



VULCAN MINE

Mine Operating Procedure Dust Management & Monitoring



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1. PURPOSE

The objective of this Dust Management and Monitoring Mine Operating Procedure (MOP) is intended to provide a consistent approach for dust management, with the aim of continuously reducing respirable dust levels and preventing workers from being exposed to levels of respirable dust outside of the above acceptable levels, and, to ensure that workers do not exceed an average concentration **equivalent** for an 8-hour period.

The MOP has been prepared to meet the requirements of:

- Coal Mine Safety and Health Regulations section 89 and 89A,
- Recognised Standard 20 (Dust Management in Coal Mines); and
- Recognised Standard 14 (Monitoring Respirable Dust in Coal Mines).

The overall aim is to identify harmful dust atmospheres generated as a result of mining activities and naturally occurring background levels, and to control atmospheric concentrations of dust which have the potential to cause harm.

The potential for harm results from a combination of the concentration of dust and the duration of the exposure. As such, section 89 of the Coal Mine Safety and Health Regulations indicates that each coal mine workers exposure to respirable dust is kept at an acceptable level; and the worker does not breathe an atmosphere at the mine containing respirable dust exceeding an average concentration, calculated under AS2985 equivalent to the following for an 8-hour period –

- For Coal dust – 1.5mg/m³ air;
- For free silica – 0.05mg/m³ air

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).
COPD	Chronic Obstructive Pulmonary Disease.
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.
CWP	Coal Workers' Pneumoconiosis.
CMW	Coal Mine Worker.
DEM	Dust Extinction Moisture
JHA	Job Hazard Analysis.
MOP	Mine Operating Procedure
OCE	Open Cut Examiner
RSHQ	Resources Safety and Health Queensland
RSK	Risk Assessment
ROM	Run of Mine.
RS	Recognised Standard



SEG	Similar Exposure Group.
SHMS	Safety and Health Management System.
SME	Surface Mining Equipment.
SOP	Standard Operating Procedure.
SSE	Site Senior Executive.
SWP	Safe Work Procedure
Senior Person	A person appointed to a senior position in the Vitrinite Mine Management Structure
Shall	Indicates a requirement is mandatory
TARP	Trigger and Response Plan
Take 5	Personal Risk Assessment.
WRAC	Workplace Risk Assessment and Control.

4. PROCEDURE

4.1. Requirements

4.1.1. Overview

This MOP is intended to provide an achievable and consistent approach to managing potential dust generated by activities on the mine site.

Sources of dust generation in areas of the mine have been identified through a risk assessment process with dust controls for each activity identified and summarised.

A Respirable Dust and Silica Management WRAC (***VUL-RSK-089-Dust Management-Review Update-29082023***) has been developed to assist personnel with decisions relating to conditions and preventative and mitigating controls.

Where there are any changes to mining methods which result in potential deficiencies in dust management (including dust suppression or maintenance issues) interim controls shall be implemented through the risk assessment process.

These interim controls shall meet legislative requirements (i.e., within acceptable limits and as low as reasonably achievable) until a review of the dust control measures for the activity is conducted.

This will enable the Vulcan Mine to achieve the following:

- Ensuring CMWs do not breathe an atmosphere at the mine containing respirable dust exceeding an average concentration, calculated under AS 2985:2009, equivalent to the following for an 8-hour period—
- i) for coal dust—1.5mg/m³ air;
- (ii) for free silica—0.05mg/m³ air.

Refer to Table 1: Outline of Vulcan Mine Dust sources and controls.

Developing risk treatment measures

All identified factors contributing to the generation of dust are to be recorded and additional risk treatment measures (specific to each situation), are to be put in place to ensure coal mine workers exposure to respirable dust is kept at an acceptable level.

Controls for the management of dust have been identified and documented **Appendix 1.** In circumstances when these controls are not available or put in place, a risk assessment shall be undertaken to determine



further dust management controls for the situation / activity. The hierarchy of control shall be referenced in risk treatment measures.

Identifying Triggers and Related Actions

Figure 1 will help mining equipment operators, mining supervisors and OCE's identify when operational changes or additional controls are needed to minimise dust.

Dust Levels		
Dust levels are being managed. 	<i>Dust levels are increasing, and operators should take all reasonable and necessary action to reduce dust as soon as reasonably practicable.</i> OCE/Supervisor to increase frequency of monitoring. 	<i>Dust levels require operators to take action immediately to control dust.</i> 
Vehicles on Haul Roads	Drilling Rigs	Excavator Loading
		
		
		

This series of photos shows dust levels with and without the application of water to the bench prior to being excavated.

