



**NSW
Resources
Regulator**

TARGETED INTERVENTION PROGRAM

RESPIRABLE DUST IN QUARRY OPERATIONS

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Executive summary

This report summarises the findings of assessments undertaken in relation to the hazard of respirable dust in NSW quarry operations. This program commenced in September 2019 and involved 24 mines.

The findings of the assessments are grouped into those that are specific to the hazard, and those that could be generally applied to all aspects of critical control measure implementation.

In general, the assessments highlighted there was a lack of awareness among workers about the risks to their health from exposure to dust at quarry operations. The assessment team found that maintainers and supervisors were particularly vulnerable to dust due to the nature of their work, yet no additional information, training or instruction was being provided to these workers to increase their awareness of the risks to their health from exposure to dust. In particular, the induction processes lacked information, training and instruction to workers on the risks to their health from exposure to dust.

In several cases, the risk assessments for dust did not include a cross-section of the workforce and did not include those workers or similar exposure groups (SEGs) at increased risk due to the nature of the work they performed (e.g. contractors).

Specific findings identified that the procedure for personal protective equipment (PPE) did not state the mandatory respiratory protective equipment (RPE) required for tasks and areas of the mine where workers are at increased risk due to exposure to dust.

Background

Targeted interventions provide a systematic response to a critical risk. They can be applied across all sectors of the mining industry. The need to undertake an intervention will be identified through:

- a series of events
- a single significant event, such as a catastrophic failure or fatality
- a change in the operation's risk profile
- data that suggests an emerging issue

Targeted interventions are typically undertaken by a team of inspectors from various disciplines. The interventions provide an assessment of the:

- operational and management plans and supporting documentation
- implementation of plans and procedures

- effectiveness of control measures, and
- operator's compliance with relevant legislative provisions.

The decision to complete this targeted intervention program was the result of the following influences:

- Increased community concerns following media coverage of worker dust exposure.
- Complaints received from the public and other agencies relating to dust.
- Late reporting on exceedances – respirable dust and respirable crystalline silica.
- SafeWork NSW Silica Dust Workshops.
- Previously completed planned inspections on dust resulting in the following notices issued:
 - WHSA s191 improvement notices
 - WHSA s195 prohibition notices
 - WHS(MPS)A s23 notice of concern.

Scope

Air quality or dust or airborne contaminants is identified as a principal mining hazard in the NSW WHS (MPS) legislation. Dust can be generated in many of the processes used in extractive mines. Many of these mines process material that contains silica. The silica component, along with exposure to the dust generated can be dangerous to a person's immediate and long-term health. This targeted intervention was planned to obtain a sample from mines with varying production rates and across various product types, with reference to how well they are carrying out worker health monitoring, managing and controlling dust.

Generally, the site assessments were conducted unannounced.

The process

The targeted interventions at the quarries were completed in several stages. These were:

1. preliminary meetings and the preparation of documents
2. discussions on information and assessment requirements
3. execution of a one-day on-site assessment involving:

- a. a site desk-top assessment of the principal mining hazard management plan and risk assessment for air quality or dust or airborne contaminants, health control plan and the implementation and monitoring of the identified controls.
 - b. a discussion with the mine management team on the legislative compliance of the relevant plans.
 - c. an inspection of site operations to observe the implementation and effectiveness of the controls.
 - d. interviews with workers to assess their understanding of the dust hazard and the required controls.
4. discussion and feedback to the mine operator and/or the quarry manager on the findings and actions that need to be taken by the mine operator in response.

Respirable dust in quarry operations

Respirable dust is generated during quarry operation activities such as extraction, drilling, crushing, screening, hauling and stockpiling aggregates and construction materials such as road base and manufactured sand. Quarry workers may be exposed to inhalable and respirable crystalline silica dust.

In quarry operations, crystalline silica dust can occur in both an inhalable and respirable fraction. Normally, dust of the larger inhalable fraction is considered an irritant because it is deposited in the upper respiratory tract. In the smaller respirable fraction, these dust contaminants represent a serious health risk to people who are exposed.

The smaller-sized particles can penetrate into the lower regions of the lungs where gas exchange takes place. As such, silica dusts at the respirable fraction can cause silicosis. This condition is a debilitating and often fatal lung disease.¹

In NSW mines, no person is to be exposed to airborne dust that exceeds in total²:

- 3 mg/m³ (or 2.5 mg/m³ in the case of a coal mine) for respirable dust
- 10 mg/m³ for inhalable dust.

Exposure standards for individual substances also must be satisfied within these overall limits. For example, the exposure standard for crystalline silica is 0.1 mg/m³.

For further information, including obligations under work health and safety legislation, refer to the booklet [Dust safety in the metals and extractive industry](#).

¹ [CDC - Mining Topic - Respirable Dust - NIOSH](#)

² Measured in accordance with Australian Standard, AS 2985-2009

Assessment findings

The assessment program has identified issues with the implementation of critical controls that manage the hazard, and more generally, with the process of developing, reviewing and implementing controls. While the highlighted issues were not relevant at all the sites assessed, the findings provide some valuable information that should be considered when developing and implementing critical controls.

