



VULCAN MINE

Standard Operating Procedure

Fluid Above and Below Atmospheric Pressure



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1. PURPOSE

The purpose of this procedure is to describe requirements and to effectively manage the hazards and risks associated with hydraulic and pneumatic systems.

The procedure provides guidance to all persons on site involved in the handling, transport, disposal, overhaul, pressurising and de-pressurising of components with the potential to contain pressure greater than atmospheric pressure.

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.
CMSH	Queensland Coal Mining Safety and Health Act (1999).
CMSHR	Queensland Coal Mining Safety and Health Regulation (2017).
CMW	Coal Mine Worker.
Competent Person	A person who has, through a combination of training, education and experience, acquired knowledge and skills enabling that person to perform correctly a specified task.
EMP	Environmental Management Plan.
Fluid	A substance, as a liquid or gas, that is capable of flowing and that changes its shape at a steady rate when acted upon by a force tending to change its shape.
IMS	Integrated Management System.
JHA	Job Hazard Analysis.
NDT	Non-Destructive Testing.
OEM	Original Equipment Manufacturer.
SDS	Safety Data Sheet.
SHMS	Safety and Health Management System.
SOP	Standard Operating Procedure.
Take 5	Personal Risk Assessment.
WRAC	Workplace Risk Assessment and Control.

4. PROCEDURE

4.1. Identification of Pressurised Fluids

Components with the potential to contain fluids at pressure may include:

- hydraulic cylinders;
- hydraulic accumulators;
- suspension struts;
- gas cylinders;
- pressurised pipes; and
- other pressure vessels.

This document does not apply to fluids under pressure in tyres. Refer to the VUL-SOP-072a-Tyres, Wheels and Rims Management.



4.2. Risk Management

When conducting a risk assessment, consideration needs to be given to all potential energy sources and controls established to manage pressurised fluid risks, including the VUL-SOP-078-Isolation and Tagging, relieving stored energy, and testing for zero potential.

For the purpose of this document, a pressure vessel shall be deemed high risk if it is:

- defined as such by a risk assessment; or
- classified as Hazard Level A, B or C as defined by AS 4343:2014 – Appendix B.

4.2.1. Risk control measures

Isolation

Isolation processes ensure high pressure systems are effectively depressurised to ensure all potential energy sources are neutralised.

Engineering

- provision of anti-whip socks and protective sleeves;
- segregation plates or barriers, and; and
- anti-abrasion/ diffusion covers (below).

Administrative controls

- adopt a whole-of-life cycle strategy for the fluid power system components; and
- conduct regular and effective inspections of all components of the fluid pressure system, particularly those areas subject to wear and tear.

4.3. Signage of Pressure Vessels

All identified high-risk components, shall be fitted with signage to warn persons that the component may contain pressure. Signage shall be checked to ensure it is in place and legible as part of the routine service and inspections of the equipment to which it is fitted.

4.4. Use of Pressure Vessels

4.4.1. Pressure Vessels Register

VUL-REG-18-30-Pressure Vessels will record pressure vessels $\geq 150\text{MPa.L}$, (i.e. pressure*volume $\geq 150\text{MPa.L}$) and be maintained within the SHMS. This register will form the basis for identifying pressure vessels which shall be subject to statutory inspection and testing.

4.4.2. Protective Devices

Where required by Australian Standards and/or manufacturer's specifications, vessels containing fluid at pressures greater than atmospheric pressure shall be:

- clearly marked with the safe working pressure to which it may be subjected, as advised by the manufacturer;
- fitted with a suitable pressure gauge;
- fitted with a safety relief valve which will prevent pressure from exceeding the maximum safe working pressure of the vessel;
- temperature control, where specified by the manufacturer; and
- fitted with a suitable appliance to facilitate draining.

4.5. Inspection and Maintenance of Pressure Vessels

4.5.1. Inspections

All pressure vessels and safety devices, as defined by this procedure, shall be included in a preventive maintenance program that will include routine inspections and testing. Testing will only be performed by qualified, certified personnel engaged specifically to do this work.

Inspections and checks will be conducted in accordance with relevant Australian Standards.

In-service inspections must be performed in compliance to AS/NZS 3788 and OEM recommendations.

The inspection interval that applies to most air receivers with a pressure*volume product $>150\text{MPa.L}$ are indicated in brackets:



- External pressure vessel inspections (2 years);
- Internal pressure vessel inspections (4 years); and
- Pressure relief devices (1 year).

Refer to AS/NZS 3788 for inspection intervals on pressure vessels containing fluids other than air or where they operate in harsh environments.

Hard stamped or neatly engraved solid metal tags attached to the equipment with wire should provide the following information:

- Inspection type (e.g. internal pressure vessel);
- Last inspection date (dd/mm/yyyy); and
- Next inspection due (dd/mm/yyyy).