Figure 1- Identifying Triggers and Related Actions



4.1.2. Mandatory Requirements

The core mandatory requirements and expectations of Vulcan Mine are that all workers (including internal employees, contractors, and visitors) will follow the SHMS as it applies when working.

Should a system gap be identified, a supervisor must be notified immediately, and a risk assessment conducted before the work can continue.

Further mandatory requirements identified include the following:

- All workers will comply with CMSHA s. 39 Obligations of persons generally.
- All workers shall be trained, competent and authorised to be on site and to carry out those tasks specific to their role.
- All workers must present themselves in a state fit for duty and unaffected by drugs, alcohol, fatigue and other physical or psychological impairment.
- All workers will conduct a personal risk assessment (i.e., Take 5) prior to undertaking tasks and in the event of a change to the conditions, process, or environment.
- There are risk assessments (JHAs) in place under which tasks are being carried out. These risk assessments may indicate controls that go above and beyond the legislative or SHMS requirements and must be followed.
- Errant behaviours are prevented through compliance to the training scheme and managed appropriately through supervision and site discipline procedures.
- At any stage should a worker feel unsafe or at risk when undertaking a task, they are to stop work, make the area safe (if necessary and possible) and immediately report this to their supervisor; and
- If a worker sights another worker undertaking a task, which they feel is unsafe or at risk, that work may be stopped, and a supervisor immediately notified.
- Each piece of HME shall be fitted with a HEPA filter prior to being utilised in the open cut excavation.
- Effectiveness of cabin pressurisation systems to be tested at each 250hr service interval. Should a piece of plant fail to adequately pressurise the cab, the piece of plant must not be returned to service until adequate cab pressurisation can be achieved.
- New plant to site tested to ensure the effectiveness of cab pressurisation systems before being commissioned.

4.2. Process Definitions

Table 1 – Process Definitions

Inhalable Dust	Inhalable dust refers to the particle size entering the mouth and nose during normal breathing. These particles may be deposited into the respiratory tract. The term inhalable dust applies to both non-toxic and toxic dusts. The inhalable fraction of dust entering the respiratory tract may be further divided into 'respirable' and 'non-respirable' fractions.
Respirable Dust	The respirable dust fraction is composed of the very fine dust which is able to reach the lower bronchioles and alveolar regions of the lung.
Sampling	Sampling is the process of conducting a measure or series of measures of the concentrations of airborne contaminants, such as respirable dust and respirable crystalline silica.



4.3. Hazards of Dust Exposure

Hazardous levels of dust have the potential to cause health problems from respirable dust and safety problems from visible airborne dust. Inhalation is the most common means by which contaminants enter the body.

Health effects of dust exposure depend on:

- The size and nature of the dust particle;
- The chemical composition of the dust;
- Airborne concentration;
- Particle size;
- Exposure frequency; and
- Exposure time.

Dust exposure can pose both acute and chronic health risks, including irritation to the eyes, skin and respiratory tract, impaired breathing, severe allergic reactions and central nervous system effect.

Prolonged exposure can lead to a range of illnesses including silicosis, coal workers' pneumoconiosis, chronic obstructive pulmonary disease, lung cancer and legionellosis.

Potential exposure sources at the Vulcan Mine have been identified as inhalable dust, respirable dust and quartz (crystalline silica). The hierarchy of control for risk management is displayed in **Figure 2**.

Dust may be generated from several sources including:

- Building and construction activities ;
- General Maintenance activities;
- Conveyor operations;
- Exploration drilling; and
- Mining tasks including:
 - Clearing of vegetation;
 - Topsoil removal
 - HME operations generally, Load, haul and dump;
 - Highwall mining
 - Drill and blast;
 - Stockpile operations;
 - ROM operations/Coal processing; and
 - Rehabilitation and topsoil spreading.

