Gladstone Ports Corporation
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Respirable Dust Management Plan

Brief description

The purpose of the Respirable Dust Management Plan (RDMP) is to specify the requirements for managing respirable dust hazards and preventing exposure to respirable dusts, specifically respirable crystalline silica (RCS), respirable coal dust (RCD), and respirable quarry dust (RQD) at GPC-operated sites.

Document information	
Current version	#1999709v2
First released	04/08/2025
Last updated	16/04/2025
Review frequency	Every 2 years or when changes to process, guidance material or exposure limits occur
Review before	16/04/2027
Audience	Managers / Superintendents / Supervisors / Leaders / Employees / Contractors / Consultants / Risk Owners / Workers / Vendors / Port Users / Visitors

Document accountability	
Role	**Position**
Owner	Executive General Manager Safety and ESG
Custodian	Safety and Environment Manager

Approved by	Executive General Manager Safety and Environment Social Governance on 01/08/2025

If you require any further information, please contact the Custodian.

Contents

1 Terms and definitions

In this Respirable Dust Management Plan:

Term or Acronym	Definition or Detail
Chronic Obstructive Pulmonary Disease (COPD)	Disease characterised by airflow limitation. This is usually progressive and associated with an abnormal inflammatory response of the lungs to airborne contaminants and pollutants. The two main forms of COPD are chronic bronchitis and emphysema.
Competency – Develop and Review Respirable Dust Monitoring Program	Only a person who has a recognised competency as a Certified Occupational Hygienist, or an equivalent competency under an international certification scheme (e.g. certified industrial hygienist), can develop and review the respirable dust monitoring program, and specifically: establish similar exposure groups; develop a respirable dust sampling plan that is representative of worker numbers, workers' shift work, tasks performed and conditions; and, estimate exposure risk of similar exposure groups.
Competency – Conduct Respirable Dust Sampling	Air monitoring is to be carried out by a person such as an Occupational Hygiene technician with skills to carry out the monitoring according to standards and to interpret the results. Examples of training to support competency as an Occupational Hygiene Technician include: • OHTA Series 5 modules W201 Basic Principals of Occupational Hygiene, or W501 Measurement of Hazardous Substances; or • BSBWHS409 Respirable Dust Monitoring (QLD).
Controlled Processing of CSS	From the Work Health and Safety Regulation 2011…. Under regulation 529B(1) the ***processing*** of a CSS is controlled if: a) control measures to eliminate or minimise risks arising from the processing are implemented so far as is reasonably practicable; and b) at least 1 of the following measures are used during the processing: i. the isolation of a person from dust exposure; ii. a fully enclosed operator cabin fitted with a high efficiency air filtration system; iii. an effective wet dust suppression method; iv. an effective on-tool extraction system; v. an effective local exhaust ventilation system; and c) a person still at risk of being exposed to respirable crystalline silica after 1 or more of the measures in paragraph (b) are used: i. is provided with respiratory protective equipment (respiratory protective equipment); and ii. wears the respiratory protective equipment while the work is carried out. If it is not reasonably practicable to implement at least one of the isolation or engineering controls outlined in paragraph (b) above, the ***processing*** of a CSS will only be considered controlled if a person who is at risk of being exposed to RCS during ***processing*** of a CSS is: i. provided with appropriate respiratory protective equipment; and ii. wears the respiratory protective equipment correctly while the work is carried out.
Crystalline Silica	The crystalline form of the abundant naturally occurring mineral silica or silicon dioxide (SiO2), also known as 'free silica'. The main forms of crystalline silica are cristobalite, quartz, tridymite and tripoli. It is present

Term or Acronym	Definition or Detail
	in almost all types of rocks, sand, clays, shales and gravel and in construction materials such as concrete, tiles, bricks and engineered stone.
Crystalline Silica Substance (CSS)	Material that contains at least 1% crystalline silica, determined as a weight/weight (w/w) concentration. CSS is referenced in the Work Health and Safety Regulation 2011, Chapter 8A Crystalline silica.
FTIR	Fourier Transfer Infrared Spectroscopy
GPC	Gladstone Ports Corporation Limited
HEPA	High-efficiency Particulate Air
High Risk CSS Processing	The processing of a crystalline silica substance is high risk if the processing of the substance at a workplace is reasonably likely to result in a risk to the health of a person at the workplace.
Inhalable dust	The mass fractions of inhalable dust that are defined in ISO 7708 and correspond to particle sizes <100µm
NATA	National Association of Testing Authorities
PAPR	Powered Air Purifying Respirator
Person Conducting a Business or Undertaking (PCBU)	A person conducting a business or undertaking alone or with others, whether for profit or gain. A PCBU can be a sole trader, a partnership, company, unincorporated association or government department of public authority (including a local government).
Personal Protective Equipment (PPE)	Clothing or equipment designed to be worn by a worker to protect them from the risk of injury or illness.
Pneumoconiosis	A general term for lung diseases wherein inhalation of dust results in interstitial fibrosis. The three most common types are asbestosis, silicosis and coal workers' pneumoconiosis (black lung).
Principal Contractor	A PCBU that commissions a construction project. A construction project has only one principal contractor at any specific time.
Respirable Coal Dust (RCD)	Refers to <10µm dust formed from mining, transporting, stockpiling, crushing and conveying the raw material coal; and the by-product of coal combustion, fly ash.
Processing in Relation to a CSS	- The use of a power tool or mechanical plant to carry out an activity that involves the abrasive polishing, crushing, cutting, drilling, grinding, sanding or trimming of the crystalline silica substance; or - The use of a roadheader to excavate the crystalline silica substance; or - The quarrying of the crystalline silica substance; or - Mechanical screening that involves the crystalline silica substance; or - Tunnelling through the crystalline silica substance; or - A process that exposes, or is reasonably likely to expose, a person to respirable crystalline silica during the manufacture or handling of the crystalline silica substance.
Respirable Crystalline Silica (RCS)	Crystalline silica particles which are small enough to penetrate deep into the lung (<10µm). These particles are too small to be seen under normal lighting and the small particle size allows it to stay airborne for long periods of time.
Respirable Dust	Any small solid particles which are small enough to penetrate deep into the lung (<10µm).

