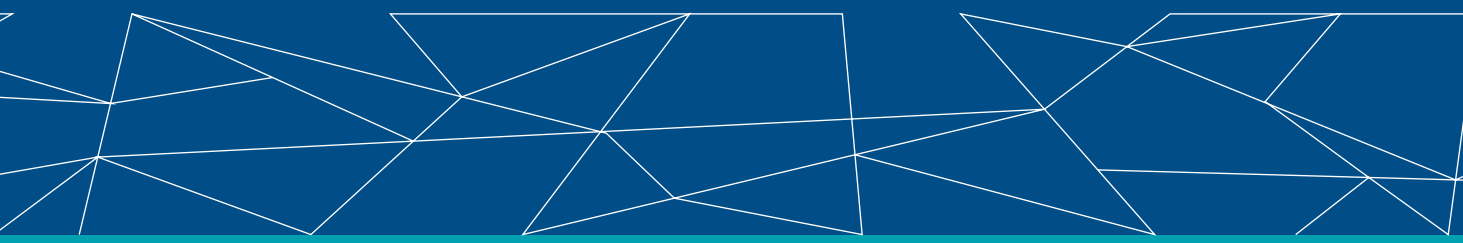
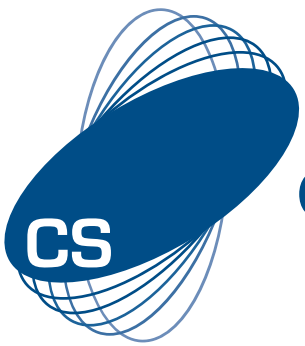
# Protecting against airborne dust exposure in coal mines

8th Edition



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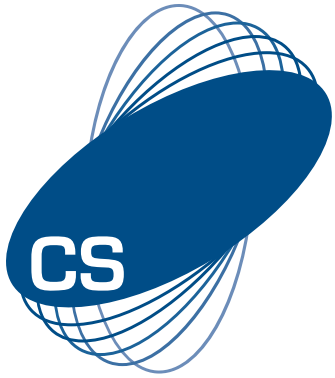


## Preface

New South Wales Work (NSW) Health and Safety legislation defines airborne dust to include both respirable dust and inhalable dust.

In the NSW coal mining industry, dust control measures such as the enforced regulation of dust monitoring and health surveillance continue to help protect NSW coal mine workers from developing Coal workers' pneumoconiosis (black lung disease) and other coal mine dust lung diseases.

Coal Services Pty Limited's Standing Committee on Airborne Contaminants and Occupational Hygiene (Standing Dust Committee) has produced this booklet to promote a better understanding of the health effects and control of airborne dust.

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# 1. Why the subject of dust is important

Long-term exposure to many dusts, including respirable coal dust and respirable crystalline silica, can cause disabling lung diseases.

In 1947, Coal workers' pneumoconiosis (commonly known as black lung disease) was prevalent throughout the NSW coal industry, affecting 16 per cent of all coal mine workers with 4.5 per cent showing obvious symptoms.

The creation of the independent Joint Coal Board (JCB) in 1947 provided a greater commitment to enforcing compliance of the new dust standards recommended by the Royal Commission on Safety and Health of Workers in Coal Mines (1939).

Controls initiated and implemented by the JCB, such as periodic health surveillance, chest x-rays and independent airborne dust monitoring, continue today as statutory obligations performed by Coal Services.

Our collaborative model unites all stakeholders across the NSW coal industry to prevent, detect, enforce and educate about occupational disease.

Modern dust control measures, low workplace exposure standards and worker education about respiratory protection are essential components for worker safety.

Coal mine dust lung diseases are 100% preventable. Yet a sustained effort and continued vigilance must be key factors in every workplace to protect workers against disease.

This book aims to promote and provide a better understanding of the health effects and controls of airborne dust.

## 2. What is the difference between inhalable, respirable and respirable crystalline silica dust?

### Inhalable dust

(1) Inhalable dust particles are <100 microns(μ) in diameter and can be easily seen.

(2) Inhalable dust is usually breathed in but is trapped in the mouth, nose and upper respiratory tract. Inhalable dust can also include respirable dust particles.

### Respirable dust

(1) Respirable dust and respirable crystalline silica can be thought of as ‘invisible dust’ because the dust particles are too small to be seen with the naked eye.