4.5.2. Maintenance

OEM manual shall be consulted and adhered to when performing maintenance on pressure vessels and associate pipes, valves, etc.

4.5.3. Overhaul of Components

Prior to disassembly for overhaul, components shall be discharged where required as per the OEM procedure.

Components may have stored residual energy due to:

- change in ambient temperature;
- shift in component internals during transport;
- failure of discharging valve; and
- inability to discharge due to internal failures or blockages.

4.5.4. Disposal of Components

Any components being disposed shall be drained of fluids, vented to atmosphere and disposed of in accordance with VUL-PLN-005 Environmental Management Plan.

4.5.5. Transport of Reusable Pressure Vessels

Any pressure vessel being transported shall be done so in accordance to the OEM specifications and relevant standards.

4.6. Procurement and Modification of Pressure Vessels

A risk assessment shall be completed prior to the procurement of new pressure vessels and associated equipment for use.

Pressure vessels shall not be modified on site.

4.7. Refilling

Certified systems shall be maintained and refilled by suitably qualified personnel (e.g. fire suppression systems).

4.8. Storage and Transport

Identified high-risk components set for transport from site shall be relieved of any stored fluid energy.

4.9. Air-Powered Tools and Equipment

Air-powered tools and equipment must be maintained and kept in a Fit for Purpose condition and a visual inspection completed every six months.

4.9.1. Installation and Use

Compressed air equipment, including compressors, receivers, plumbing and in-line accessories shall be installed in accordance with relevant Australian Standards.

Usage shall be risk assessed and exclusion zones with due consideration of line-of-fire implemented as required.

A pressure gauge shall be fitted to every pressure regulator.



Airline connectors, placed at air service outlets, should be installed to face downwards. Where practicable, hoses should be secured against inadvertently coming loose (e.g. safety clips on 'MINSUP' couplings).

Air hoses shall be purged before connecting to machinery or air tools.

Always close the air supply valve and relieve pressure before changing air tools or disconnecting air hoses from equipment.

Never use compressed air to blow off clothing or skin.

Filtration and Water Separation - Air line standard filtration should be 10 micron or finer. A correctly sized water separation device should be installed prior to each valve panel, or group of valves.

Air lubricator oil - a suitable mineral oil will be used to fill and refill airline lubricators.

4.9.2. Colour Coding

Equipment and pipelines should be colour coded in accordance with AS2700. Compressed airlines should have a finish coat of Aqua (B25) with a band – white and lilac (P23) at outlets. Pipelines should be clearly marked with direction of air flow.

4.9.3. Inspection and Maintenance

Air-powered tools and equipment will be included in a preventive maintenance program including routine inspections and testing.

Inspections and checks will be conducted in accordance with relevant Australian Standards.

4.10. Emergency response

Emergency response for a suspected fluid injection injury must be fast and coordinated. The injured worker needs to be evaluated as soon as possible by a medical practitioner with expertise in the diagnosis and treatment of these injuries.

4.10.1. Treatment Protocol

- Treat all possible fluid injection injuries as extremely serious or life threatening;
- Training site first aiders in the appropriate response and treatment strategies;
- Providing immediate emergency transport to hospital – depending on the fluid, a high-pressure fluid injury has the potential to be fatal within a few hours if not treated correctly;
- Provide the attending medical professionals or institutions with the SDS for the product suspected of being injected;
- Provide the medical facility that will be treating the patient with documentation that describes the time, date, circumstances and symptoms that have been observed while at site; and
- Ensuring that medical institutions and professionals equipped with the appropriate expertise have been identified and are utilised when a fluid injection occurs.



5. ROLES AND RESPONSIBILITIES

SSE	Shall review and approve this procedure.
HSET Superintendent	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 2700-2011 Colour standards for general purposes
- AS 4343:2014 Pressure equipment – Hazard levels
- AS/NZS 3788:2006 (R2017) Pressure Equipment – In-service inspection
- Coal Mining Safety and Health Act 1999 (Qld)
- Coal Mining Safety and Health Regulation 2017 (Qld)
- DNRME Safety Bulletin 139: Risk management of high-pressure fluids and gases
- Mining Design Guideline 41 – Fluid Power Safety Systems at Mines
- VUL-PLN-005-Environmental Management Plan
- VUL-REG-18-30-Pressure Vessels Register
- VUL-SOP-072a-Tyres, Wheels and Rims Management
- VUL-SOP-078-Isolation and Tagging

7. 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.

8. DOCUMENT CONTROL

Version	Date	Description	Document Controller
01	21/05/2020	Initial draft	Rachael Dacker
02	30/06/2020	Risk Workshop	Shane Johnson
03	28/04/2021	Review and formatting	Nicole Davey
04	1/09/2021	Review and formatting	Rachael Dacker