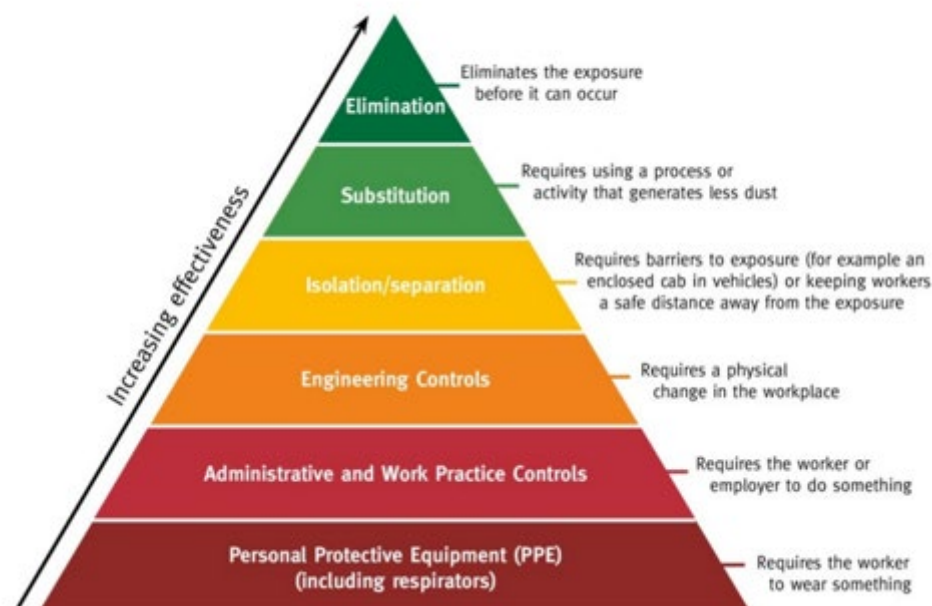




Figure 2 - Hierarchy of Control for the Risk Management of Airbourne Dust (RSHQ Recognised Standard 20)

To ensure that controls are in place and are effective Vulcan Mine has developed a system of review to monitor the effectiveness of controls and implement corrective and preventative actions as require.

4.4. Dust Monitoring Plan

The HST Manager must ensure the mine has a Dust Monitoring Plan as part of the mine's SHMS.

A certified occupational hygienist (or equivalent competency under an international certification scheme), shall be engaged to determine respirable dust levels at the Vulcan Mine, and to ensure the adequacy of and endorse the mine's Dust Monitoring Plan in accordance with Recognised Standard 14.

The occupational hygienist shall:

- Establish similar exposure groups;
- Conduct baseline monitoring (risk identification) to establish the initial estimate of exposure;
- Develop a respirable dust sampling plan that is representative of worker numbers, workers, shift work, tasks performed and conditions at the mine;
- Estimate exposure of a SEG using descriptive statistics;
- Submit their review of the Dust Monitoring Plan to the SSE; and
- Conduct periodic monitoring to ensure the risk exposure is at an acceptable level.

Ongoing sampling shall be conducted by the Occupational Hygienist, at a frequency defined in the Dust Monitoring Plan.

The Dust Monitoring Plan shall be reviewed routinely. The frequency of the review will generally be determined by the duration over which the respirable dust sampling is run (e.g., six-monthly or annually). If there are any changes to the plant, equipment, operating environment or operating methods that have the potential to impact dust exposure levels, the frequency of sampling shall be reviewed and, in some instances, a new baseline established.

The Dust Monitoring Plan and sampling results shall be available to all CMWs via the Mine Record.

Dust monitoring shall take place on each shift at the mine. Records of this monitoring shall be captured within the following documents:

- Vulcan Mine OCE Report.
- Vulcan Mine Supervisor Shift Report.
- Vulcan Mine ROM Shift Report.
- Vulcan Mine Workshop Inspection
- Vulcan Drill and Blast Checklist

4.4.1. Similar Exposure Groups

SEGs are used to identify a group of workers who have the same general exposure to risks. This can include:

- Similarity and frequency of the tasks performed;
- The types of materials and processes used to complete tasks; and
- Similarity of the way tasks is performed.

The SSE shall ensure the established SEGs cover the following areas:

- Coal processing plants (including stockpiles and laboratories);
- Drill and blast operations;
- Excavation operations;
- Haulage operations;
- Topsoil removal
- Rehabilitation activities.
- Maintenance activities;



- Other support services (e.g., pumps, inspections, survey);
- Exploration drilling; and
- Highwall/auger mining.

Further guidance on SEGs can be found in the *Similar exposure groups: coal mine workers' health scheme and RSHQ Recognised Standard 14 Monitoring respirable dust in coal mines*.

4.4.2. Quarterly dust sampling results

The Vulcan Mine shall submit all personal respirable dust monitoring results to the chief inspector every three months.

The periodic dust monitoring results submitted shall include all personal exposure samples collected during the past quarter.

All results should be classified into the SEGs outlined in the department's Similar exposure groups: coal mine workers' health scheme.

The dust monitoring results must be submitted in a format approved by the Chief Inspector.

Dust monitoring results shall be made available to all CMWs via the Mine Record.

4.4.3. Exposure Exceedances

If a personal sample exceeds the relevant exposure limit, an investigation shall be initiated in accordance with Section 8 of Recognised Standard 14. This shall be conducted in consultation with the Occupational Hygienist.

Figure 3 shows the action requirements relating to a single sample exceedance result with reference to the applicable sections of CSMHR 2017. These requirements apply if a single personal exposure dust sample result shows that the average concentration of respirable dust in the atmosphere of the work environment exceeds the levels stated in Section 89 (1) of the CSMHR 2017.