(2) When air containing dust is breathed in, the larger particles are either stopped by the nose, mouth or trapped in the mucus lining of the airways. However, a small fraction of the dust cloud, the very small particles such as respirable dust, can be retained in the lungs.

(3) Just because respirable dust cannot be seen does not mean it is not present in the air.

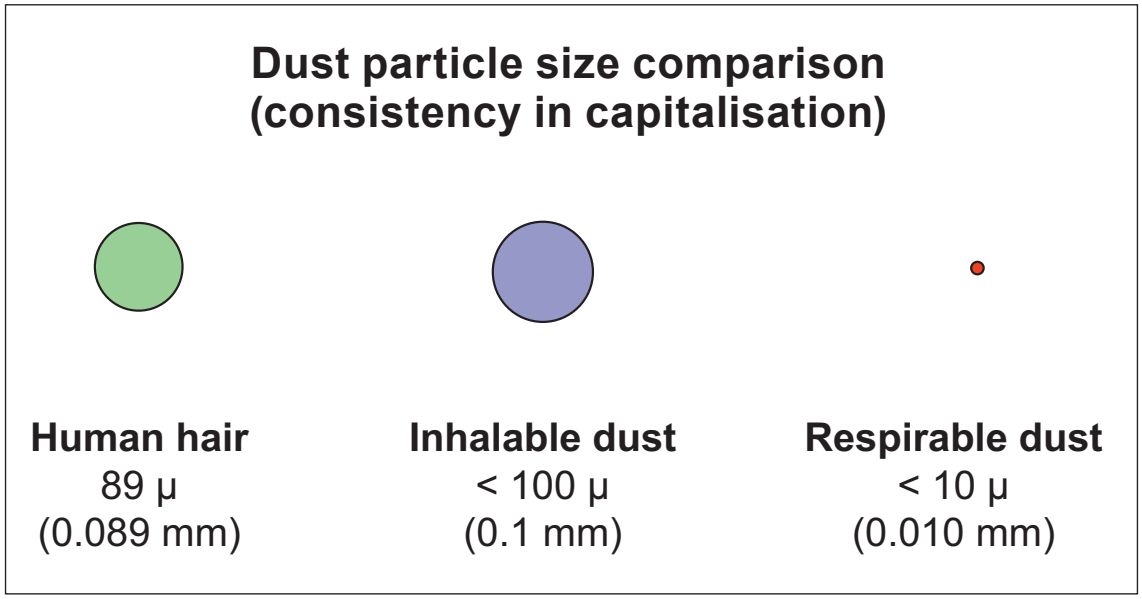
## Respirable crystalline silica

(1) Respirable crystalline silica is the respirable dust fraction of crystalline silica which enters the body by inhalation.

(2) Quartz is the most common form of crystalline silica and is the second most common mineral on the earth's surface. It is found in almost every type of rock, i.e. igneous, metamorphic and sedimentary. Quartz is present in most mining operations.

Figure 1 shows the comparison of dust particles to a single human hair.

**Figure 1**



# 3. Health effects of airborne dust exposure

## What defences does the body have against dust that is breathed in?

The human body has three lines of defence against foreign particles (such as dust) entering the lungs:

(1) Particles may be trapped by nasal hairs or in the mucus lining of the airways.

(2) Receptors can initiate sneezing and/or coughing to expel particles.

(3) Airways can constrict as a response to chemical or mechanical irritation.

## What are the adverse health effects of inhalable dust?

(1) Reduced visibility in the workplace.

(2) Irritation of the eyes and nose.

(3) Pre-existing conditions such as asthma can be affected. Inhalable dust can also cause bronchitis.

Currently there is not enough research to indicate that inhalable dust is a contributor to chronic obstructive pulmonary disease (COPD).

## What are some of the adverse health effects of respirable dust?

(1) Fibrosis and scarring of the lungs, see Section 4, Pneumoconioses.

(2) Cough, sputum and shortness of breath.

(3) Respiratory failure.

