VULCAN MINE

Standard Operating Procedure

Confined Spaces

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1. PURPOSE

The purpose of this procedure is to describe requirements and to manage the hazards and risks associated with working in confined spaces at the Vulcan Mine.

This procedure has been developed to ensure compliance with section 96 (a) and 96 (c)(ii) of the CMSHR.

- Section 96 (a) controlling access to, and working in, confined spaces at the mine;
- Section 96 (c)(ii) cutting and welding, including using cutting and welding equipment in a confined, wet or dusty location;

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 been assessed as competent and authorised under the authority of the SSE/SSE delegate to undertake a specific task at Vulcan Mine.
Competent Person	A person for a task at a coal mine that has the demonstrated skill and knowledge required to carry out the task to a standard necessary for the safety and health of persons.
CMSHA	Queensland Coal Mining Safety and Health Act (1999).
CMSHR	Queensland Coal Mining Safety and Health Regulation (2017).
CMW	Coal Mine Worker.
CABA	Compressed Air Breathing Apparatus.
CPR	Cardiopulmonary Resuscitation.
ERT	Emergency Response Team.
JHA	Job Hazard Analysis
LEL	Lower Explosive Limit.
LPG	Liquefied Petroleum Gas.
PPE	Personal Protective Equipment.
CABA	Compressed Air Breathing Apparatus.
SHMS	Safety and Health Management System.
SSE	Site Senior Executive.
Stand by Person	A competent person assigned to observe and communicate with those within a confined space.
Take 5	Personal Risk Assessment.
VRD	Voltage Reduction Device.

4. RISK MANAGEMENT

Where Confined Space works are to be conducted onsite or where there is a potential of injury when performing Confined Space work, the risk management process shall be followed to the level of the task being undertaken in accordance with ***VUL-MOP-049-Risk and Hazard Management***.

Risk management is a systematic process to eliminate or minimise the potential for harm to people.

The risk management process shall consider the following points:

- Identification of confined spaces
- Confined space categorisation
- The most appropriate access and egress of a confined space

- The possibility for weather and other environmental conditions to influence the working conditions (e.g., wind, rain, dust, gases, poor lighting, temperature etc.)
- Selection of appropriate equipment
- Selection of appropriate control measures
- Condition of work area
- Potential for engulfment
- Potential of changing atmosphere
- Working in a confined space
- Gas detection devices
- Stand by persons and communication for confined space
- Emergency evacuation plans; and
- Emergency rescue plans;

NOTE - Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, as far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that has been notified to workers, including information, instructions and training in relation to work carried out by the worker in a confined space. If personal protective equipment (PPE) is provided, the worker must so far as they are reasonably able, use or wear it in accordance with the information, instructions and training provided.

5. TRAINING AND COMPETENCY

Personnel required to enter a Confined Space and perform to perform a task shall hold the relevant current competencies and who have been assessed as competent and authorised under the authority of the SSE/SSE delegate to undertake Confined Space work at Vulcan Mine.

Persons authorised and required to work in a confined space shall:

- Be competent in confined spaces; and
- Shall possess a current nationally recognised confined spaces skill.
- Be trained and authorised in monitoring hazardous and toxic atmospheres.

The following competencies are, but not limited to:

Task	Competencies
Confined Space	RIIWHS202 Enter and Work in Confined Space VUL-ATN-05 Confined Space Authorisation
Spotter	RIIWHS202 Enter and Work in Confined Space VUL-ATN-05 Confined Space Authorisation

6. PROCEDURE

6.1. Definition of a Confined Space

Confined spaces include an enclosed or partially enclosed space not intended or designed primarily for human occupancy, within which there is a risk of one or more of the following:

- An oxygen concentration outside the safe oxygen range
- A concentration of airborne contaminant which may cause impairment, loss of consciousness or asphyxiation
- A concentration of flammable airborne contaminant which may cause injury from fire or explosion; or
- Engulfment in a stored free-flowing solid or a rising level of liquid which may cause suffocation or drowning.