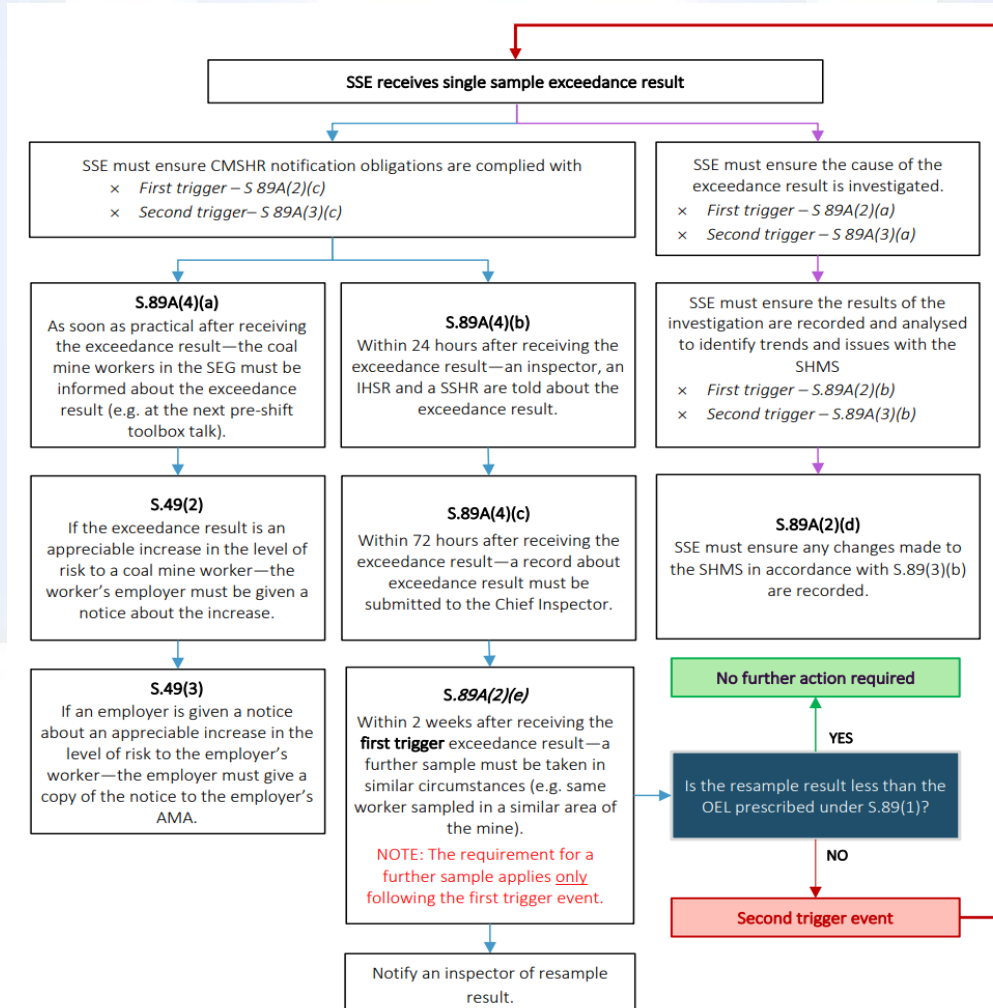




Figure 3– Single Sample Exceedance Requirements

4.4.4. Respiratory Protective Equipment

Where persons are required to work in areas of excessive, otherwise uncontrollable dust, they shall be provided with, and required to wear, suitable RPE.

RPE shall be to the Australian Standard and calibrated in accordance with AS/NZS 1715, and personnel shall be 'Fit Tested' in accordance with the **VUL-SOP-065-PPE**.

4.5. Coal Mine Worker's Health

Testing of all CMWs for detrimental health effects caused by respirable dust is a requirement of the Queensland Coal Mine Employee's Health Assessment Scheme. This is conducted during the pre-employment medical and at least once every five years or advised by the Appointed Medical Advisor (AMA). Participation in the medical assessments is mandatory.

4.6. Training

The mine's SHMS includes a requirement for all CMWs to be educated to understand the airborne dust health impacts and control mechanisms relative to their mine. This education is provided during the Vulcan Mine induction process. Education and training in relation to dust exposure is in accordance with Section 11 of Recognised Standard 20.