Term or Acronym	Definition or Detail
Respiratory Protective Equipment (RPE)	Means personal protective equipment that: (a) is designed to prevent a person wearing the equipment from inhaling airborne contaminants; and (b) complies with: (i) AS/NZS 1716:2012 (Respiratory protective devices); and (ii) AS/NZS 1715:2009 (Selection, use and maintenance of respiratory protective equipment).
Safe Work Method Statement (SWMS)	Is a consultative and documented process for activities classified as high-risk construction work. A SWMS identifies workplace hazards specific to the high-risk work; identifies the risks to health and safety; and describes how the risk of exposure will be managed, including: what controls will be used; and how the controls will be used.
Silica Risk Control Plan	Work Health and Safety Regulation 2011, Chapter 8A, r529CB **Silica risk control plan must be prepared for processing that is high risk** (2) A silica risk control plan must— (a) identify the processing of any crystalline silica substance carried out at the workplace that is high risk; and (b) include the assessment made under section 529CA for the processing of any crystalline silica substance that is high risk; and (c) state the control measures that will be used to control the risks associated with the processing of any crystalline silica substance that is high risk, and how the measures will be implemented, monitored and reviewed; and (d) be set out and expressed in a way that is readily accessible and understandable to a person who will use the plan.
Silicosis	A fibrotic lung disease resulting from chronic exposure to moderate concentrations of silica dust; or acute exposure to high concentrations of silica dust.
Similar Exposure Group (SEG)	Is a group of workers who have the same general exposure risks, e.g. the same type, frequency and duration of the tasks they perform; the materials and processes with which they work; or the similarity of the way they perform those tasks.
UCL	Upper Confidence Limit
Workplace Exposure Standard (WES)	Legally enforceable upper limits for exposure concentrations to airborne contaminants. There are three types of WES values: - Time Weighted Average (TWA); - Short Term Exposure Limit (STEL); and - Peak Limitation (Peak). If the critical effect of a substance on a worker is chronic (long-term) or sub-chronic (medium-term), the substance is assigned a TWA value – an 8hr time-weighted average. If the critical effect of a substance is acute (short-term), it is applied a STEL value – 15min average. If the critical effect is acute and very dangerous, it is given a Peak value – the maximum concentration over the shortest possible time frame that can be measured, to a maximum of 15mins.
XRD	X-ray Diffraction

2 Introduction

2.1 Purpose

The purpose of this Respirable Dust Management Plan (RDMP) is to specify the requirements for managing respirable dust hazards and preventing exposure to respirable dusts, specifically respirable crystalline silica (RCS), respirable coal dust (RCD), and respirable quarry dust (RQD).

2.2 Scope

This Respirable Dust Management Plan (the Plan) applies to all GPC employees, contractors, port users and visitors who may be exposed to respirable dust or respirable crystalline silica (RCS) at any of the GPC-managed sites.

Excluded from this Plan are the following particulate exposures that are addressed in other site documentation:

- Asbestos – refer to GPC Asbestos Management Procedure
- Abrasive Blasting Particulates – refer to GPC Abrasive Blasting Procedure

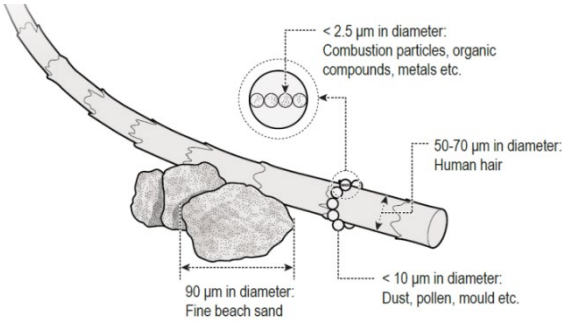
Although specific to respirable dust and RCS, the controls defined in this RDMP can be applied to any situation or activity that has the potential to generate hazardous dust.

3 Respirable Dust

3.1 Health Effects

Most dust contains particles of varying sizes which are mixtures of organic and inorganic substances. Dust particles with diameters greater than 100µm are generally too large to inhale into the upper airway, and as a result are not considered an inhalation risk.

Inhalable particles are those less than 100µm in diameter, and which typically become trapped in the nose, throat and upper respiratory tract. The body's natural defences such as coughing and sneezing can remove much of the inhalable portion, however, exposure to high concentrations of inhalable dust can overwhelm the respiratory system resulting in these particles lodging in the upper airways and exerting a physical effect.



Respirable particles are less than 10µm in size and can reach the lowest parts of the lung, the gaseous exchange region (alveoli), the tissues of which are highly vulnerable to damage.

Exposure to respirable dusts either at high concentrations over short periods, or moderate concentrations over longer periods, can cause irritation to, and inflammation of, the lung tissue resulting in chronic inflammation; destruction of the alveoli; and/or scar tissue formation (fibrosis) between and around the alveolar sacs. Each of these responses results in chronic shortness of breath, cough and fatigue, and although symptomatically treatable, none of these forms of illness are reversible or curable.

Fibrosis-related disease is termed pneumoconiosis. Pneumoconiosis is not cancer, but it can increase the risk of developing respiratory cancers and of developing pulmonary tuberculosis. The two most common types of pneumoconiosis relevant to RCS and RCD exposures are silicosis and coal workers' pneumoconiosis (black lung).

