

Fact sheet

Identifying respirable crystalline silica as a hazard

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Introduction

Under the *Work Health and Safety Act 2011*, a person conducting a business or undertaking has the primary duty to ensure, so far as is reasonably practicable, workers and other people are not exposed to health and safety risks arising from the business or undertaking. This duty includes eliminating exposure to airborne dusts, so far as is reasonably practicable.

The operator of a mine (other than a tier 3 quarry) must prepare a principal hazard management plan (PHMP) if airborne dust contaminants are a risk at the mine. The PHMP must set out how the mine operator will manage the risks associated with airborne contaminants at the site. In so doing, it should provide for compliance with any requirements of the work health and safety laws that relate to airborne contaminants, such as personal exposure monitoring for airborne dust.

The Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 took effect on 1 September 2022. From 1 September 2023, operators of mines other than coal mines (excluding opal mines) where respirable crystalline silica has been identified as a hazard, will be required to undertake compliance sampling and analysis of airborne dust in accordance with Schedule 6 of the regulation. This fact sheet provides guidance on the process for identifying crystalline silica as a hazard.

Obligations of mine operators

Under section 41 of the regulation mine operators must minimise the exposure of workers at the mine to dust as far as reasonably practical and must also ensure that a worker's exposure to dust (including respirable dust and respirable crystalline silica) does not exceed the 8-hour time weighted average exposure limits prescribed in section 41(1)(b) of the Regulation and the workplace exposure limits for airborne contaminants.

Identifying respirable crystalline silica as a hazard

Hazard identification is usually a qualitative process undertaken by a group of skilled and experienced people with knowledge of the operation or activities being undertaken. Those who will be exposed to the hazards can also make a valuable contribution to identifying the hazards.

When identifying respirable dust and respirable crystalline silica hazards at mines and quarries, operators should consider:

- whether the material extracted at site contains crystalline silica
- whether other materials and products used at the site contain crystalline silica
- operations at the site that may cause dust to be released into the air, such as drilling and blasting, digging or excavating, loading, transporting or conveying, crushing or screening, maintenance and housekeeping processes.
- the duration of worker exposure during operations

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Assessing the risk

Once a hazard has been identified, an operator must use appropriate risk assessment methods to investigate and analyse the hazard. The risk assessment must be conducted by a person or group that is competent to conduct the assessment. The risk assessment should include all operations, activities, areas or phases of operations and addresses all aspects of the hazard (e.g. likelihood and consequence; different ways the hazard may arise or different impacts it may have in different circumstances).

Monitoring worker exposure to respirable dust and respirable crystalline silica is often an important component of assessing the risk. Exposure monitoring must be undertaken if you are unsure if the dust at your site exceeds the exposure limit for respirable crystalline silica, or if you are uncertain if silica is a risk to worker health at your site.

Obligations under clause 50 WHS Regulation (2017)

Under clause 50 of the WHS Regulation 2017 a person conducting a business or undertaking must ensure that air monitoring is carried out to determine the airborne concentration of substances in the workplace such as airborne dust, if they are not certain the:

- concentration of airborne dust is greater than the relevant exposure limits, or
- dust is a risk to worker health

Hazard determination

Results of monitoring conducted to identify a respirable crystalline silica exposure concentration or risk to worker health under clause 50 of the WHS Regulation 2017, should be reviewed by a qualified occupational hygienist. The characterisation of worker exposure to respirable crystalline silica can be undertaken by evaluating the monitoring data. Statistical metrics including the geometric mean of results, the estimated average (MVUE) of measurements, 95% upper confidence limits of the MVUE, or the 95th percentile probability distribution can be used to establish compliance with exposure limits. A report outlining the review of the monitoring results and comparison with the exposure limit should be provided by the occupational hygienist.

Further clarification

The information presented in this fact sheet outlines the obligation of mine operators in relation to the identification of crystalline silica as a hazard at non-coal mines, and the requirement for compliance sampling and analysis of crystalline silica exposures.