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.
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 2985-2009 Workplace atmospheres - Method for sampling and gravimetric determination of respirable dust
- AS 3640-2009 Workplace atmospheres - Method for sampling and gravimetric determination of inhalable dust
- AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
- Coal Mining Safety and Health Act 1999 (Qld)
- Coal Mining Safety and Health Regulation 2017 (Qld)
- RSHQ Information Sheet – Similar Exposure Groups (SEGs)
- RSHQ Recognised Standard 14 Monitoring respirable dust in coal mines.
- RSHQ Recognised Standard 20 Dust control in surface mines System.
- RSHQ Safety Bulletin 151 Preventing dust-related lung diseases.
- RHSQ Safety Bulletin 88 Management of dust containing crystalline silica (quartz)
- NOHSC 3008: Exposure standards for atmospheric contaminants.

7. RELATED DOCUMENTS

- VUL-PLN-001-Safety & Health Management Plan
- VUL-SOP-065-Personal Protective Equipment
- VUL-SOP-021 Electrical Work section 14.
- VUL-TAR-001 Post Blast Fumes
- VUL-FRM-19-05-Hot Work Permit
- VUL-SOP-096c(ii)-Hazardous Hot Work - sec4.10. Ventilation
- VUL-FRM-02-05-Hot Work Hazard Assessment
- VUL-SOP-072a-Tyres, Wheels & Rims Management
- VUL-RSK-089_Dust_Review_update_0923
- VUL-FRM-11-01-OCE Report
- VUL-FRM-11-24-Supervisor Shift Report
- VUL-FRM-11-25-ROM Shift Report
- VUL-FRM-11-05-Workshop Inspection
- VUL-FRM-16-04-Drill Blast Pattern Checklist



8. 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.

9. DOCUMENT CONTROL

Version	Date	Description	Document Controller
01	21/05/2020	Initial draft	Rachael Dacker
02	10/07/2020	Risk Workshop	Shane Johnson
03	28/04/2021	Review and formatting	Nicole Davey
04	1/09/2021	Review and formatting	Rachael Dacker
05	13/09/2023	Review and Update	Kelly Jensen
06	09/12/2024	Review & Update	Kelly Jensen

10. APPENDIX 1 - Dust Source Activities and Controls identified by Risk Assessment

Hazards	Controls Identified but Not Limited to:
Exploration Drilling: - Drilling is an activity that can generate excessive dust, and this dust then has the potential to cause secondary exposures post drilling activities (e.g., Blast crew). - Dust suppression shall be implemented during the drilling process with due consideration to the controls.	<i>Fitted dust suppression systems must be operational during the drilling process.</i> <i>Water must be used when removing cuttings from drill holes with compressed air to control airborne dust.</i> - where dust is being discharged through ducting, positioning the ducting so dust will not blow back on the operators or others working in the vicinity. - controlling dust at the source if using a cyclone sample collector and during the crushing and splitting of samples - operating drill rigs from a well-sealed air-conditioned cabin – the cab needs to be pressure checked on a maintenance schedule to confirm pressurisation. - Scheduled inspection and replacement of filters or cleaning filtration devices and systems to prevent dust build-up. <i>When drilling exploration rigs fitted with compressed air, controls need to be implemented to ensure the safety of persons on the ground in the near vicinity. The following controls shall be implemented:</i> - Drill rigs to be fitted with fixed diverters (engineered T Piece), pressed into the ground over the bore hole casing, dust collection cyclone. - Compressed air drilling – drill rigs to be fitted with fixed diverters (engineered T piece), pressed into the ground over the borehole casing. - Drill site set up - ensures T piece is angled away from people and equipment. - Dust suppression via water injection - Drill site inspections to include checks for dust generation. - Drill bits and drill rods size match to allow adequate annulus (this will allow the cuttings to be ejected from the hole without being subjected to extra grinding and size reduction. - Maintenance of drilling equipment to original equipment manufacturers (OEM's) specifications – including cleaning filters on cabs VUL-FRM-16-04-Drill and Blast Pattern Checklist must be completed before undertaking work on a newly established pattern. <i>Inspections – supervisors and OCE's to check for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report.</i> - Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Mine design and Site Plan	Early mine planning shall consider dust generation to minimise airborne dust. This includes, but is not limited to: - sequence of production operations, particularly in known high risk areas - predominant wind direction, and environmental conditions such as temperature inversion layers The location of:



- crib huts, workshops, offices, parking areas, camps etc
 - coal processing plants
 - coal crusher / breaker stations and transfer points
 - coal stockpiles
 - tailings dams and reject dumps.
 - refuelling stations
 - *Water cart fill points reduce travel time for watercarts.*
 - dedicated maintenance shutdown areas
 - dust generating activities external to the mine.
 - and accessibility of water for dust suppressing
 - external sensitive receptors / stakeholders
- Mine roads**
- Design of mine roads shall take into consideration:
 - the geographical location of the road in relation to surface mine facilities and infrastructure
 - selecting road surface material that minimizes dust generation.
 - the frequency of use and travelling speeds
 - sealing of mine road surfaces where sensitive areas may be impacted (offices, workshops, public roads etc).
- Geological conditions**
- Mine design shall consider the issue of whether present or anticipated geological conditions will create excessive airborne dust exposure. This may be achieved by analysing geological / geotechnical drill data to understand for example the in-situ silica content within the overburden strata. Consideration shall be given to coal constituents.
- Operational planning and design review**
- Based on continuous improvement principles, the mine SSE shall review the availability of new operating methods (e.g. or more effective higher order engineering controls to minimise dust generation (e.g., ventilation, water treatment and filtered, pressurised mobile cabins). During operational planning and design
 - review, the mine SSE shall consider implementation of controls that address relevant factors including, but not limited to, the following:
 - Recognised Standard 20 Dust control in surface mines 12
- Implementation of new technology or mining methods**
- When implementing new mining methods or technology ensure the SHMS can demonstrate compliance with change management and effective implementation that considers:
 - documented evidence for the basis of the technology or method being selected, including documented evidence demonstrating the effectiveness of the new controls.



	the introduction of any hazards from the implementation of any new technology, and the potential impacts to limit reliance on personal protective equipment as an interim measure.
Plant Selection	<i>When selecting equipment or undertaking major overhauls on existing mobile plant, the following shall take place.</i> - The ability to continuously monitor cabin pressure with a system that alarms when the pressure is not adequate. <i>The ability to remove dust that has been brought into the cabin on boots and clothing or when doors are opened. Respiratory PPE must be utilised when cleaning cabs to reduce the risk of inhaling dust.</i> <i>Adequate cabin sealing to assist in pressurisation of the air space.</i> - Seats in mobile plant (including light vehicles) shall be covered wherever possible to inhibit the ingress of dust. A cab pressurisation system must be installed that maintains a positive differential pressure within the cab of: 50 Pa minimum; or 20 Pa minimum, if a device informing the operator when the pressure drops below 20 Pa is provided. <i>Cab pressurisation systems are to be tested at each 250hr service interval.</i>
Highwall mining operations	<i>Operational water sprays to be installed and operational on the following:</i> - Cutter head - Coal transfer points. <i>All efforts shall be made to reduce the freefall of coal wherever possible.</i>
Crushing/Screening operations and Maintenance	<i>When mobilising screening/stacking units, the CMW and associated spotter in control of the unit must position themselves upwind of any dust being emitted from the unit whilst it is being moved.</i> <i>If CMWs are required to work on the ground in close proximity to operational screening/stacking units, appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded.</i> <i>All reasonable attempts shall be made to reduce the height the coal is free-falling to the stockpile.</i> <i>Allocating a Bulk Water Cart with an operational water cannon to spray loading area whilst operations are underway if required should excessive airborne dust is identified.</i>
Conveyer systems	<i>When mobilising screening/stacking units, the CMW and associated spotter in control of the unit must position themselves upwind of any dust being emitted from the unit whilst it is being moved.</i> <i>If CMWs are required to work on the ground in close proximity to operational screening/stacking units, appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded.</i> <i>All reasonable attempts shall be made to reduce the height the coal is free-falling to the stockpile.</i>



	<i>Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report.</i>
Topsoil stripping/ disturbed areas - removal and long-term storage of topsoil	Minimising dust exposure shall be prioritised when determining the mining method. This includes interaction between mining activities, dust generation sources, wind direction, environmental conditions and mine roads. Some examples include: • vegetation clearing and topsoil removal. • drilling (exploration and production) • blast crew activities. • dozer activities • shovel / Excavator / Truck, and Dragline operations • Minimising drop heights when handling soil to control dust. • Coal loading face, haul, and dump • Coal processing (crushing, stockpiling etc) • Highwall Mining The following methods can be used to reduce the risk from respirable dust from these areas: • <i>Enclosed cabs/equipment - from a well-sealed air-conditioned cabin – the cab needs to be pressure checked on a maintenance schedule (at each 250hr service interval) to confirm pressurisation to achieve the following standards</i> <i>The air delivery system shall cause a positive differential pressure within the cab of:</i> (a) 50 Pa minimum; or (b) 20 Pa minimum, if a device informing the operator when the pressure drops below 20 Pa is provided. • Review the predominant wind direction when selecting a location for spoil and waste dumps. • Minimise the footprint area of spoil and waste dumps, avoid dumping over large surface areas. • Use sprinkler systems to suppress the dust. • Use of GEOFAB until soil stabilised. • Enclosed cabins on equipment • Vegetation clearing and topsoil stripping not undertaken when wind conditions promote the generation of dust. • Minimising drop heights when handling soil to control dust. • <i>All reasonable attempts shall be made to reduce the height the topsoil is free-falling to the stockpile.</i> • <i>Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report.</i> • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Stockpile Management	• <i>If CMWs are required to work on the ground in close proximity to stockpiles of coal and or topsoil, appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded.</i> • <i>All reasonable attempts shall be made to reduce the height the height of the stockpile.</i>