Distinct from fibrosis, RCS can also cause COPD, which symptomatically shares similar traits, but without the scarring. COPD includes a range of illnesses from chronic bronchitis to emphysema, (which destroys the lung tissue). RCS is additionally a class 1 carcinogen - known to cause lung cancer - and is also linked to the development of auto-immune disorders and chronic renal (kidney) disease.

3.2 Respirable Crystalline Silica (RCS)

Silica is a naturally occurring and widely abundant mineral found in most rocks and soils. There are non-crystalline (amorphous) and crystalline forms of silica, with four main substances classified as crystalline - quartz, cristobalite, tridymite and [1]tripoli. Amorphous silica is *currently* considered less toxic than RCS and is not included in the scope of this RDMP.

GPC operates sites that:

- conduct tasks using materials that contain ≥1% crystalline silica (crystalline silica substances);
- process crystalline silica substances;
- undertake construction work using materials that contain ≥1% crystalline silica;
- conduct tasks that generate RCS or make it airborne;
- are covered by the Work Health and Safety Act 2011 and Regulation 2011; and,
- are covered by the Mining and Quarrying Safety and Health Act 1999 and Regulation 2017.

Consequently, GPC is required to adhere to:

- Chapter 8A of the Work Health and Safety Regulation 2011 for processing work involving crystalline silica substances (CSS).
- the Safe Work Australia *Working with crystalline silica substances – Guidance for PCBUs* document as endorsed by Workplace Health and Safety Queensland.
- Managing respirable crystalline silica dust exposure in construction and manufacturing of construction elements Code of Practice 2022.
- QGL02 – Guideline for management of respirable dust in Queensland mineral mines and quarries, endorsed as mandatory under the Mining and Quarrying Safety and Health Regulation 2017.

The WHS Regulation and Guidance document mandates the following minimum requirements in addition to the general application of risk management principles:

- **PROHIBITED**: uncontrolled dry cutting or processing of materials that contain 1 per cent or more crystalline silica.
- **PROHIBITED**: use of free silica for abrasive blasting.
- **MUST**: prepare a SWMS before carrying out construction work that includes a risk of exposure to respirable crystalline silica (RCS).
- **MUST**: prepare a Silica Risk Control Plan for high-risk crystalline silica substances (CSS) processing work.
- **MUST**: not expose a person at the workplace to RCS at a level above the workplace exposure standard.
- **MUST**: conduct air monitoring if uncertain, on reasonable grounds, the workplace exposure standard has been exceeded; or, monitoring is needed to determine if there is a risk to health.
- **MUST:** give the regulator the results of air monitoring where an exceedance of the respirable crystalline silica workplace exposure standard is recorded.
- **MUST**: conduct health monitoring if there is an ongoing significant risk to a worker's health from exposure to RCS.
- **MUST:** ensure all workers potentially exposed to crystalline silica receive regulator-approved or accredited crystalline silica training. *NB: GPC provides in-house regulator-approved training.*

[1] *Tripoli is a natural material that contains a high percentage of quartz but is not commonly found in Australia.*

- **MUST**: provide workers with RPE if an exposure risk remains following implementation of higher order controls. RPE provision must align with the requirements of AS/NZS 1716:2012 and AS/NZS 1715:2009.
- **MUST**: ensure that Safety Data Sheets (SDS) complying with the *Preparation of safety data sheets for hazardous chemicals* Code of Practice is received from suppliers or importers ahead of introduction of RCS-containing substances.
- **MUST**: manage risks to health and safety associated with storage, movement and disposal of construction materials and waste at the workplace.

Additionally, QGL02 – Guideline for management of respirable dust in Queensland mineral mines and quarries prescribes:

- qualitative risk assessment,
- quantitative risk assessment (where indicated by the qualitative assessment),
- sample number determination for baseline and periodic programs,
- data analysis methods, and
- reporting requirements for respirable dust and respirable crystalline silica sampling, including WES exceedances.

3.3 Respirable Coal Dust (RCD)

GPC's RG Tanna Coal Terminal:

- receives coal from multiple sources via train,
- unloads this coal at dump stations,
- transfers the coal via conveyors and trippers to stockpiles,
- uses Dozers to manage stockpiles and push stockpiled material through feeders to conveyor systems associated with ship loading,
- loads ships via shiploaders with coal for export,
- maintains fixed and mobile equipment associated with coal transfer and stockpiling, and
- conducts cleaning of locations contaminated by coal dust.

The extent of movement and handling of the coal increases the potential for respirable dust creation, and the multiple sources of coal supply and blending of coal increases the uncertainty of coal-source silica concentrations. The result is the potential for worker exposure to respirable coal dust and its inherent contaminants in unacceptable or uncertain concentrations.

3.4 Respirable Quarry Dust (RQD)

GPC's Ticor Quarry produces rock and aggregates for use in construction projects across GPC sites. The drilling, blasting, excavating, hauling, stockpiling, loading and transporting of these materials constitutes 'processing of CSS'. Not only does the virgin rock and subsequent miniaturised material contain crystalline silica >1%, but stemming materials used in blast holes is also a CSS - the processing of these materials has the potential to produce RCS and RQD at elevated levels.

Management of Respirable Dust in quarries in Queensland is regulated by Resources Safety and Health Queensland, who enforce the Mining and Quarrying Safety and Health Act 1999 and Regulation 2017. QGL02 is the Minister-approved Guideline enforceable under the Regulation which prescribes the required steps to assess, measure, prevent, monitor and manage respirable dust exposures. Similar Exposure Group (SEG) determination, sampling numbers, and data analysis is prescribed in QGL02. This Guideline applies the same RCS exposure standard as for other national guidance material (0.05mg/m^3), and a respirable dust exposure standard of 5mg/m^3.

