers must be installed to prevent other CMWs from inadvertently accessing the item of equipment undergoing the test. An Equipment under Test tag must be completed in full and attached to the board.

Where a specific SWP does not exist, a JHA must be developed and approved prior to testing.

4.5. Locks

4.5.1. Personal Locks

- Coloured **RED**.
- Carried by every person and is intended to provide personal protection from inadvertent operation of equipment when personnel need to access equipment for maintenance or inspection.
- Clearly marked with the CMW/Isolator name, or if not marked, used in conjunction with a Danger Tag.
- Only one key shall exist for each lock.
- Up to six keyed alike Personal Locks may be issued to employees.

4.5.2. Complex Isolators Lock

- Coloured **YELLOW**.
- Keyed alike within a group lock set and not have a second-party master override key.
- Permanently marked with the plant or equipment identifier.
- Used in conjunction with a multi-lock device and must only be placed by an Authorised Complex Isolator.

4.5.3. Equipment Isolation Lock

- Coloured **PURPLE**.
- Set is stored in lock box.
- Individually numbered locks for each lockbox set.
- Placed on isolation points when a VUL-FRM-19-07-Group Isolation Permit is used.

4.5.4. High Voltage Isolation Lock

- Coloured **BLACK**.
- Keyed alike locks to be used within a HV lock box.
- Applied to all isolated apparatus.

4.5.5. High Voltage Control Lock

- **GREEN** control lock, uniquely keyed.
- To be applied to the HV lock box.
- Be used with a High Voltage Isolation Tag.

They must not be combination locks or have a master key or duplicate keys that can be accessed or used during normal operations. If sites choose to maintain master keys for locks, they must document how these keys will be managed to prevent use during normal operations.

4.5.6. Multi-Lock Device (Hasp)

- Only to be used for Simple Isolations.
- To be fitted by the first person to work on the plant.
- No more than one device attached directly to the isolation point.
- A maximum of two hasps may be used (i.e. daisy chained).
- Each person working on the plant must place their Personal Isolation Lock on the device.



Figure 2 : Multi-Lock Device (Hasp)

4.6. Lockboxes

Lockboxes must be used as part of a system to control Complex Isolations. Lockboxes may be a physical part of a Permit Control Board or separate individual Lockboxes. They may be in a fixed location or as mobile units.

4.7. Tags

Tags are applied to identify the equipment, inform of the status of equipment or identify personnel working on equipment under an isolation.

All tags will have an eyelet large enough to allow direct fitment to a padlock, and a string provided for an alternative attachment method.

Single use tags must be destroyed once removed unless there are specific requirements listed for a type of tag, e.g. Out of Service tags must be handed to a Supervisor (when applicable).

4.7.1. Personal Danger Tags

This is a tag instructing all persons not to operate the equipment stated on the tag. A Personal Danger Tag must only be attached to a Personal Lock whenever an unidentified Personal Lock is used.

All workers using Personal Danger Tags are required to fully complete all information fields provided on the Danger Tag.

The Personal Danger Tag is applied whenever using a personal lock for Personal isolations or when participating in Complex Isolations.

At the end of the job or the shift, personnel must remove only their own Personal Lock and Personal Danger Tag. Where a job extends past the end of a shift, an Out of Service Tag must be attached to the isolation point by the last worker before removing their Danger Tag and Lock. The Out of Service Tag must explain the status of the work being conducted under isolation.

Personal Danger tags cannot be transferred or reused and must be destroyed.



Figure 3 : Personal Danger Tag

4.7.2. Out of Service Tags

The Out of Service Tag IS NOT to be used in conjunction with a Personal Danger Lock and DOES NOT indicate that the item of plant to which it is attached has been isolated. Tags should be written on in permanent marker.

The minimum requirements for use of the Out of Service Tag must apply as follows:

- The Out of Service Tag is used to identify any item or component of an item of plant that is either defective, unserviceable, or would represent a risk to another CMW if it was operated or used.
- The Out of Service Tag can be applied by any CMW if they know, or should reasonably be expected to know, that it is defective, unserviceable or would represent a risk to themselves or another CMW if it was used or operated.
- The Out of Service Tag must be fully completed with details of the person who applied it, the reason for applying it and the date it was attached.
- The Out of Service Tag may only be removed by either the person who placed it OR a person deemed competent to inspect, test and repair that item of plant.
- An item of plant with an Out of Service attached must not be used or operated other than for inspecting and testing the item of plant as part of a repair task.



Figure 4 : Out of Service Tag

4.7.3. Information Tag

The Information Tag is simply a means to convey non-critical information between common users of equipment regarding the condition or status of that equipment.

It **MUST NOT** be used as an alternative to either an Out of Service Tag, Personal Danger Lock or a Personal Danger Tag and **DOES NOT** indicate that the item of plant to which it is attached has been isolated.

Tags should be written on in permanent marker.