6.2. Identification of a Confined Space

A confined space is determined by the structure and a specific set of circumstances. The same structure may or may not be a confined space depending on the circumstances when the space is entered. Entry to a confined space is considered to have occurred when a person's head or upper body enters the space. Refer to ***Table 1 – Identification of a Confined Space.***

A space may become a confined space if work that is to be carried out in the space would generate harmful concentrations of airborne contaminants.

Audits and inspections shall be conducted to identify confined spaces.

Identified confined spaces shall be entered into the ***VUL-REG-18-17-Confined Space Register.***

Confined spaces should at all times be secured against unauthorized entry and, where practicable, permanently signposted. Signs should comply with *AS 1319 Safety signs for the occupational environment*.

Confined spaces are to be individually marked with the corresponding Confined Space ID number for example:

- CS01
- CS02
- CS03
- CS04

As per ***VUL-REG-18-17-Confined Space Register.***

For the purpose of this SOP, a person whose head i.e. The head or upper body is within a confined space, is considered to have entered the confined space.

A person may insert their hand or arm while holding a test instrument or probe into a confined space as part of the evaluation prior to entering.

NOTE - Temporary control measures such as providing temporary ventilation or achieving a satisfactory pre-entry gas test will not cause a confined space to be declassified. For a confined space to be declassified as a non-confined space, it needs to have undergone sufficient changes in structure and use to eliminate all inherent hazards that define a confined space

6.3. Confined Space Permit

A task specific JHA shall be conducted, and ***VUL-FRM-19-02-Confined Space Permit*** issued prior to commencement of any work in a confined space.

Work shall not be carried out in a confined space or hazardous area without an authorised permit.

The authorised permit must have an Emergency Evacuation Plan.

Permits for working in confined spaces shall be maintained in the work area where the work is being undertaken.

6.4. Mandatory Requirements

Work in confined spaces shall only be undertaken when the following guidelines are met:

- Adequate emergency response is identified in a risk assessment (comply with strict requirements for CABA rescue team)
- Adequate precautions are taken to eliminate or reduce risk to an acceptable level
- Where oxygen deficiency exists below 19.5%, authorised and suitable air supplied respiratory protective equipment must be used
- Where atmospheric contaminants such as H_2S, CH4, CO and CO2 (Hydrogen Sulphide, Methane, Carbon Monoxide and Carbon Dioxide) exceed safe exposure, levels authorised, and suitable air supplied respiratory protective equipment is used
- Substances likely to present a hazard to personnel who enter a confined space are removed prior to entry
- All cylinders containing compressed or liquefied gas in the confined space except for cylinders for use with self-contained breathing apparatus are removed

- Only personnel authorised by the authority of the SSE/SSE delegate via ***VUL-ATN-05-Confined Space*** shall enter confined spaces
- Confined space entry IS NOT to take place where large amounts of flammable or explosives materials are present; and
- The atmosphere must be tested prior to entry and continually for oxygen levels, contaminants, temperature extremes, and flammable substances until all person have exited the space.

NOTE - Where oxygen enriched atmosphere above 23.5% exists, or where concentration of flammable contaminants in atmosphere is greater than 5% LEL confined space Work shall not take place.

6.5. Stand-by Person

A stand-by person is a competent person assigned to observe and communicate with those within a confined space. They must be in close proximity to the confined space, but not inside it themselves.

A stand-by person is a mandatory requirement to conduct work in a confined space.

A stand-by person shall:

- Be familiar with the use of the atmospheric monitoring device
- Remain on the outside of, but in close proximity to the confined space for the duration of entry to or work within the confined space
- Maintain constant visual and/or audible contact with personnel working within the confined space for the duration of the task
- Be fully conversant with the emergency rescue arrangements documented on the ***VUL-FRM-19-02-Confined Space Permit***
- Ensure the required emergency rescue equipment is available
- Initiate the emergency rescue arrangements in the event of an emergency situation;
- Be able to contact emergency services at any time
- Notify the Permit Issuer and CMWs signed onto the ***VUL-FRM-19-02-Confined Space Permit*** of any changes in the scope of work or changes to the working environment
- Monitor and log who enters and exits the confined space
- Monitor any equipment outside of the confined space that provides services to those working inside the confined space (e.g., gas cylinders, generators) to ensure they remain functional; and
- Ensure that access and egress is clean and maintained at all times when work is being performed.