	Allocating a Bulk Water Cart with an operational water cannon to spray loading area whilst operations are underway if required should excessive airborne dust is identified.
Maintenance Activities. Mobile Equipment	- Vacuum cleaner available to clean out cabs before servicing. - Water cannon available to wash down HME prior to servicing. - HME cabins to be kept clear of built up dust. – <i>appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded if vacuum cleaner is not being used.</i> - Inspections – Maintenance Supervisors to monitor for dust and records of the inspection captured in the Workshop Inspection Report. - Mobile Service Cart to have cab pressurisation system installed and operational at all times. - Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Maintenance Activities – fixed plant and equipment – enclosure cabinets	- Vacuum cleaner available to clean out cabs before servicing. - Water cannon available to wash down HME prior to servicing. - HME cabins to be kept clear of built up dust. – <i>appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded if vacuum cleaner is not being used.</i> - Inspections – Maintenance Supervisors to monitor for dust and records of the inspection captured in the Workshop Inspection Report. - Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Maintenance activities – workshop environment	- Vacuum cleaner available to clean out cabs before servicing. - Water cannon available to wash down HME prior to servicing. - HME cabins to be kept clear of built up dust. – <i>appropriate PPE must be worn to ensure the exposure limits to airborne dust are not exceeded if vacuum cleaner is not being used.</i> - Inspections – Maintenance Supervisors to monitor for dust and records of the inspection captured in the Workshop Inspection Report. - Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Maintenance – in-pit – services, breakdowns	- Field maintenance activities shall be conducted clear of the area that operations are taking place wherever possible. If plant is immobile, then operations shall cease until the risk to persons from respirable dust is at an acceptable level. - traffic flow must be managed to minimise interaction in the area. - Washdown machines before undertaking any maintenance activities if practicable and reasonable. - PPE available – dust masks
Maintenance – tyres VUL-SOP-072a-Tyres, Wheels & Rims Management	- If using extension hose position elevate silencer from ground, removal of build off around rims etc (PPE whilst preparing surfaces) - Using compressed air to clean components, and buffing and dressing of components.



Blast crew operations: Storage compound/magazine compound--bench design-blast design. Refer to VUL-TAT-001 Post Blast Fumes which also references dust	Designated magazine and explosive reload compounds shall be established. Surfaces around these facilities should be constructed of low dust generation materials e.g., concrete, bitumen, or gravel. - General care and maintenance should also be undertaken e.g., watering, cleaning, and resurfacing when required. - Material type and geological properties of the blast area should be considered in the design phase. of dust to be released into the air during initiation of the shot. (Scale Depth of Burial - equations are usefully in determining the reaction of the shot surface during initiation) - process to remove excessive fines from the bench and possible. - watering of the area to create a surface seal on the bench. - Blast bench traffic management plan should consider the wind direction. - Remove excessive fines from the bench and possible watering of the area to create a surface seal on the bench. - Water injection with drills - Inspections – supervisors and OCE's to check for dust. - PPE - Dust Masks – available as required. - Coal board medicals / x rays for early detection - A dust path should be formulated and included on the blast exclusion zone. Factors for consideration when determining the dust path are: - weather conditions e.g., wind speed, wind direction, wind gusts, inversion layers, boundary heights, temperature, and atmospheric moisture. - bench surface area being disturbed; this should include any free faces which may create dust during the blast. - surface and strata moisture levels. - topography and the likely influences. - estimated time the dust will be airborne. - distance and down wind direction of dust cloud. - Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. - Coal board medicals / x rays for early detection of respiratory illness in CMWs. - The Shotfirer or Blast Controller should view the blast from a vantage point if possible and indicate to the Blast. - Guards the direction, size, and speed of the dust cloud from the blast. The actions required to maintain a safe zone away from the dust cloud should also be communicated.
Blast Operations. Drilling	<i>Drill/Blast pattern surface – Dust suppression must be completed as per Fig.1</i> <i>Drills must be fitted with a water injection or dust extraction system (or both) suitable to control or extract the dust at the hole during drilling.</i> <i>Dust suppression via water injection</i> - operating drill rigs from a well-sealed air-conditioned cabin – the cab needs to be pressure checked on a maintenance schedule (every 250hrs) to confirm pressurisation. - Scheduled inspection and replacement of filters or cleaning filtration devices and systems to prevent dust build-up.