## 4. Pneumoconioses (lung diseases)

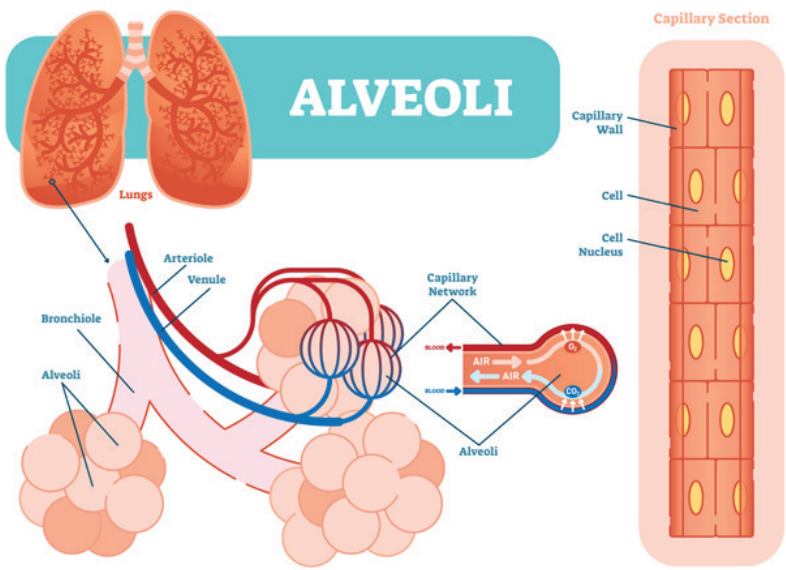
### What are pneumoconioses and how are they caused?

Pneumoconioses are lung diseases caused by the fibrotic reaction of the lung tissue to the inhalation of some dusts.

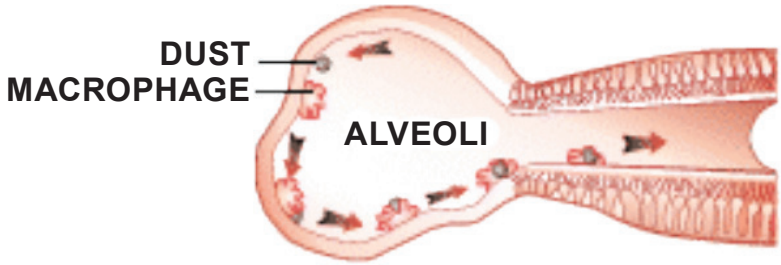
In coal mining, both coal dust and respirable crystalline silica dust can cause lung diseases such as CWP and silicosis, see Figure 2.

**Figure 2**

**1.** Alveoli, or air sacs, are responsible for exchanging gases with the blood. They are located at the ends of each bronchiole.



**2.** Macrophages, a type of blood cell, collect foreign particles and carry them to where they can be coughed out or swallowed.




**3.** If more dust is inhaled than the lungs can clear, it can accumulate in the terminal airways and alveoli. Over an extended period this can trigger inflammation and scarring.

## What is black lung disease?

Coal workers' pneumoconiosis (CWP) is caused by the inhalation of coal dust and is commonly referred to as 'black lung disease'. The disease gets its name because affected lungs appear to be black in colour rather than pink.

CWP is caused by prolonged exposure to respirable coal dust and the gradual build-up of coal dust particles within the terminal airways and alveoli. These particles can eventually cause persistent inflammation and the healing response in the lung causes scar tissue to form around them.

The dust collections and scarring may eventually become large enough to show up as small shadows on a regular chest x-ray.

## Who is at risk of developing CWP?

Anybody exposed to harmful levels of dust is at risk of developing a dust-related lung disease. The risk is directly linked to the total level of personal exposure to dust.

## What are the symptoms of CWP?

CWP usually takes several years to develop. There are usually no symptoms in the early stages of the disease.

Cough and sputum (mucus) may be present, but these symptoms may also be due to inhalable dust or smoking.

In more severe stages of CWP there may be increasing shortness of breath on exertion and eventually at rest.

The onset and severity of the disease can vary with the type of coal dust, how much dust was in the air, how long the person has been exposed to it and individual sensitivity.

## If a person is breathless on exertion, does it mean that they have CWP?

Not necessarily. There are many lung and other diseases unrelated to coal mine dust exposure like asthma which can cause breathlessness.

> The single biggest cause of chest and related disease and disability is smoking.

## Is CWP a serious disease? Is there a cure?

CWP is a serious disease.

CWP may exist as simple disease (Simple CWP) with nodules of up to 10 mm in diameter. There are usually no symptoms to indicate early stages of Simple CWP.

