



VULCAN MINE

Standard Operating Procedure Lasers and Radiation



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1. PURPOSE

The purpose of this procedure is to describe the requirements and to ensure the safe use of ionising and non-ionising radiation (referred to collectively in this SOP as 'radiation') and laser equipment at the Vulcan Mine.

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
CMSHR	Queensland Coal Mining Safety and Health Regulation
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.
HST	Health, Safety and Training
JHA	Job Hazard Analysis.
SHMS	Safety and Health Management System.
SOP	Standard Operating Procedure.
Take 5	Personal Risk Assessment.

4. PROCEDURE

4.1. Ionising Radiation

Ionising radiation sources shall be recorded in the Vulcan Mine Laser and Radiation Register.

Only competent, licenced and authorised personnel are permitted to handle ionising radiation sources.

All locations with radiation must be clearly labelled and sign posted/barricaded (where required) so personnel are aware of the hazards.

All sources of ionising radiation must be shielded to minimise the radiation dose and exposure.

Table 1 : Ionising Radiation Signage

Type of Signage	Example
Ionising Radiation Signage & Barricading	 



4.1.1. Minimise Personal Radiation Doses

The personal radiation doses shall be minimised by:

- minimise exposure time;
- distance: keep as far away as practicable from the radioactive substance;
- 3m separation when unit is in the source holder;
- 10m separation when the source is being added into the hole; and
- appropriate shielding is required according to radioactive isotope.

Radiation doses shall be monitored by the Radiation Safety Officer in accordance with the VUL-PLN-004-Radiation Safety and Protection Plan as required by the *Radiation Safety Act 1999*.

4.1.2. Removal and Storage of Radiation Sources

In the event a source is removed from its sealed containment unit:

- barricades and exclusion zones shall be established around the source;
- manufacturer's instructions shall be followed when handling or using radiation sources;
- once removed from its sealed containment unit, the radiation source shall not be left unattended;
- the radiation source shall be isolated from personnel;
- inform other workers in the immediate area, if sources are to be exposed or there is an activity scheduled which may impact the safety of other workers;

4.1.3. Disposal

The Radiation Safety Officer shall ensure all sources are disposed in the appropriate manner, as per the VUL-PLN-004-Radiation Safety and Protection Plan:

- radiation sources disposed of shall be recorded in the Laser and Radiation Register; and
- only correctly licensed organisations shall collect and dispose of radiation sources from site.

4.2. Electromagnetic Radiation

CMWs must inform their direct Supervisors of any medical condition that may be exacerbated by electromagnetic radiation.

Medical restrictions shall be recorded on the CMW health assessments. Persons with relevant medical conditions or a pacemaker must not work within the vicinity of strong electromagnetic radiation sources.

4.3. Management of Exposure to UV Radiation

To effectively manage exposure to UV radiation, the following elements are considered:

- work areas and tasks that expose workers to UV radiation;
- control measures in place to reduce exposure and the effectiveness of such controls; and
- educating the workforce in the importance of UV radiation protection.

Control measures shall be implemented (Hierarchy of Controls) to eliminate or minimise risk where practicable, such as:

- structures which prevent or limit UV exposure such as permanent or portable shade structures, and tinted glass;
- perform high exposure tasks at early morning, late afternoon or nightshift; and
- providing and using PPE as per the VUL-SOP-065-PPE including sunscreens or block-outs e.g. zinc cream, long clothes and broad hard-hat brims.



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4.4. Lasers

A Laser Safety Officer who has received training to an appropriate level and is knowledgeable in the evaluation and control of laser hazards shall be appointed.

Lasers shall be entered on the Laser and Radiation Register.

Lasers are classed into the following categories:

- Class 1: Fully enclosed laser beam of low power essentially safe in all work areas;
- Class 2: Visible lasers, power low enough for eye protection, natural blink reflex protection;
- Class 3R: Visible lasers, power low enough for eye protection, natural blink reflex protection.
3R Lasers Produce visible and invisible light that are hazardous under direct viewing conditions.
There is low risk for eye injury provided exposure time is short. There is no risk for skin injury.

Class 3B Lasers are not permitted on-site.

General safety precautions are:

- do not look directly into the laser beam;
- do not view laser beams through optical instruments such as theodolites and binoculars;
- the laser must be mounted securely to prevent the beam direction being accidentally altered; and
- ensure personnel in the area are aware of the hazards around lasers in use;
- If prolonged or momentary access to a laser beam is likely, area warning signs which comply with AS 2397 *Safe use of lasers in the building and construction industry* must be displayed in obvious locations, inside and outside the work area and at entry points to the area.
- 3R Laser devices on HWM are on a switch, only active for start of the plunge and will be wired in conjunction with flashing lights and audible alarm to alert CMW of the use of the devices and there will be an announcement to the crew from HWM Operator.
- Signage required for Class 3R Laser devices.

Table 2: Laser Signage

Type of Signage	Example
Laser Signage	

4.4.1. Equipment

Lasers include safety features as part of their design including:

- protective housings;
- access panels;
- master switches; and
- enclosed or semi-enclosed beam paths.

The selection of the laser and the safety features shall be considered prior to use.

4.4.2. Safety Precautions

General safety precautions are:

- do not look directly into the laser beam;
- do not view laser beams through optical instruments such as theodolites and binoculars;
- the laser must be mounted securely to prevent the beam direction being accidentally altered; and
- ensure personnel in the area are aware of the hazards around lasers in use.



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.
Radiation Safety Officer	The radiation safety officer is responsible for advising the manager on matters relating to the implementation of the radiation management plan for the mine. The radiation officer also investigates any defects or malfunctions discovered in plant, equipment or procedure that cause exposure to radiation in excess of dose constraints or limits, or dose rates or contamination levels in excess of authorised limits.
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 contractors)	Shall comply with the requirements of this procedure.



6. REFERENCES

- AS 2397:2015 Safe use of lasers in the building and construction industry
- Coal Mining Safety and Health Act 1999 (Qld)
- Coal Mining Safety and Health Regulation 2017 (Qld)
- Cancer Council SunSmart at work
- DNRME Safety Alert 93 Sunlight and other UV radiation risk management
- DNRME Safety Bulletin 115 Risk management of heat exposure in mining
- DNRME Safety Bulletin 91 Heat stress
- QGL1 Guideline for management of Naturally Occurring Radioactive Material (NORM) in metalliferous mines
- NM009:2010 Standard for sealed radioactive substances incorporated in sealed source apparatus used to carry out industrial gauging
- PR100:2010 Standard for Premises – Ionising Radiation Sources
- Radiation Safety Act 1999 (Qld)
- Radiation Safety Regulation 2010 (Qld)
- Laser and Radiation Register
- VUL-PLN-004-Radiation Safety and Protection Plan
- VUL-SOP-065-Personal Protective Equipment

7. REVIEW

This document shall be reviewed at a minimum two yearly, 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
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