The assessment process highlighted:

- Some operators believe that respiratory protection equipment (RPE) is the only control necessary. Operators do not understand that they are required to control workers' exposure.
- Risk assessments to identify the risks and controls for dust on sites were typically not completed, did not identify all activities that generated dust, had not been reviewed and/or controls were not detailed.
- Not all activities that generated dust were identified.
- The critical controls used by quarry operators to manage the risk of worker exposure to dust were common, such as sealed, air conditioned and/or air filtered pressurised cabins of mobile plant to isolate workers from exposure to dust and water sprays to suppress dust generation.
- Workers were not aware of the adverse health effects. They had not been trained in the methods to control dust and had not received RPE training.
- The induction process for workers lacked information, training and instruction on the risks to their health from exposure to dust and methods for controlling the hazard.
- The procedure for personal protective equipment (PPE) did not state the mandatory RPE required for tasks and areas of the mine where workers were at increased risk due to exposure to dust.

Areas of good practice

- ✓ Application of chemical surfactants.
- ✓ Enclosing conveyor transfer points.
- ✓ Implementation of water truck procedures or installing fixed sprays to manage stock pile dust generation.
- ✓ Installation of sprays at conveyor transfer points.

- ✓ Operator training and fit testing for RPE.
- ✓ Programmed maintenance of spray nozzles, pumps and plumbing.
- ✓ Regular inspections of operating dust controls.

The findings of this assessment are grouped into two categories:

- **General findings** that can be used to inform all aspects of an operation’s safety management and provide valuable information and insight across all sectors and operation types.
- **Specific findings** should be used to inform and improve safety management systems to address this principal hazard.

General findings

Risk assessment

Issue	Response
<p>The risk assessment for dust did not identify all activities that generated dust, did not detail controls used to control the hazard, did not use the hierarchy of control.</p>	<p>The operator must conduct, in relation to each principal hazard identified, a risk assessment that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with the principal hazard. (Clause 23 WHS (MPS) Regulation).</p>
<p>The risk assessment for dust did not include a cross-section of the workforce and did not include workers or similar exposure groups (SEGs) at increased risk due to the nature of the work they perform e.g. maintenance personnel</p>	<p>The operator of a mine or petroleum site must consult with workers at the mine or petroleum site in relation to conducting risk assessments for principal hazard management plans. (Clause 121 WHS (MPS) Regulation)</p>
<p>The health control plan was not supported by a risk assessment.</p>	<p>The operator of a mine or petroleum site must prepare a health control plan for the mine or petroleum site that sets out the means by which the operator will manage the risks to health associated</p>

with mining operations or petroleum operations at the mine or petroleum site in accordance with clause 9 Management of risk to health and safety. (Clause 26 WHS (MPS) Regulation).

Training workers

Issue	Response
<p>The induction process lacked sufficient information, training and instruction to workers on the risks to health of dust and other airborne contaminants.</p> <p>Workers were not aware of the adverse health effects, they had not been trained in the methods to control dust and had not received RPE training.</p>	<p>The operator of a mine or petroleum site must ensure that each worker at the mine or petroleum site is provided with suitable and adequate information, training and instruction related to the hazards associated with the work being carried out and the implementation of control measures relating to the work being carried out by the worker. (Clause 104(2-3) WHS (MPS) Regulation)</p>

Specific findings

Personal protective equipment

Issue	Response
<p>The procedure for PPE did not state the mandatory RPE required for tasks and areas of the mine where workers are at increased risk due to exposure to dust or other airborne contaminants (e.g. maintenance personnel working on plant screen change outs).</p>	<p>Mine operators must ensure the documented PPE procedure clearly identifies the circumstances when wearing RPE is mandatory. The RPE must suit the nature of the work and any hazard associated with the work. (Clause 44(3)(a)(i) WHS Regulation)</p>

Workers did not always carry or wear appropriate PPE when working in areas of the mine where respirable dust was present.

Mine operators must ensure that workers are provided with appropriate PPE³ and are provided with information, training and instruction in the proper use of the equipment.⁴ The worker must, as far as the worker is reasonably able, use or wear the PPE in accordance with the information, training or instruction provided.