Complicated CWP (progressive massive fibrosis) is much less common and occurs when nodules expand past 10 mm in diameter and start to coalesce. As this destroys more and more lung tissue symptoms may include increasing breathlessness and eventual respiratory failure.

There is no specific treatment for CWP. Most treatments are aimed at limiting further damage to the lung, managing symptoms and improving quality of life.

For early Simple CWP, avoiding further exposure to harmful dust may stabilise the disease.

The aim of the preventative measures in the NSW coal industry is to stop CWP occurring or, at least, stop any progression beyond the very early stages of the disease. As the symptoms may remain undetected for years, periodic health surveillance medicals are recommended.

Globally, thousands of mine workers die from CWP every year, despite it being a preventable disease.

## What is silicosis?

Silicosis is a lung disease with similarities to CWP. It is caused by sufficient exposure to respirable crystalline silica or quartz dust.

Respirable crystalline silica reaching the terminal airways and alveoli triggers a greater inflammatory response than coal dust. This causes scarring to form around the silica particles and damages the surrounding lung tissue (silica induced pneumoconiosis). This damage eventually reduces the lungs' ability to extract oxygen from the air.

Like CWP, silicosis has simple and complicated forms and has symptoms similar to those of CWP.

Respirable quartz dust is more likely to be harmful to a person's health than respirable coal dust.

### Who is at risk of developing silicosis?

**Open cut workers** are possibly at risk during drilling and shot firing operations in the stone overburden if not protected by proper procedures or cabin sealing.

**Underground workers** are particularly at risk at mines that regularly require the extraction of stone roof and/or floor as part of their normal process.

Any task that requires the cutting or drilling of stone has the potential to expose mine workers to unacceptable levels of quartz (crystalline silica).

### What can you do if you are concerned about your health?

If a person is unsure of when they last had a periodic surveillance medical or x-ray, they should contact CS Health for assistance or see their local doctor.

## 5. Health surveillance

### Why do I need a pre-employment medical?

A pre-placement medical assessment is required before an individual commences work or changes roles in the NSW coal industry. This includes a chest x-ray for new entrants to the industry. The medical and chest x-ray serve as a baseline for future health surveillance.

If you were already working in the industry and were asked to attend a pre-placement medical, a chest x-ray would

only be conducted if one was due as required under Coal Services Health Monitoring Requirements for Coal Mine Workers Order No. 43 (Order 43), or if clinically indicated.

## Why do I need a health surveillance medical?

As most occupational illnesses take many years to develop, regular health surveillance allows for early detection and intervention with the goal of ensuring that a person can continue to work safely.

Under Order 43, every NSW coal worker must have a health surveillance medical (known as a periodic medical assessment) every three (3) years from when they commenced work in the industry.

The periodic medical assessment focuses on a range of occupational health issues including the following:

(1) Dust.

(2) Noise.

(3) Fatigue.

(4) Vibration.

Also included will be an assessment of the following issues that may arise from workplace exposure:

(1) General health issues.

(2) Cardiovascular system.

(3) Mental health.

(4) Musculoskeletal issues.

(5) Alcohol usage.

The periodic medical assessment ensures that workers' ongoing health is protected and monitored for any adverse health risks as a result of their employment.

## How often do I need a chest x-ray?

Order 43 sets the frequency of chest x-rays for coal workers as follows:

(1) **A pre-placement chest x-ray** for all workers entering the NSW mining industry.
Existing workers who are changing roles are not required to undergo a chest x-ray.

(2) **Underground coal workers** must undergo a chest x-ray every three (3) years or at a shorter interval if indicated in their last medical.

(3) **Open cut workers** involved in the production, processing or maintenance of coal must undergo a chest x-ray every three (3) years or at the interval recommended in their last medical.

(4) **Workers with a history of hazardous dust exposure** must undergo a chest x-ray every three (3) years.

(5) **Other workers with past but not current dust exposure** must undergo a chest x-ray every six (6) years.

## Who are the qualified specialists that review chest x-rays?

CS Health utilises qualified radiologists with recognised expertise in reading chest x-rays for dust disease. When

a possible dust-related disease is detected, Coal Services uses respiratory physicians to complete the investigation and diagnosis. CS Health doctors also review the reports from the radiologists.

In Australia, radiologists are doctors who undergo a post-graduate training program that qualifies them to read and interpret x-rays for any signs of abnormalities. Their curriculum includes the study and identification of dust disease such as pneumoconiosis and silicosis.