NOTE – The Spotter of a confined space shall be authorised by the SSE/SSE Delegate in VUL-ATN-05-Confined spaces. The spotter is NOT to enter a confined space under any circumstances, even to aid injured personnel.

6.6. Isolation Requirements

Prior to any work is to be conducted in a Confined Space the ***VUL-SOP-078-Isolation and Tagging*** shall be considered to identify all energy sources and the potential to affect the CMW/s performing a task in a Confined Space.

Prior to any person entering a confined space, all potentially hazardous services, (including all process services) normally connected to that space shall, where it is possible to do so, be isolated in order to prevent—

- The introduction of any materials, contaminants, agents or conditions harmful to persons occupying the confined space
- The activation or energizing in any way of equipment or services that could pose a risk to the health or safety of persons within the confined space; and
- Isolation of all other energy sources that may be external to, but still capable of, adversely affecting the confined space.

NOTE: Where it is not possible to isolate all potentially hazardous services, appropriate risk control measures should be in place.

6.7. Evaluation of Atmosphere

When persons are in the Confined Space. Assisted ventilation techniques shall be employed where necessary. The atmosphere within the Confined Space must remain or be maintained at safe working levels at all times.

The following conditions must be met before personnel enter a confined space:

- The confined space must contain a safe oxygen level (between 19.5% and 23.5% by volume)
- Atmospheric contaminants in the confined space shall be reduced to levels below the relevant exposure standard
- The confined space shall be free of temperature extremes; and
- The concentration of flammable contaminants in the atmosphere of the confined space shall be below 5% of the LEL.

The concentration of any flammable gas, vapour, mist or dust in the atmosphere of the space must remain at less than 5% of the LEL at all times while work is being conducted in the space.

If at any time the concentration of flammable gas is greater than or equal to 5% of the LEL, work must immediately cease and all workers shall leave the confined space.

Atmospheric testing should include testing by scientific means for;

- Oxygen concentration
- Concentration of flammable airborne contaminants; and
- Concentration of airborne contaminants.

Atmospheric testing or monitoring

- Atmospheric testing or monitoring shall be conducted in a manner consistent with the hazards identified in the risk assessment of the confined space; and
- No person shall enter a confined space to conduct atmospheric testing or monitoring without authority.

Where the risk assessment or the evaluation of the atmosphere identifies a need for retest or monitoring, or because of the potential for later release of airborne contaminants or a variation in oxygen concentration, arrangements should be made to monitor or retest the atmosphere within the confined space, as determined by risk assessment.

NOTE - Where it is not possible to ensure a safe atmosphere within the confined space, no personnel shall enter the confined space unless equipped with suitable PPE, e.g., supplied air respiratory protective equipment.

6.8. Initial Cleaning and Purging

Prior to commencing any task within the confined space, the following shall be completed:

- Where practicable, all solids and liquids which are liable to present a hazard to persons inside the confined space shall be removed from the confined space prior to the entry of personnel
- Where necessary the confined space shall be cleared of contaminants by use of a suitable purging agent
- Care should be taken to ensure cleaning agents do not create additional hazards
- Where required by risk assessment, barriers and signs should be erected to indicate exclusion/prohibition areas surrounding purging vents and openings; and
- When flammable contaminants are to be purged, purging and ventilation equipment designed for use in hazardous places (AS/NZS 60079.10.1) shall be employed and precautions taken to eliminate sources of ignition.

NOTE - Where necessary, the confined space shall be cleared of contaminants by use of a suitable purging agent. The purging agent or any gas used for ventilation purposes shall not be pure oxygen or gas mixtures with oxygen concentration greater than 21%.

6.9. Ventilation

The following guidelines for ventilation shall be adhered to for all confined space work:

- Ventilation of a confined space should be by natural, forced or mechanical means to establish and maintain a safe atmosphere

- This ventilation should be continued throughout the period of occupancy
- Where the maintenance of a safe working environment is dependent on mechanical ventilation equipment for example a fan or blower, the equipment shall:
    - Be continuously monitored while the confined space is occupied; and
    - Have the controls clearly identified. (Including any remote power supply).
- All contaminants should be exhausted in a manner that does not create a hazard external to the confined space; and
- A continuous monitoring program shall be undertaken to ensure the atmosphere is maintained at a safe level.