4 Respirable Dust Risk Management

4.1 Identify Respirable Dust Hazards

Respirable dust is generated by processes such as cutting; coring; sawing; grinding; drilling; abrasive polishing; scabbling; excavating; tunnelling; jackhammering; sanding; trimming; crushing; screening; milling; transport and conveying; wind, turbulence, use of high-pressure air; and, maintenance, operational and housekeeping activities that release material to air.

Consultation is a critical element in identifying which of these processes, when applied at GPC, can create respirable dust. In collaboration with the Safety Specialist - Occupational Hygiene, workers, supervisors and planners must be involved in determining sources and activities that pose an actual or potential exposure risk.

The respirable dust hazards listed below represent **known** exposure sources and activities, but not necessarily all **potential** respirable dust sources and activities. Where there is any concern or uncertainty surrounding the exposure risk associated with a dust-generating activity, contact the Safety Specialist - Occupational Hygiene to assist with identifying required controls and monitoring.

(a) Respirable Crystalline Silica (RCS)

At GPC, materials known to contain crystalline silica (>1%) include:

- Quarry materials;
- Concrete, asphalt, grout, plaster, mortar, brick, blocks, tiles, fibre cement; and,
- Coal.

Operational, Maintenance and Project work likely to result in RCS exposures include:

- Quarrying operations;
- Coal transport, handling, maintenance and housekeeping activities;
- Concrete demolition, remediation and disposal; and,
- Drilling into brick, masonry and tiles.

(b) Respirable Coal Dust (RCD)

At GPC, respirable coal dust can be generated in harmful concentrations during:

- Unloading, conveying, stockpiling and dozer operations;
- Maintenance activities on fixed and mobile equipment;
- Coal sampling and sample preparation; and,
- Housekeeping activities.

(c) Respirable Quarry Dust (RQD)

At Ticor Quarry, respirable quarry dust can be generated in harmful concentrations during:

- Drilling
- Stemming and blasting
- Excavating
- Stockpiling and pushing-up
- Loading haul trucks
- Loading roadtrains
- Road and quarry floor maintenance
- Crushing and screening
- Travel along unsealed roads

- Landscaping and housekeeping activities

4.2 Assess the Risk from Respirable Dust Exposure

Exposure to respirable dust can be Primary or Secondary:

- Primary exposure occurs to workers doing the dust-generating task, or workers directly in the line of fire of generated dust.
- Secondary exposure occurs to workers doing other tasks in or near work areas in which RCS, RCD or RQD is being generated.

Both Primary and Secondary exposures must be considered when assessing respirable dust exposure risk.

(a) Respirable Dust Exposure Monitoring

All dust-generating tasks are to be identified by the Safety Specialist - Occupational Hygiene during qualitative exposure risk assessments, to determine whether there is sufficient data available to confirm exposure risk; or whether air monitoring will be required during the proposed activities. Conducting a dust-generating activity without first confirming required controls with the Safety Specialist - Occupational Hygiene may result in inadvertent worker exposure to hazardous respirable dust.

Where there is uncertainty as to whether a material is silica-containing or has the potential to pose a respirable dust risk, sampling of the suspect material is undertaken by the Safety Specialist - Occupational Hygiene. Bulk material samples are sent to an independent, NATA-accredited laboratory for crystalline silica (or other contaminant) analysis.

The Safety Specialist - Occupational Hygiene is responsible for implementing an exposure monitoring program developed in collaboration with a Certified Occupational Hygienist (COH). Personal respirable dust monitoring is undertaken for relevant SEGs across the GPC workforce, including Contractors.

All respirable dust monitoring is completed in accordance with AS 2985 *Workplace atmospheres – method for sampling and gravimetric determination of respirable dust*.

Respirable dust monitoring involves a worker wearing a personal dust sampler for the duration of their shift. The participant completes a log sheet throughout the day to identify the tasks they conducted, the location, the duration, and any personal protective equipment (PPE) that was worn. This information allows the Safety Specialist - Occupational Hygiene to compare these activities to the results recorded and determine where high-risk exposures may be occurring. Collected samples are sent to a NATA-accredited laboratory for analysis. On receipt of the analysis results, participants are provided with a feedback letter specifying their respirable dust and respirable crystalline silica exposure for the shift that was sampled. If an exposure is recorded above the adopted WES an incident is to be raised by the Safety Specialist - Occupational Hygiene, and the worker's Supervisor is to initiate an investigation to identify cause and implement controls to prevent recurrence.

The Safety Specialist - Occupational Hygiene may conduct real-time, static or personal dust monitoring to provide instant feedback on whether harmful concentrations of dust are being generated and distributed in a work area or a worker's breathing zone. This monitoring cannot substitute personal monitoring as per AS 2985 but can supplement the existing monitoring program by assisting in the identification of high-dust locations and activities and confirming the effectiveness of implemented dust controls.

(b) Workplace Exposure Standards

The workplace exposure standard (WES) for:

- RCS is **0.05** milligrams per cubic metre (**mg/m^3**)
- RCD (containing <5% crystalline silica) is 1.5mg/m^3
- Respirable Dust (Not Otherwise Classified) is **3mg/m^3** (HCIS – low toxicity contaminants)

- Respirable Dust (Not Otherwise Classified) is **5mg/m^3** in Schedule 5 of the Mining and Quarrying Safety and Health Regulation 2017 for QGL02 reporting.

GPC utilises the Quebec Model to adjust WES for extended work shifts (>40hrs/wk).

(c) Exceedance Reporting

- Applicable to GPC operations, Section 529CE of the Work Health and Safety Regulation 2011 requires reporting to the regulator of any respirable crystalline silica air monitoring result that exceeds the workplace exposure standard within 14-days of receiving the result; and,
- Applicable to GPC's quarrying activities, QGL02, section 3.4.3 requires that all exposure monitoring results be reported by the SSE to the mines inspectorate (Resources Safety and Health QueelnsIand) within 28-days of any exposure monitoring. Section 3.4.2 requires that any single sample exceedance of the applicable occupational exposure limit is investigated, with findings and corrective actions formally recorded in the mine record and communicated to workers.