The following section further provides clarification in terms of the identification, sampling, and analysis obligations of mine operators regarding respirable crystalline silica. This information is presented in a question-and-answer style format.

Regarding the Regulator's position as to what criteria a mine operator should consider when identifying respirable crystalline silica is a hazard:

What is the specific criteria for silica to be determined a hazard? Is the criteria based the percentage of silica contained within the material/product at the site, determined through petrographic analysis? Or is the criteria based on the exposure of workers, determined through personal dust monitoring?

The Regulations state: "where respirable crystalline silica has been identified as a hazard as a result of air monitoring being carried out under the WHS Regulations, clause 50(1)"

The initial identification of silica as a Hazard should be made based on the following considerations:

- whether the material extracted at site contains crystalline silica (any amount)
- whether other materials and products used at the site contain crystalline silica (any amount)
- operations at the site that may cause dust to be released into the air, such as drilling and blasting, digging or excavating, loading, transporting or conveying, crushing or screening, maintenance and housekeeping processes
- the duration of worker exposure during operations

If it is determined that silica is or may be a hazard at the site, then the risk of worker exposure needs to be analysed (by exposure monitoring) to decide if the risk is at an acceptable level.

Investigating and analysing the hazard - Risk assessment of worker exposures:

Risk assessments of worker exposure can be qualitative or quantitative.

Note: The following process has been adapted from the RSHQ QGL02 Guideline for management of respirable dust in Qld mineral mines and quarries (Version 4.0, April 2021).

A *Qualitative risk assessment* should be undertaken in consultation with an occupational hygienist. The qualitative risk assessment should include a review of the following components to estimate the exposure of workers to respirable crystalline silica:

- the results of hazard identification (i.e., materials extracted/used, site operations/ processes and worker exposure durations)
- the results of personal exposure (risk) monitoring (as per clause 50 of the WHS Regulations, 2017)
- the methods of operation at the site and the work environment
- control measures used at the site, their effectiveness and reliability

Following this review, the risk can be assessed using the following criteria:

- Acceptable – the estimated 8-hour time weighted average exposure to respirable crystalline silica is below 0.02 mg/m³ (refer footnote¹).
- Unacceptable – the estimated 8-hour time weighted average exposure to respirable crystalline silica is greater than 0.05 mg/m³ (the Workplace Exposure Limit).
- Uncertain – the estimated 8-hour time weighted average exposure to respirable crystalline silica is between 0.02 mg/m³ and 0.05 mg/m³ (refer footnote²).

¹ For Respirable Crystalline Silica, where workgroup or SEG exposure is estimated to be below 0.02 mg/m³, exposure may be considered 'Acceptable'. A review of RCS health effects conducted for Safe Work Australia in 2019 recommended that 0.02 mg/m³ is protective for silicosis and lung fibrosis, and the risk of lung cancer (*Draft Evaluation Report – Respirable Crystalline Silica*, Safe Work Australia, 2019).

² For Respirable Crystalline Silica, where workgroup or SEG exposure is estimated to be between 0.02 mg/m³ and 0.05 mg/m³ (i.e., 100% of the exposure limit), exposure may be considered 'Uncertain'.

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If the qualitative risk assessment estimates the exposure of workers to crystalline silica is **'Acceptable'** then **respirable crystalline silica is not considered at hazard** at the site.

If the qualitative risk assessment estimates the exposure of workers to crystalline silica is **'Unacceptable'** then respirable **crystalline silica is considered a hazard** at the site.

If the qualitative risk assessment estimates the exposure of workers to crystalline silica is **'Uncertain'** a quantitative risk assessment should be conducted to further define the level of risk.

A *Quantitative risk assessment*, also known as a baseline exposure assessment, should be undertaken in consultation with an occupational hygienist. The quantitative risk assessment should comprise:

- an exposure assessment plan and sampling requirements for each workgroup or Similar Exposure Group (SEG), using appropriate methodologies (refer *Appendix 1 & 2*)
- statistical analysis of exposure results to establish the exposure risk of workers (refer *Appendix 3*)

Workgroup/SEG exposures are considered 'Acceptable' if the Land's Upper Confidence Limit (UCL95%) is less than the Workplace Exposure Limit for respirable crystalline silica.