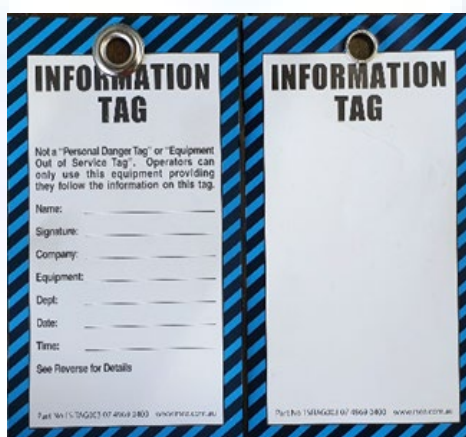


Figure 5 : Information Tag

4.7.4. Equipment under Test Tag

Equipment under Test tags are used as a means of control over isolations by a restricted workgroup to enable testing, maintenance, calibration or commissioning of equipment when the inspector (a CMW qualified to inspect the equipment under test) is in the footprint of the equipment.

Each member of the work group must complete an Equipment Under Test tag and placed on the approved Equipment Under Test board.

Removal of Equipment Under Test tags by someone other than the owner without Supervisor approval is prohibited.

For mobile equipment that is subjected to an Equipment Under Test stage, all workers must apply an Equipment Under Test tag to the Equipment Under Test Board.

After testing is completed, the tag must be destroyed and disposed of in an appropriate manner.



Figure 6 : Equipment under Test Tag

4.7.5. High Voltage Isolation Tag

A HV isolation tag is to be used with a **GREEN** LV Control lock to prevent inadvertent or un-appointed re-closure of HV isolation points, by locking and affixing appropriate HV Electrical Isolation Locks and Tags. This includes all HV isolations.



Figure 7 : High Voltage Isolation Tag

4.8. Failure to Remove a Personal Lock

The following steps shall occur when it is required that a personal lock be removed by someone other than the person who originally installed it:

- All reasonable attempts must be made to contact the person to inform them that their lock needs to be removed and to confirm the persons location. The person may be requested to return to the site to remove the lockout.
- If unable to contact the person, or the person is unable to return to the facility, the following steps are to be performed:
 - It must be verified that the person who installed the lock is no longer at the mine.
 - Before the device is removed, a complete inspection of the affected area must be performed by the relevant Supervisor to ensure that all personnel involved in the isolation are clear and the equipment is safe to return to operating status.
 - The Supervisor is to inform the Site Superintendent of the situation.
 - The Supervisor is to personally remove the lock, returning the equipment to service.
- Prior to allowing the person to return to work, the Supervisor must inform them of the removal of their lock for replacement.



5. ROLES AND RESPONSIBILITIES

SSE	Shall review and approve this procedure.
HST Manager	Shall ensure that all provisions of this procedure are implemented, and that compliance is achieved.
Managers/Superintendents	Shall be responsible for their area of operations and the implementation and application of this procedure; Provide adequate training, information, structure and supervision to ensure that this procedure is implemented; Carry-out a periodic review of activities to ensure the appropriate application and understanding of this procedure; and Ensure immediate and appropriate steps are taken to investigate and rectify any risks to health and safety arising from these activities.
Supervisors	Ensure all CMWs are familiar with, have access to and comply with the requirements set out in this procedure.
All CMWs (including visitors and contactor)	Shall comply with the requirements of this procedure.

6. REFERENCES

- AS 1319-1994 (R2018) Safety signs for the occupational environment
- AS 1674.2-2007 Safety in welding and allied processes – Electrical
- AS 4343:2014 Pressure equipment - Hazard levels
- AS/NZS 3000:2018 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- AS/NZS 3007:2013 Electrical equipment in mines and quarries - Surface installations and associated processing plant
- AS/NZS 4024.1-2019 Series Safety of machinery
- AS/NZS IEC 61111:2020 Insulating mats for electrical purposes
- Coal Mining Safety and Health Act 1999 (Qld)
- Coal Mining Safety and Health Regulation 2017 (Qld)
- DNRME Safety Alert 82 Failure of an Isolation Device
- DNRME Safety Alert 136 Fatal injury to prime mover operator as rim assembly fails
- DNRME Safety Alert 163 Incorrect Isolation of Conveyor
- DNRME Safety Bulletin 41 Working on compressed air lines
- DNRME Safety Bulletin 48 Isolation Facilities for Equipment Operated by Electricity
- DNRME Safety Bulletin 49 Isolation of plant containing stored energy
- DNRME Safety Bulletin 67 Managing high pressure fluids and gases
- DNRME Safety Bulletin 70 Hazards of stored energy
- DNRME Guidance Notes, QGN01 Out of Service Procedures
- DNRME Guidance Notes, QGN02 Isolation of plant
- Electrical Safety Act 2002 (Qld)
- Electrical Safety Code of Practice 2020 (QLD) – Works
- Electrical Safety Regulation 2013 (Qld)
- Safe Work Australia Code of Practice 2018 – Managing electrical risks in the workplace
- VUL-ATN-17-Complex IsolatorVUL-FRM-19-07-Group Isolation PermitREVIEW

This document shall be reviewed at a minimum every two years, or as follows:

- when there is a change of method and/or technology and/or legal or other requirement that may affect the accuracy of this document;
- when operational changes occur that effect the currency of the document;
- when there has been a significant event to which this document was relevant; and
- as a result of relevant audit findings.



7. DOCUMENT CONTROL

Version	Date	Description	Document Controller
01	03/03/2020	Creation of Document	Rachael Dacker
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03	28/04/2021	Review and Formatting	Nicole Davey
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