(d) Assessing high risk CSS processing activities

Risk assessment associated with the processing of crystalline silica substances must consider specific criteria in accordance with Chapter 8A of the WHS Regulation.

- The specific processing that will be carried out;
- The forms of crystalline silica present in the crystalline silica substance;
- The proportion of crystalline silica contained in the crystalline silica substance, determined as a weight/weight (w/w) concentration;
- The hazards associated with carrying out the processing, including the likely frequency and duration of a person's exposure to respirable crystalline silica;
- Whether the airborne concentration of respirable crystalline silica that is present at the workplace is reasonably likely to be more than half the exposure standard for crystalline silica;
- The results of any relevant air and health monitoring previously conducted at the workplace;
- Any previous incidents, illnesses or diseases associated with exposure to respirable crystalline silica at the workplace.

Consideration can be given to isolation or engineering controls in place to control RCS, but consideration cannot be given to administrative controls or use of personal protective equipment.

4.3 Control Respirable Dust Hazards

(a) Consultation

Consultation is a critical element in choosing the right controls. Impacted workers (both primary and secondary exposures) and supervisors need to understand exposure risks; know the minimum required controls; and have the opportunity to propose improvements and alternatives.

(b) Hierarchy of Hazard Controls

The Hierarchy of Hazard Controls must always be used to ascribe dust management strategies and control methods. Due to the significant health potential associated with exposure to respirable dust, higher-order controls (elimination, substitution, isolation and engineering controls) must be implemented. Residual risk must be further minimised using administrative controls and RPE.

(i) Elimination

PROHIBITED Uncontrolled dry cutting or processing of materials that contain 1 per cent or more crystalline silica.

PROHIBITED Use of free silica for abrasive blasting.

Silica is inherent to multiple materials across the GPC-managed sites associated with quarrying, construction, and general maintenance activities. Although not possible to eliminate silica from existing infrastructure and in-use materials, it is possible to ensure that new materials brought to GPC sites are not RCS-containing.

GPC operates a coal terminal, and subsequently, the elimination of coal is not currently feasible.

(ii) Substitution

During demolition and refurbishment, there is potential to replace silica-containing materials with safer alternatives.

Any RCS-containing materials being sought for use on-site are to be considered against less hazardous alternatives.

An example of substitution at Ticor Quarry is the replacement of high-silica stemming material for lower silica-concentration stemming material. This exposure risk reduction decision was made in response to air monitoring results identifying the exposure potential.

Source locations of coal vary, and it is critical to understand the contaminant composition and concentrations of each coal supply. Stockpile samples will be taken by the Safety Specialist - Occupational Hygiene quarterly for geoassay, which serves to identify contaminant concentrations, including silica.

NB: existing WES for RCD applies to coal containing silica in concentrations <5%. Where higher concentrations are identified through geoassay, specialist advice is to be sought from a COH.

(iii) Isolation and Engineering

The combination of water suppression and local exhaust ventilation/on-tool extraction provide the best engineering outcomes for minimising RCS, RCD and RQD exposures when using portable equipment/tooling, whilst fully enclosed, positively pressurised cabins fitted with HEPA filters provide the best outcomes for mobile equipment operators. The specific examples taken directly from the guidance material are provided here. No method should be taken to be 100 per cent effective **without the support of air monitoring data.**

Water Suppression

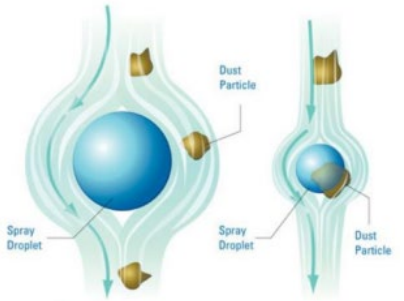
Water suppression means using water at the point where dust is generated. This can prevent the dust from being released into the air.

To effectively control dust, water or fine mist suppression needs to be supplied at the right levels for the full duration of time that the exposure-risk work is conducted. In practice, this means supplying enough water throughout the task to prevent the generation of any visible airborne dust.

Technical advice from those competent in the science of water behaviour in dust capture and spray application (including droplet size and interactions with dust particle size) is required to achieve effective respirable dust management. Some key considerations in effective water design are to ensure that: effective water distribution is within the pressure and flow capacity of the delivery system; and there is capability to contain and manage the water generated.

When selecting or designing a water misting or fogging system, there are two important considerations:

- The water droplet size range needs to match the airborne dust particle size range.
- Water additives should be used to ensure hydrophobic (water-repellent) dust is captured by the water.



Dust particles join with water droplets of the same size much more efficiently. If the spray droplet diameter is larger than the dust particle diameter, the dust particle will follow the air stream around the drop (shown left). If the diameters of the drop and the dust particle are comparable, the dust particle will follow the air stream and collide with the drop (shown right).

Equipment or machinery fitted with water suppression should:

- have an appropriate ingress protection (IP) rating for use with water suppression
- have the water feed attached and an adequate number of water feeds directed at the contact point to prevent dust release during the process
- have a consistent water flow and adequate water pressure (usually at least 0.5L/min) during operation
- have a fit-for-purpose nozzle
- be fitted with guards, flaps or brush guards designed to manage the water spray or mist containing respirable dust
- be maintained according to the manufacturer's instructions.

Examples include:

- wet spraying, to suppress dust at the point of generation (e.g. at transfer points on crushers, screens, conveyors and stockpiles),
- adding surfactant to dust suppression water,
- using tools fitted with water attachments,
- installing water applicators onto machinery,
- wetting spillages, conveyors and roadways.