Respiratory physicians are specialists in diagnosing any condition of the lungs.

## What is the process to check chest x-rays?

All x-rays taken of NSW coal miners by CS Health are read and reported on by a specialised group of radiologists. From there, x-rays that show any abnormalities are referred for further investigation, which may include a high-resolution CT scan, and referral to a respiratory physician if there is any suspicion of a dust disease of any type.

As required by Order 43, medical assessments not conducted by CS Health, including x-rays and radiologists' reports, must be sent to CS Health for inclusion in the NSW coal database. All of these medical assessments are fully reviewed by CS Health and any abnormal x-ray results would be discussed with the doctor who conducted the medical to ensure appropriate investigation is being carried out. The results of these investigations would be sought for review and inclusion in the miner's medical record held by CS Health.

## What are the typical causes of abnormal chest x-rays?

In coal miners' x-rays, the most common cause of abnormal x-ray results are due to medical conditions NOT associated with dust disease.

Medical conditions identified generally include the following:

(1) An enlarged heart due to high blood pressure.

(2) Bony abnormalities such as scoliosis.

(3) Old scarring due to previous lung infections.

(4) Plaque due to previous asbestos exposure.

(5) Tuberculosis.

(6) Tumours.

(7) Sarcoidosis (autoimmune inflammatory disease).

(8) Granuloma (a mass of tissue typically produced in response to infection, inflammation or the presence of a foreign substance).

## I haven't had a chest x-ray, or can't remember when I last had one.

In either case, please contact your nearest CS Health office and we can assist you.

These diseases can sometimes take decades to become detectable and may appear even after exposure to the dust has ceased. Retired and former NSW coal miners may continue health monitoring with a retired miner medical.

# 6. Exposure to airborne dust

## In what way does longwall mining differ from continuous miners in respect to airborne dust hazards?

Longwall mining potentially provides the most difficult situation for dust control in coal mines because of the following:

(1) Longwall mining systems produce more coal which therefore means more coal dust.

(2) Different ventilation flow patterns.

(3) Workers' positions vary in relation to dust sources and ventilation flows.

(4) Additional dust sources such as coal crushers, powered roof support movement, AFC coal clearance and BSL discharge to the conveyor belt.

> One of the worst mining practices causing high dust results on longwalls is people working on the return side of the shearer and/or advancing supports.

Mining using continuous miners (or bolter miners) has the potential to provide significant airborne dust control challenges, particularly in situations where roof or floor stone is being extracted. Auxiliary fan ventilation, when maintained to a high standard is an extremely effective control for removing dust away from the working area in most 'business as usual' situations.

Mine sites that conduct drivages that require the cutting of stone using continuous miners, need to assess the adequacy of their existing controls to reduce any increased risk of exposure to crystalline silica down to as low as reasonably practicable.

The following are examples of where increased stone may require cutting:

(1) Achieve mine roadway design specifications.

(2) Driving belt chamber and conveyor transfer areas.

(3) Extracting additional height for overcast install areas.

(4) Breakaways.

(5) Mining through geologically affected zones, e.g. faults, dykes, seam thinning, rolls in seam, or areas of floor heave.

## Is dust exposure a problem for open cut mine workers?

It is important to remember that anybody exposed to coal dust or crystalline silica dust is at risk of developing pneumoconiosis or other dust-related diseases. In open cut mines, exposure to coal and other dusts is usually minimal when workers are located in enclosed, well maintained air-conditioned cabins. This lower level of exposure assumes correct cabin sealing is maintained and appropriate work procedures are in place.

Any task that is conducted outside the cabin, particularly where drilling has or is occurring (e.g. shotfirers and blast crew) should be viewed as a potential high-risk activity and controls should be applied to reduce dust exposures.

## Can exposure to visible dust (e.g. large dust clouds) in an open cut mine be harmful?

Yes, open cut mines can be harmful as they may contain respirable dust and quartz and the large fraction (inhalable dust) is thought to contribute to respiratory disorders.

A coal mine worker can be exposed to large clouds of dust but still be below the respirable dust WES. However, excessive dust levels can cause respiratory disorders, such as bronchitis, and exposure should be kept to a minimum.