Where ventilation of a Confined Space cannot be achieved the following must be established:

- Compressed Air Breathing Apparatus; and
- The Confined Space must be treated as an irrespirable noxious atmosphere.

Combustion engines, e.g., those used to drive generators and pumps, should not be used inside a confined space unless risk control measures are implemented to provide for the safety of the atmosphere.

Risk control measures should include the complete removal of exhaust gases and continuous atmospheric monitoring.

The risk arising from the use of combustion engines can be eliminated by using electrically or pneumatically powered equipment.

NOTE - When mechanical ventilation equipment is to be used the ON/OFF switch is to be locked and tagged to guard against unauthorised or unintentional interference. (Isolated in the "ON" position)

6.10. Communication

Prior to commencing confined space work the Supervisor must establish an effective communication system.

Communication can be established by one or more of the following means:

- Unobstructed vision or conversation;
- Clearly defined noise signals;
- Whistles;
- Torch signal;
- Safety ropes; and
- Approved call back device.
- Local UHF channel (away from used channels)

NOTE - The communications shall be established so there is always visual, audible or tactile (touch) communication between those personnel within the confined space and the stand-by person.

6.11. Housekeeping

CMWs working in and around a confined space shall ensure a high standard of housekeeping is maintained. This includes:

- Removal of hazards form the entry point as much as practicable;
- Ensuring there is adequate lighting;
- Being aware of ground/floor conditions;
- Excess materials/rubbish are removed from the work area as the work progresses and/or as soon as practicable;
- Maintaining an escape route;
- Maintaining guidelines, ropes and taglines.

6.12. Gas and Heating Equipment

All equipment shall be in good condition and suitable for the task being conducted and must be compliant with the following:

- An examination of safety equipment shall be carried out before each use;
- Gas welding and heating equipment is to be purged of pressure prior to entry;
- Gas welding and heating equipment is to be ignited with flint gun;
- Gas welding and heating equipment is to be removed from the confined space when not in use.

- The cylinders are to be isolated and equipment purged of pressure;
- In confined spaces, all gas hoses shall be of continuous lengths without joining couplings; and
- For hazardous work adjacent to confined spaces, if joining couplings must be used, they shall be leak tested.

NOTE - LPG heaters are not to be left on during breaks without a stand-by person.

When performing Hot Works in a Confined Space the following work must be in accordance with VUL-SOP-096(ii)-Hazardous Hot Work

6.13. Electrical and Welding Equipment

The following requirements shall be fulfilled before any electrical equipment is used in a confined space:

- Prestart equipment checks, including:
  - Full insulation along length of welding cables ensuring no cuts, tears, etc;
  - Fully insulated hand piece; and
  - Lead couplings and hand pieces with complete insulation.
- Isolation switch installed in the electrode lead for access;
- The isolation switch must be used when changing electrodes;
- Earth to be clamped direct to job as near as possible with the clamp in good working order;
- Work/Earth lead to be shorter than electrode lead where practicable;
- If the welding machine is engine driven, vent engine exhaust gases so as to avoid them being drawn into the working area;
- Earth or electrode lead must not be looped around welder's body at any time;
- Welders to be turned off when not in use;
- Isolate and place locks and danger tags where appropriate as per ***VUL-SOP-078-Isolation and Tagging***; and
- If doubt exists, as to the appropriate safe working practice, workers shall stop and review the necessary information from an appropriate resource.

NOTE - VRDs shall be fitted to all alternating current electric arc welders in use at the Vulcan Mine.

6.14. Flammable Contaminants in the Confined Space

Chemicals that are to be used in the Confined Space are to be site approved and the Chem alert to be checked prior to introducing chemicals into the work area that can affect the atmosphere.

When flammable contaminants are to be purged, purging and ventilation equipment designed for use in hazardous locations should be used and risk control measures taken to eliminate all sources of ignition. For example, fans used to exhaust flammable contaminants should be intrinsically safe.