In the case of retrofitting or introducing water suppression as part of a process which uses electrical equipment, consideration needs to be given to the IP rating. Only tools and machinery which have been specifically designed for use with water attachments should be used. A thorough check of electrical equipment, including electrical cords, should also be undertaken to ensure safety when undertaking wet cutting or other processing.

A wet slurry will always result from the use of water suppression. This must be prevented from drying out and creating a secondary exposure risk. The slurry can be:

- directed into sealable 200µm clear bags, double-bagged with a goose-neck seal when full, and disposed of as general waste;
- directed through a filtration system suitable for capturing and removing respirable-size particulate. The remnant water can then be recycled, while the filters are double-bagged in sealable 200µm clear bags with a goose-neck seal when wet, and disposed of as general waste; or
- wet vacuumed as the slurry is being produced for subsequent disposal via the specified methods above.

Ventilation and Extraction

Local exhaust ventilation (LEV) is used to capture dust where it is made. LEV removes the dust before it can reach the air that workers are breathing. It can be used for both wet and dry activities.

NOTE: Unless personal air monitoring shows that the respirable dust levels in the breathing zone of the worker are below the WES, RPE should always be used in combination with LEV to protect workers.

NOTE: Maintenance of LEV equipment can present a risk of exposure to respirable dust which must be managed.

Regular testing of LEV's is required to ensure effective operation. Air current tubes or anemometers can be used to test the capture velocity of a system and the airflow of the exhaust system.

On-tool dust extractors or vacuums for power tools should be H class where practicable, as these are much more effective at capturing dangerous dust like RCS. M-class vacuums are only permissible (for RCS) when it is not reasonably practicable to use an H-class vacuum.

For all power tools (except for power drills), the dust extractor or vacuum should meet the requirements of M or H class requirements of AS/NZS 60335.2.69:2017 *Household and similar electrical appliances – Safety – Particular requirements for wet and dry vacuum cleaners, including power brush, for industrial and commercial use* (IEC 60335.2.69 ED 5, MOD).

For power drills, the dust extractor should meet the requirements above or use a HEPA-filtered tool-mounted dust collector.

In most cases, natural/dilution ventilation is not effective on its own. Fans or large air extraction systems can be used for air movement if arranged so that clean, uncontaminated air reaches workers, and the contaminated air is removed from worker locations. Ensure fans do not dry any wet slurry before it can be removed in wet form.

Silica-contaminated waste produced from extraction, ventilation, suction and suppression activities is to be double-bagged in clear, 200um plastic bags, goose-neck sealed, and disposed of to general waste. The concentration and volume of silica waste generated at the GPC sites via these methods does not currently meet thresholds for regulated waste.

Cabin filtration and pressurisation

A fully enclosed operator cabin fitted with a high efficiency air filtration system is identified as a specific control for RCS exposure in regulation 529B. The *Working with crystalline silica substances - Guidance for PCBUs* further defines what this means, identifying that a fully enclosed operator cabin fitted with a high efficiency air filtration system is one that:

- is operated with the cab door and windows closed, and
- is maintained to ensure the cab, door, windows and rubber seals are free from damage which could allow ingress of dust, and
- maintains a positive internal cab pressure between 50 Pa and 200 Pa (as per ISO 10263-4:2009) when the machine is in use, and
- is fitted with a real-time monitor which displays the internal cabin pressure and alarms when the pressure drops below a pre-determined level, and
- uses HEPA (H13 or H14) filtration on the cabin air intake, and
- incorporates a HEPA (H13 or H14) filter in the internal air-recirculation system (where possible).

Physical Barriers

Installation of hard, physical barriers such as enclosures, temporary walls or sheeting may be required if there is a potential secondary exposure risk, and/or ventilation and dust suppression controls have not adequately reduced the exposure risk. Wetting down of

brattice cloth or similar materials used as a physical barrier increases the capture rate of dust onto these.

(iv) Administrative

The following administrative controls are recommended as an adjunct to higher order controls and apply to all respirable dusts.

- Implement exclusion zones. Use barricade tape and signage to further reduce exposure risk if respirable dust processes have the potential to impact other workers and work locations. The extent of the exclusion zone should be confirmed after assessing the risk to all unprotected persons, taking into account prevailing conditions. The exclusion zone will represent the perimeter within which respiratory protection equipment (RPE) will be required.
- Conduct housekeeping using wet methods or (H-class) vacuum. Housekeeping is necessary during and after the respirable dust work to prevent build-up or dry-out of contaminated materials. Dry sweeping, use of high-pressure air, and use of high-pressure water are **not** to be used to remove contaminated dust from any work area.
- Routinely check that higher-order controls implemented to manage dust generation and transmission are operating effectively.
- Apply good personal hygiene practices. Ensure contaminated clothing, PPE and workers are not able to enter clean areas until decontamination is complete.
- Routinely monitor and appropriately maintain all machinery and equipment directly associated with respirable dust management. *The exposure risk to maintainers conducting inspection, servicing and repair activities must be appropriately managed.* With regard to mobile equipment, a maintenance regime must be implemented in accordance with the manufacturer's recommendation that specifically addresses:
    1 Status of cabin seals and positive pressurisation;
    2 HEPA filter replacement; and
    3 Air circulation system effectiveness.
- Develop and implement Safe Work Procedures for activities and equipment operation that may generate respirable dust. How tools, equipment and plant are used affects how much respirable dust is generated and transmitted.
- Seek appropriate approval for new chemical products brought onto GPC sites (including products used by Contractors). This includes coal introduced to site, and all products which contain silica. Contact the Safety Team for assistance with using the ChemAlert system for chemical submissions and assessments.

NB: Training and Information requirements are specifically addressed in section 4.4 of this document.

High-Risk Construction Requirements

MUST: Prepare a SWMS before construction-related RCS work commences, that includes all criteria specified in the Silica Risk Control Plan.