	• Drill site inspections to include checks for dust generation. • Drill bits and drill rods size match to allow adequate annulus (this will allow the cuttings to be ejected from the hole without being subjected to extra grinding and size reduction. • Maintenance of drilling equipment to original equipment manufacturers (OEM's) specifications – including cleaning filters in cabs. • <i>Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report.</i> • Coal board medicals / x rays for early detection of respiratory illness in CMWs. ▪ <i>Fitted dust suppression systems must be operational during the drilling process.</i> • <i>Water must be used when removing cuttings from drill holes with compressed air to control airborne dust.</i> • Scheduled inspection and replacement of filters or cleaning filtration devices and systems to prevent dust build-up. • VUL-FRM-16-04-Drill and Blast Pattern Checklist must be completed before undertaking work on a newly established pattern.
Blast Operations: <i>Dipping and logging holes, barricading blast bench baiting blast holes and commencing blast for initiation</i>	• Road design and maintenance • Drill/Blast pattern surface – Dust suppression must be completed as per Fig.1 • Inspections – supervisors and OCE's to monitor work areas for excessive respirable dust and record evidence of inspections in their respective shift reports. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
<i>Loading blast holes</i>	• Blast bench traffic management – consideration to wind direction (from movement of vehicles etc.) • Drilling - Skirting / ducting to direct dust away from personnel at point of loading • Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
<i>Stemming blast holes</i>	• Specialized stemming truck with water injection to be used if available. • If a loader is being used to load stemming, the stemming stockpile shall be monitored for excess airborne dust. • Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
<i>Firing of shot</i>	• Dust path and fume management • Dust path reviewed as part of the blasting procedures – considerations: wind speed, wind direction. • Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
All mining activities (including pre-strip, dozer, coal mining operations,	• Enclosed cabs/equipment - from a well-sealed air-conditioned cabin – the cab needs to be pressure checked on a maintenance schedule (at each 250hr service interval) to confirm pressurisation to achieve the following standards The air delivery system shall cause a positive differential pressure within the cab of:



pit activities) and ROM, – dust generating.	(a) 50 Pa minimum; or (b) 20 Pa minimum, if a device informing the operator when the pressure drops below 20 Pa is provided. In addition to the above the following shall also be implemented: • The design of the cabin should be such that the need for the operator to get in/out of the cabin for operational reasons is minimised (ie adequate visibility). • Covering seats in mobile plant with less porous materials to minimise the harbouring of dust wherever possible. • Housekeeping practices (e.g., clean cabs) to minimise airborne dust exposure – including cleaning filters on cabs (avoid using compressed air to blow out) • Allocating a Bulk Water Cart with an operational water cannon to spray loading area whilst operations are underway if required (if excessive airborne dust is identified). • Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection
Electrical Maintenance of Cabinets ▪ VUL-SOP-021 Electrical Work section 14.	When installing or inspecting enclosures for electrical equipment the following dust control measure shall be implemented. • Vacuum (with HEPA filter) to remove any dust prior to inspection of enclosures. • OEM door seals fitted. • General housekeeping
Traffic management – all support infrastructure (offices, crib rooms)	• Airconditioned office buildings. • Windows and doors shall be kept closed whenever possible. • Cleaning of offices, air conditioners and crib rooms daily with the use of either mop or • Inspections – supervisors and OCE's to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report Workshop Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
Transporting Coal on public Roads	• covers placed on top of trailers preventing dust from being emitted. • selecting travel routes that have minimal interaction with towns and communities. • speed restrictions on both mine and public roads. • use of shakers (for example a grid to shake dust from the exterior of trucks) if a build up of material is identified.
Rehabilitation / Topsoil stockpiling	• Enclosed cabs/equipment - from a well-sealed air-conditioned cabin – the cab needs to be pressure checked on a maintenance schedule (at each 250hr service interval) to confirm pressurisation to achieve the following standards The air delivery system shall cause a positive differential pressure within the cab of: (a) 50 Pa minimum; or (b) 20 Pa minimum, if a device informing the operator when the pressure drops below 20 Pa is provided. • Allocating a Bulk Water Cart with an operational water cannon to spray loading area whilst operations are underway if required (if excessive airborne dust is identified).



	• Inspections – supervisors and OCE’s to monitor for dust and records of the inspection captured in the Vulcan Mine OCE Report, ROM Inspection Report and Supervisor Shift Report. • Coal board medicals / x rays for early detection of respiratory illness in CMWs.
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