6.15. Evacuation and Rescue

The sounding of an atmosphere monitoring alarm requires immediate evacuation of all personnel without hesitation or continuance of work.

The type of evacuation or rescue will be dependent on the specific situation and are described in detail in *Table 2* below. Evacuation or rescue may be required in the following scenarios:

- Self-evacuation in the case of a slight injury or suspected hazard;
- Assisted evacuation in the case of an injured or collapsed person; and
- Emergency rescue in the case of atmospheric contamination.

NOTE - Rescue in a confined space must be completed by Trained and Competent Mines rescue personnel. This includes a minimum of 4 rescue persons to conduct a confined space rescue.

Table 1: Identification of a Confined Space

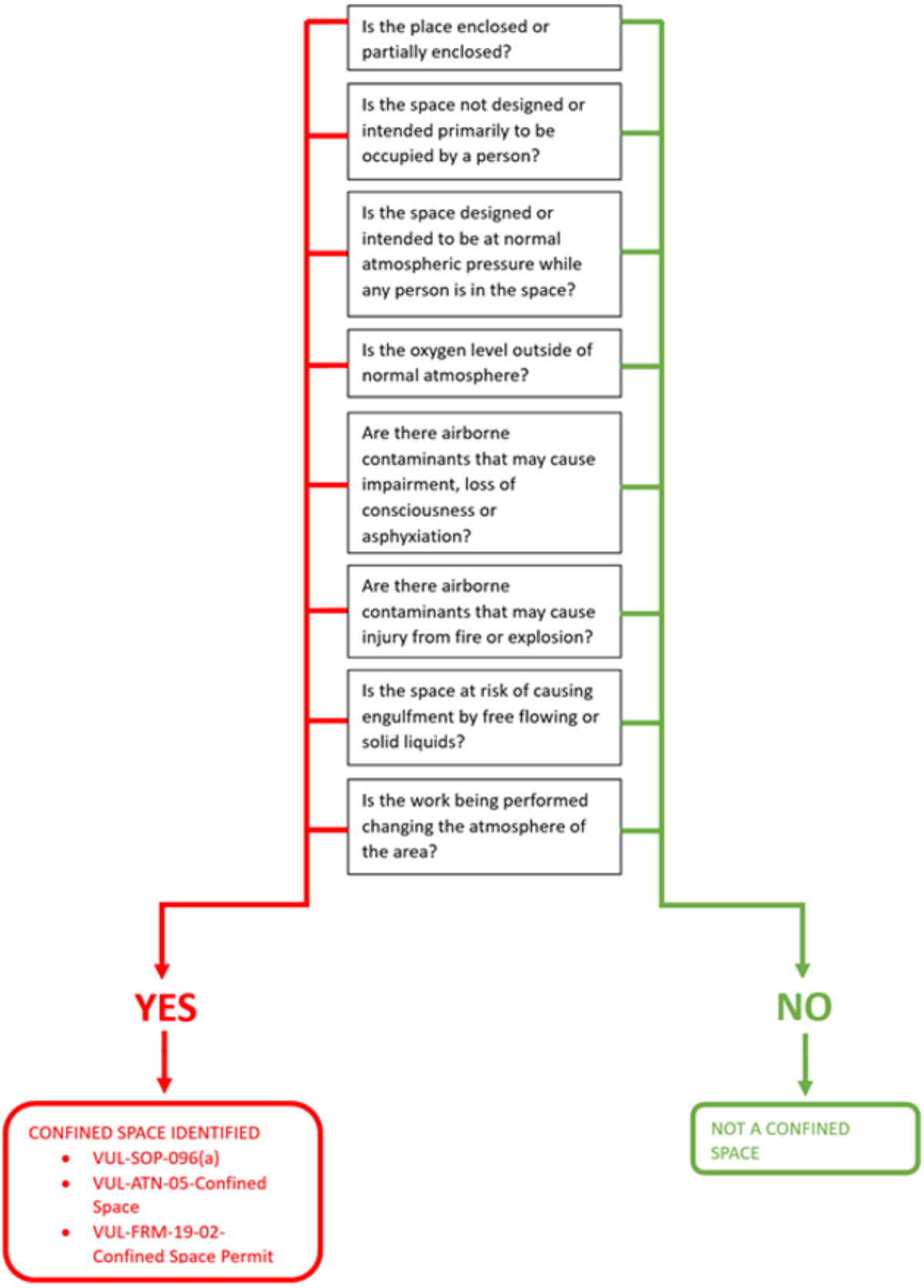

Table 2: Types of Evacuation and Rescue

Evacuation	Description
Self-Evacuation	• Self-Evacuation may become necessary due to a slight injury to a member of the confined space team. Alternatively, a monitoring alarm may indicate a contaminant is present in the atmosphere. • Immediately alert all confined space team members and/or the stand-by person of the hazard/reason for evacuation, the nature of any injury and the route of evacuation. • Evacuate via the quickest, safest exit and means. • Apply necessary first aid where required as soon as it is safe to do so. • The stand-by person will contact emergency response on notification of evacuation where warranted. • The stand-by person will contact the Supervisor in the event of an evacuation of a confined space. • The Supervisor will account for all personnel as soon as the confined space is evacuated.
Assisted Evacuation – Injured or Collapsed Person	• It is necessary to determine whether the reason for injury or collapse is a result of unidentified contamination. Unidentified gases may be the cause of falls or collapse. If the reason for a collapse cannot be determined, a hazardous environment must be assumed, and emergency rescue protocols followed. • Immediately alert others in the confined space and the stand-by persons of the hazard and reason for evacuation. The stand-by person will immediately contact emergency response, before instigating rescue. • The confined space work team must enter via the route outlined in the emergency evacuation plan detailed in the permit. Where atmospheric contamination is suspected, the ERT will initiate the rescue. • Necessary first aid should only be applied within the confined space if the atmosphere is being monitored and can be determined as safe. • The stand-by person is not to enter the confined space or attempt a rescue. • Upon exit all persons are to be accounted for by the stand-by person. • Re-entry to the confined space will only be permitted after the atmosphere has been tested and the confined space made safe.