MUST: Make (compliant) Safety Data Sheets (SDS) available for RCS-containing construction materials/elements.

High Risk CSS Processing Activity Requirements

MUST: In consultation with workers involved in the carrying out processing of a CSS that is high risk and if any, their elected health and safety representatives (HSR), develop a Silica Risk Control Plan covering the processing tasks.

MUST: The Silica Risk Control Plan must be available to all workers generally and provided to all workers before they commence the processing of a CSS.

MUST: Ensure that Silica Risk Control Plans are reviewed and revised to maintain, so far as is reasonably practicable, a safe work environment.

NB: “Processing of a CSS may be considered high risk construction work if RCS may contaminate the work atmosphere. If a SWMS has been prepared for high risk construction work that involves processing of a CSS that is high risk, a silica risk control plan is not needed, provided the SWMS includes all the information required for a silica risk control plan …”

Working with crystalline silica substances – Guidance for PCBUs, p. 38

(v) Personal Protective Equipment

Respiratory Protection

Knowing how much respirable dust you are going to be exposed to is essential to the correct selection of effective respiratory protection equipment (RPE).

- The Safety Specialist – Occupational Hygiene is to be involved in the planning and execution of activities involving the potential generation and transmission of RCS, RCD and RQD to provide information about known, predicted and uncertain levels of exposure and the required protection.
- The Safety Specialist – Occupational Hygiene will conduct air monitoring to confirm exposure levels.
- The Health and Wellbeing Centre conduct respirator fit-testing for tight-fitting respiratory protection, and provide awareness training on the correct use and maintenance of respirators and filters.

All workers required to wear RPE shall follow the requirements of GPC’s *Respiratory Protection Program.* The minimum site standard for respiratory protection is a fit-tested, tight-fitting, negative-pressure respirator with P2 filtration.

All workers required to wear RPE must be clean-shaven whenever tight-fitting respiratory protection devices are worn. Workers who have a relevant medical condition or who are authorised to not wear tight-fitting RPE will be required to wear a Powered Air Purifying Respirator (PAPR) with a loose-fitting headpiece. Prescription spectacles can be worn with half-face RPE, however if full-face is required, and the wearer does not have the appropriate spectacle kit to fit their fit-tested full-face respirator, a PAPR with loose-fitting head piece will need to be considered.

Long-duration wear times of tight-fitting, negative pressure RPE (>1hr) can impact the sealing capability of the respirator (through contaminant build-up around the seal; heat, humidity and sweat; and, general discomfort), potentially leading to the loosening or removal of the mask by the wearer whilst in an exposure-risk area. Where RPE is required to be worn **continuously** for periods greater than 1hr, PAPR’s or supplied-air respirators are to be used as alternative options.

Other PPE

If following the implementation of engineering controls, a residual risk of skin or clothing contamination remains, disposable outer garments (e.g. coveralls and boot covers) are to be used.

Where disposable clothing is not practicable or use would introduce additional hazards, a personal decontamination process is to be implemented, either:

- Using an industrial M- or H- class vacuum cleaner to remove dust from clothes.
- Providing designated dirty-to-clean change areas with shower and laundry facilities to ensure contamination does not leave site.

4.4 Information and Training

Workers **MUST** receive information and training on the risks from respirable dust and respirable crystalline silica (along with all other risks at the workplace). This training aims to educate workers on the hazards, risks, potential health impacts and effective control mechanisms for known respirable hazards and risks.

- Training is to be delivered by suitably qualified competent persons with relevant subject matter expertise and training experience.
- Training records are to be kept, documenting who was trained, when and on what topics.

GPC provides targeted training to cover:

- What respirable dust and respirable crystalline silica is.
- The health effects of exposures and what to look for.
- How to determine if a material contains crystalline silica.
- The meaning of processing, and controlled processing, in relation to a CSS.
- How RCS can be generated, disturbed and transmitted.
- Known tasks, activities and conditions that create respirable dust.
- What controls to use and how.
- The purpose and importance of personal exposure monitoring.
- When RPE is required and how it is to be fit-tested, fit-checked, used and maintained.
- How to monitor and review controls.
- Housekeeping and cleaning procedures.
- Details of SWMS and Silica Risk Control Plans (for RCS).
- Requirements for health monitoring.

4.5 Health Monitoring

Working with crystalline silica substances – Guidance for PCBUs states at page 42:

"Division 6 of Part 7.1 of the WHS Regulation requires a PCBU to provide health monitoring to any worker carrying out ongoing work at a workplace using, handling, generating or storing hazardous chemicals and there is a significant risk to the worker's health because of exposure to a hazardous chemical.

This means that where there is significant risk to a worker's health arising from **ongoing** exposure to RCS, whilst undertaking processing of a CSS that is high risk, the worker must be provided with health monitoring.

Depending on the circumstances, health monitoring may not only be required for workers who are directly generating RCS by regularly undertaking processing of a CSS that is high risk but also for workers who may regularly be in the vicinity of RCS or in contact with RCS in other ways such as through cleaning work areas or equipment."

Managing respirable crystalline silica dust exposure in construction and manufacturing of construction elements Code of Practice 2022, section 10 Health monitoring, requires:

1 A PCBU to provide health monitoring to a worker if on 30 days or more in the previous 12 months, or with reasonable certainty on 30 days or more in the next 12mths, the worker has done, or will be doing tasks:

- Involving materials containing crystalline silica; and,
- That make RCS, or disturb RCS; and,
- According to the Code, the worker should have worn RPE for those tasks.[2]

The 30-day trigger for health monitoring should be worked out using the following rules:

[2] To promote worker protection and eliminate confusion around the use of RPE, GPC implements respiratory protection controls for all construction-related RCS generation and disturbance work. This is an improvement on the minimum control requirements listed in the *Controls Table in Appendix 4* of the *Managing respirable crystalline silica dust exposure in construction and manufacturing of construction elements* Code of Practice. Additionally, P1 protection is not approved for use at site – only P2 or P3 filters are to be used to combat exposures to respirable dust hazards at GPC sites.