Any exceedances of the Workplace Exposure Limit should be investigated to identify the cause of the exceedance and define control measures/actions that will be implemented to prevent further exceedances.

Regarding the Regulator's position as to what criteria a mine operator should consider 'when determining the identification of respirable crystalline silica is a hazard':

Does the initial assessment have to include a hygienist?

The initial hazard identification process can be undertaken by skilled and experienced people with knowledge of the operation or activities being undertaken. The determination of the level of risk will involve either personal exposure monitoring, or the analysis of previous personal exposure monitoring results via a qualitative or quantitative risk assessment. Whilst there is no legislative requirement for an occupational hygienist to undertake the quantitative or qualitative risk assessments, it is considered 'best practice' to consult with an occupational hygienist, as it is their area of expertise.

If the mine operator already knows they have a silica hazard onsite through previous exposure assessment, are they required to re-do the assessment?

If a site has identified that silica dust is a hazard at the site and has previously conducted exposure monitoring which has identified a risk to workers, then further assessment of the risk is not required by legislation. The compliance monitoring requirements listed in Part 8 of Schedule 6 would apply to this site. Note: any previous hazard determination and risk monitoring should be documented and recorded in the site Safety Management System.

What happens if it is a marginal site, for example, sites which extract material which contains silica in the range of 5-10% content based on petrographic analysis?

All sites should define the hazard and risk by the same process, regardless of the silica content of the materials they extract or process. It is the obligation of the mine Operator to conduct risk-based monitoring if they are unsure of the concentration of airborne contaminants or risk to workers (as per clause 50 of the WHS Regulations, 2017), and to ensure compliance with the exposure of workers under section 41 of the WHS (MPS) 2022.

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Regarding the legislation which requires Schedule 6 sampling to be conducted by a person holding a licence issued by the Regulator: When is licencing required?

A licence is *not* required for risk-based sampling (undertaken as per clause 50 of the WHS Regulations, 2017).

A licence is only required for sampling conducted under Schedule 6.

In summary:

A dust sampling licence IS required for:	A dust sampling licence NOT required for:
<ul style="list-style-type: none">• Sampling at each part of a non-coal mine where dust is or may be present.• Sampling of specific persons nominated in Schedule 6 (driller, shotfirer/stemmer, mobile plant operator).	<ul style="list-style-type: none">• Sampling conducted to define risk/hazard (under cl 50 of WHS Regs).• Ongoing sampling programs to verify & review risk/hazard status.• Real-time monitoring• Static monitoring
<p>Note: Samples are required from each part of the mine, with a minimum of 5 samples collected every 12 months.</p>	

Regarding the sampling requirements under Part 8, of Schedule 6: How will small operators comply with the requirements of schedule 6 (8) with respect to the number of workers, some will not have 5 people on site?

The Regulation states:

- *Samples must be taken in each part of a mine where dust is, or may, be present, including from the breathing zone of at least 5 persons.*
- *For samples taken where extraction is occurring, the persons referred to above must include, as far as reasonably practicable, a drill operator, a shotfirer/stemmer, and a mobile plant operator.*

The term 'each part of a mine where dust is, or may, be present' would include areas such as:

- laboratory / core shed
- crushing / milling areas
- smelting areas
- control rooms / weighbridge
- administration / ablution areas
- workshops
- drill / blast areas
- stores / warehouse
- production areas
- development areas
- stockpile areas / rom
- product loading areas

This means that if dust is present at any of the abovementioned areas, then a personal sample must be collected from workers in this area, in addition to the requirement for sampling of extraction area operators.

For sites that have less than 5 persons working in total, a sample must be collected from the breathing zone of each person working at the site.

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More information

More information on dust management and risk controls is available on our [website](#).

For further assistance you can also contact the Resources Regulator on 1300 814 609 (option 3) or via email at cau@regional.nsw.gov.au

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