## Where are coal miners exposed to respirable crystalline silica?

The most common exposures occur in, but are not limited to, the following environments:

(1) Underground
    (a) Cutting stone roof or floor or stone bands in the seam during continuous miner or longwall operations.
    (b) Roof bolting or drilling into sandstone or mudstone, dry drilling.
    (c) At material transfer and loading points.
    (d) In ventilation returns.
    (e) Spraying or grouting with products that contain crystalline silica.
    (f) Shotfiring activities.

(2) Open Cut

(a) Drilling or shotfiring operations, dry drilling.

(b) Any tasks that require an operator to work from outside a sealed cabin, particularly in areas where fine drill tailings remain on the ground untreated.

(c) In vehicle cabins where cab cleaning is given a low priority.

(d) Poor housekeeping standards in and around workshops and coal preparation plants.

(e) Poor bench preparation.

## 7. Workplace Exposure Standards (WES)

### What are the WES?

In the NSW coal industry, the WES are as follows:

| | | |
|---|---|---|
| (1) | Respirable dust | 1.5 mg/m$^3$ |
| (2) | Inhalable dust | 10 mg/m$^3$ |
| (3) | Respirable crystalline silica | 0.05 mg/m$^3$ |

NOTE: WES are current as at July 2021.

### Should the WES be less for longer shifts?

The current workplace exposure standards for dust and quartz have been determined based on the 40-hour, five day work week. In mining, this traditional work hours structure has been replaced by rosters that include extended work shifts and variable numbers of shifts per week.

For workers on rosters that result in working weeks greater than 40 hours, the WES may need to be adjusted.

NOTE: For more detailed information, refer to Safe Work Australia, *Guidance on the interpretation of workplace exposure standards for airborne contaminants*, April 2013.

# 8. Personal dust monitoring

## What is the purpose of personal dust monitoring?

A comprehensive, targeted monitoring programme is continually being carried out to determine whether dust levels at every coal mine are kept below the WES and to protect the long-term health of mine workers.

Regular monitoring also allows the mine operator to identify any areas or tasks within the mine that could potentially present a risk.

Monitoring also provides data for mines to review the effectiveness of existing dust controls. Many mine operators engage Coal Services to provide additional dust monitoring to ensure and validate continued effective dust control.

## How is statutory airborne dust monitoring undertaken?

Independent, onsite dust sampling is carried out by a Coal Industry Act inspector. Inspectors are experienced mining

practitioners who understand the mining environment and are trained in occupational hygiene and monitoring techniques.

The inspectors operate within the following framework:

(1) Coal Industry Act 2001 - Order 42 (Order 42)

(2) AS 2985, *Workplace atmospheres — Method for sampling and gravimetric determination of respirable dust and AS 3640, Workplace atmospheres — Method for sampling and gravimetric determination of inhalable dust.*

(3) *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.*

The frequency of monitoring is based on the requirements in Order 42 and the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*. In general, all shifts/ crews are monitored every 6-12 months depending on their location, tasks undertaken and exposure risk. Typically, five (5) crew members will be sampled during each shift monitored.

A single sample that exceeds the WES requires the entire crew to be re-sampled to ensure no systemic problems exist. Re-sampling usually occurs after the mine has conducted a review of the failed sample (exceedance) to identify contributing factors and opportunities for improvement. Typically, the re-sampling is conducted within 14 days of the original failed sample (exceedance) report being issued to the mine.

Coal Services works closely with mine operators to improve exposure levels where assistance with corrective

actions is required. This process is not just to review and approve the re-samples, but to ensure dust control measures are in place, operational and maintained to a standard. Best practice dust control initiatives are shared by Coal Services across the industry to improve the workplace environment and reduce the likelihood of lung disease.

## Who receives the dust monitoring results?

The results of statutory airborne dust samples are sent to the following:

(1) Mine where samples were taken.

(2) Department of Regional NSW (NSW Resources Regulator).

(3) Coal Services.

(4) CFMEU - Mining & Energy Division.

(5) Standing Committee on Airborne Contaminants and Occupational Hygiene (Standing Dust Committee).

(6) A separate individual result page is also provided within every test report for distribution to each mineworker sampled on that shift.

## What method is used to determine the respirable dust concentration?

The approved sampling method adopted by the NSW coal industry is personal gravimetric sampling. In this method, respirable dust is collected from the air within the breathing zone of a mine worker, i.e. zone close to the

nose and mouth. The amount of dust is then measured by weighing. The weight of this fine, respirable dust gives the most accurate prediction of the likelihood of developing pneumoconiosis.