- If the worker is required to wear RPE by this Code at any time during a day, that counts as one day of respirator use.
    - It does not matter how long the RPE was worn (including if the task takes 15 mins or less); or,
    - whether a single RPE task or multiple RPE tasks were undertaken in a day.

2 The 12-mth period is not connected to a calendar year or financial year. All that matters is that the 30 days counted takes place in 12 months or less.

3 Health monitoring must also be provided if the PCBU is not keeping a record to track a worker's use of RPE when they should be wearing RPE for the work they do.

4 Health monitoring must be conducted by a Registered Medical Practitioner with health monitoring experience, and in accordance with Safe Work Australia's *Crystalline silica health monitoring guide*; and, Schedule 14, Table 14.1 of the WHS Regulation.

5 Health monitoring records are to be kept as confidential for at least 30 years and are not to be disclosed to anyone without the worker's written consent unless required under the WHS Regulation.

QGL04 Guideline for respiratory health surveillance of workers in Queensland mineral mines and quarries, requires:

1 respiratory health surveillance is provided to workers prior to commencing work in the MMQ industry and then at least once every five years;

2 that medical examinations are consistent with best practice respiratory screening including spirometry and chest X-ray reported to the International Labour Organisation (ILO) standard; and

3 retired and former workers have voluntary access to free respiratory health surveillance.

The default position of the Mining and Quarrying Safety and Health Regulation 2017 is that respiratory health surveillance is required for all workers. However, the Regulation recognises that some workers' current and previous exposure to respiratory hazards is so minimal, any risk can be managed without respiratory health surveillance.

If an SSE is managing these minor risks without respiratory health surveillance, this must be documented by a risk assessment. The risk assessment must include an evaluation of current occupational exposure, a workers' previous work history and any relevant medical conditions the worker may have. Consideration should also be given to relevant information and data from, and practices in, other industries and mining operations.

Statistically, significant risk can be determined by applying the following criteria - where the 95 percent UCL of any SEG exceeds 50 percent of the exposure standard.

GPC will additionally adopt health monitoring for statistically significant risk to respirable dusts and RCS and ensure the results of SEG data analysis are shared with the Health and Wellbeing Team to support this.

5 Roles and responsibilities

To assist GPC Representatives to better understand their responsibilities, key responsibilities and accountabilities are summarised below:

Role	Responsibilities
Chief Executive Officer	To ensure that GPC complies with its obligations by: • Providing adequate resources to implement this Plan.
Managers and Superintendents	To ensure that GPC complies with its obligations by: • Enforcing the requirements of this management plan within the teams for which they have accountability.
Employees and Contractors	To ensure that GPC complies with its obligations by: • Applying the risk management methodologies specified in this document.
Safety Specialist – Occupational Hygiene	To ensure that GPC complies with its obligations by: • Maintaining this document as current and up to date.

6 Appendices

6.1 Appendix 1 – Related Documents

(a) Legislation and regulation

Key relevant legislation and regulation, as amended from time to time, includes but is not limited to:

Type	Legislation/regulation/guidelines
State Acts	Work Health and Safety Act 2011 Work Health and Safety Regulation 2011 Mining and Quarrying Safety and Health Act 1999 Mining and Quarrying Safety and Health Regulation 2017
Other	*Managing respirable crystalline silica dust exposure in construction and manufacturing of construction elements* Code of Practice 2022 *Working with crystalline silica substances – Guidance for PCBUs* July 2024 *QGL02 - Guideline for management of respirable dust in Queensland mineral mines and quarries* *QGL04 - Guideline for respiratory health surveillance of workers in Queensland mineral mines and quarries* AS 2985:2009 Workplace atmospheres – method for sampling and gravimetric determination of respirable dust AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment AS/NZS 1716: 2012 Respiratory protection devices

(b) Gladstone Ports Corporation documents

The following documents relate to this Plan:

Type	Document number and title
Tier 1: Policy	#1930957 Health, Safety and Environment Policy
Tier 2: Standard/Strategy	#854303 Safety Management Framework Standard
Tier 3: Specification/Procedure/Plan	#664817 Asbestos Management Procedure #1896126 Abrasive Blasting Procedure # DRAFT Respiratory Protection Program
Tier 4: Instruction/Form/Template/Checklist	#1997362 Silica Risk Control Plan #1997362 Processing of Crystalline Silica Substances Risk Assessment
Other	N/A

6.2 Appendix 2 - Silica Risk Control Plans

Silica Risk Control Plan	eDoc#
CSS Process 1 – Crushing and Screening of Quarrying Material	1999614
CSS Process 2 – Manual Concrete Cutting	1999615
CSS Process 3 – Manual Concrete Demolition	1999616
CSS Process 4 – Concrete, Brick and Masonry Drilling	1999618
CSS Process 5 – Cable Pulling across Coal-contaminated Infrastructure	1999620
CSS Process 6 – Coal Sampling	1999621
Silica Risk Control Plan – Risk Assessment	1997362

6.3 Appendix 3 – Revision History

Revision date	Revision description	Author	Endorsed by	Approved by
11.03.24	Document development	J. Bromley	Colin Simpson, Safety & Environment Manager	Richard Haward, EGM Safety & ESG
02.10.24	Updated with silica-specific amendments to the Work Health and Safety Regulation 2011 – Chapter 8A	J. Bromley	Colin Simpson, Safety & Environment Manager	Richard Haward, EGM Safety & ESG
12.03.25	Updated with silica-specific information provided in Working with crystalline silica substances – Guidance for PCBUs	J. Bromley	Colin Simpson, Safety & Environment Manager	Richard Haward, EGM Safety & ESG