Fit-testing of RPE should be provided to all workers required to wear it

Pre-start inspections of mobile equipment

Issue	Response
<p>The pre-start inspection report checklists did not include specific inspections of the cabin cleanliness, the cabin sealing arrangements and the operation of the air conditioner and filtered pressurised systems.</p>	<p>Inspection requirements should include confirmation of housekeeping standards and absence of threats related to dust and other contaminants. When developing a control measure to manage the risks to health and safety associated with dust and other airborne contaminants (e.g. cabin cleanliness and cabin sealing arrangements), inspection and testing of mobile plant must be taken into account.⁵</p>
<p>The documented pre-start inspection report system was not being correctly and consistently implemented, resulting in defects not being identified and/or defects not being rectified in a timely manner.</p>	<p>When developing a control measure to manage the risks to health and safety associated with dust and other airborne contaminants (e.g. air conditioning, filtered pressurised systems), the identification, assessment, management and rectification of defects that affect the safety of mobile plant must be taken into account.⁶</p>

³ Clause 36, WHS Regulation

⁴ Clause 44, WHS Regulation

⁵ Schedule 2(3)(e) WHS (M&PS) Regulation

⁶ Schedule 2(3)(f) WHS (M&PS) Regulation

Communication of personal monitoring results to workers

Issue	Response
Workers were only notified of their personal monitoring results when there was an exceedance. Workers were interested in the results of their personal monitoring, whether or not there was an exceedance.	Mine operators should notify workers of their personal monitoring results, whether or not there is an exceedance. Sampling results for the similar exposure groups (SEGs) should be made available to workers.

Where to now

Targeted interventions provide an account of the issues observed at particular sites at a point in time. Some of the findings resulted in notices being issued, including notices of concern, under section 23 of the WHS (MPS) Act, improvement notices, under section 191 of the WHS Act and prohibition notices, under section 195 of the WHS Act. In total 81 notices were issued. Not all notices related to dust.

The matters addressed by the notices reflect the findings of the Regulator. In summary, these findings are:

Notice	In relation to
Prohibition notices, s195	<ul style="list-style-type: none"> Excessive dust being generated through crushing and screening activities.
Improvement notices, s 191	<ul style="list-style-type: none"> Conduct risk assessments, develop and implement on air quality, dust and other airborne contaminates principal hazard management plan and health control plan. Complete personal dust exposure monitoring for (a) inhalable dust (b) respirable dust (c) respirable crystalline silica on the mine site by a NATA accredited organisation. Conduct worker health screening and communicate the results to workers.

- Workers require ready access to respiratory protection equipment.
- Training for all workers on air quality, dust and other airborne contaminants principal hazard management plan.
- The mine operator could not provide documentation to identify the constituents of the material being excavated and processed.
- Non-reporting of an exceedance in exposure to respirable crystalline silica dust.

Notices of concern, s 23

- Induction documentation for workers and contractors did not adequately address the likelihood of exposure to silica dust and dust mitigation control measures other than PPE.
- Fit testing for RPE has not yet been undertaken.
- Pre-start inspection records (no monitoring of inspections completed).
- Documented pre-operational inspection report system not being correctly implemented.
- Mandatory wearing of respiratory protection for particular tasks and areas of the mine had not been identified and documented.

All mine operators involved in this targeted intervention have responded to the notices and other issues identified through the inspections. Where significant issues were identified, these will be followed up with the individual mines.

The TIP process identified many common issues around the approach taken by the sites to manage the hazard of dust. It also highlighted broader issues that are common across mine sites associated with the process of developing, implementing and reviewing the risk assessments, management plans and procedures.

The Regulator expects that all mines will review their procedures and practices in consideration of the findings from this report.

The requirement for principal hazard management plans to comply with legislative requirements, reduce risk to as low as reasonably practicable and give appropriate consideration to the implementation and management of critical controls apply at all types of mining operations.

Issued by

Garvin Burns
Chief Inspector
 NSW Resources Regulator
 NSW Department of Planning, Industry and Environment

Further information

For more information on targeted intervention programs, the findings outlined in this report, or other mine safety information, please contact the Resources Regulator’s Mine Safety branch. You can find the relevant contact details below.

Type	Contact details
Email	cau@planning.nsw.gov.au
Phone	1300 814 609
Incident reporting	To report an incident or injury call 1300 814 609
Website	resourcesregulator.nsw.gov.au
Address	Resources Regulator 516 High Street Maitland NSW 2320

Appendix A: Legislative requirements relating to the management of dust and other airborne contaminants

The appendix provides a list of certain legislative requirements for the management of dust and other airborne contaminants referred to in this report as provided by the *Work Health and Safety Act 2011*, *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* and *Work Health and Safety Regulation 2017*.

Legislation, section/clause	Legislative requirements
WHS Act, section 19	<u>Primary duty of care</u>
WHS (MPS) Regulation clause 39	<u>Ensuring exposure standards for dusts not exceeded</u>
WHS (MPS) Regulation, clause 104	<u>Duty to provide information, training and instruction</u>
WHS (MPS) Regulation, clause 121	<u>Duty to consult with workers</u>
WHS (MPS) Regulation, Schedule 2	<u>Principal control plans - matters to be addressed</u>
WHS Regulation, clause 36	<u>Hierarchy of control measures</u>
WHS Regulation, clause 39	<u>Provision of information, training and instruction</u>
WHS Regulation, clause 44	<u>Provision to workers and use of personal protective equipment</u>
WHS Regulation, Division 6	<u>Health Monitoring</u>