Emergency rescue in the case of atmospheric contamination	• Immediately alert others in the work team of the emergency. Where the stand-by person is unaware of the condition of the work team or the cause of the emergency, or there is a loss of communication, an event is considered to have occurred and the Confined Space Rescue Plan shall be initiated. • The stand-by person will immediately contact emergency response. • If possible and safe to do so, identify and isolate the hazard. • Where rescue is required, the rescue shall only be conducted by an appropriately trained and equipped ERT. • At all times personnel shall wait for Emergency Response Personnel to provide direction as required. • Upon exit all persons are to be accounted for by the stand-by person. • Re-entry to the confined space will only be permitted after the atmosphere has been tested and the confined space made safe.

7. ROLES AND RESPONSIBILITIES

SSE	Shall review and approve this procedure.
HST Superintendent	Shall ensure that all provisions of this procedure are implemented, and that compliance is achieved.
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.

8. REFERENCES

- AS 1319-1994 REC:2018 Safety signs for the occupational environment
- AS 2865-2009 Confined space
- AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
- AS/NZS 1716:2012 Respiratory protective devices
- AS/NZS 3000:2018 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- AS/NZS 3100:2017 Approval and test specification – General requirements for electrical equipment
- AS/NZS 3190:2016 Approval and test specification - Residual current devices (current-operated earth-leakage devices)
- AS 1316-1994 Safety signs for the occupational environment
- AS/NZS 60079.10.1:2009 Explosive atmospheres – Classification of areas – Explosive gas atmospheres
- Coal Mining Safety and Health Act 1999 (Qld)
- Coal Mining Safety and Health Regulation 2017 (Qld)
- VUL-ATN-05-Confined Space.
- VUL-REG-18-17-Confined Space Register
- VUL-FRM-19-02-Confined Space Permit

9. REVIEW

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.

10. DOCUMENT CONTROL

Version	Date	Description	Document Controller
01	22/05/2020	Initial draft	Rachael Dacker
02	30/06/2020	Risk workshop	Shane Johnson
03	28/04/2021	Review and formatting	Nicole Davey
04	02/09/2021	Review and formatting	Rachael Dacker
05	26/10/2023	Review and Update	Kelly Jensen