The samples are collected by a small battery-powered pump worn by the mine worker. The pump is connected with a piece of plastic hosing to a sampling unit (or cyclone) that is clipped to the individual's shirt within their breathing zone, see Figure 3. A steady stream of air is drawn through the sampling unit where the coarse dust is first removed and only the very fine respirable dust is collected on a filter and weighed.

It is a requirement of the monitoring standards that the sampling device remain positioned in the breathing zone of the individual being sampled for the duration of the sampling period.

For monitoring results to effectively be used to protect the health of all NSW mine workers, it is vital that each result is representative of the dust exposure of the individual mine worker on that shift.

The removal of a monitor during the sampling period not only affects individual results but also influences the decisions made that protect the health of ALL mine workers.

**Figure 3**


## What method is used to determine the inhalable dust concentration?

The gravimetric method used for respirable dust sampling is also used for inhalable dust sampling. The main difference is the sampling head which collects dust particles below 100 microns(μ), rather than only the very small respirable dust particles.

## What happens if the person sampled is exposed to one very dusty task for a short time and no dust for the remainder of their shift?

The method of dust sampling is designed to give the average result for the duration of the shift and takes into account periods of high and low exposure to dust.

Job rotation during a shift is beneficial to the overall health of a worker because of the dilution effect of being exposed to a non-contaminated atmosphere following a short but high exposure to a dusty environment.

One of the key factors involved in the onset of lung dust disease is the total amount of coal dust or respirable crystalline silica that a person has inhaled during their working life. It is not based on whether the person has been exposed to a high level of dust in a single event on one part of a shift or due to a particular mining method. Repeated high exposures however, may shorten the time before the onset of disease.

## What happens to the dust results?

Copies of all results are sent to the mine operator, Inspector of Coal Mines and Industry Safety and Health Representative (ISHR).

Following a failed result (an exceedance of the WES), the Mine Manager informs the worker who was sampled. The mine should conduct an investigation to initially identify the relevant contributing factors and review the effectiveness of the existing controls. A well conducted investigation can turn an unwanted exceedance into an opportunity to drive improvements in airborne dust management.

Coal Services, through the Standing Dust Committee, also maintains an overview of all dust sampling programme results from across the NSW coal industry. The Standing

Dust Committee reviews all dust exceedances including contributing factors and any actions taken, such as respiratory protection compliance. The Standing Dust Committee recommends that all results are displayed on the mine site's noticeboards.

All dust sampling results are held in the Coal Services database.

## 9. Control Measures

### What are the most effective methods of dust control?

> It is difficult to control dust if you firstly do not identify all the potential dust sources affecting a work area. You must identify first, then control!

Controlling dust at the source is essential to effective control as follows:

(1) Adequate ventilation and the application of water, in sufficient quantity and in the correct location, are the best solutions. Since water will not control dust once the dust is airborne, water should be applied as near as possible to the point where the dust is produced in order to wet the dust and prevent it being carried away in the air current.

> Water sprays are useless unless they are operating effectively.

(2) Dust capture by using scrubber systems on continuous

miners and longwall beam stage loaders (BSL) and crushers. Again, as with water sprays, if scrubber systems are not maintained adequately, they will be ineffective.

(3) Ventilation, in particular continuous miner panels, must be maintained at the face by erecting tightly fitting brattice or ducting which should be extended systematically so that mine workers are never working ahead of the ventilation.

One of the most damaging mining practices causing high dust exposures is working inbye ahead of the ventilation ducting or brattice, and on longwall operations, working on the return side of the shearer and/or advancing supports.

(4) Operator positioning as follows:

(a) In longwall operations, any task that has the potential to place mine workers on the return side of the shearer and/or advancing supports should be reviewed and controlled. A committed approach to effective utilisation of automation, particularly on bi-directional (BiDi) faces, is considered best practice in positioning operators and reducing their exposure to airborne dust.

(b) Cutting stone in development panels can potentially place operators at significant risk of inhaling crystalline silica dust. Operators on the vent side of the continuous miner are at higher risk if dust

generated from the discharge is not controlled adequately. The cutting/loading cycle should be interrogated to identify the parts of the cycle that have the potential to expose face operators to unacceptable levels of airborne dust, e.g. loading while cutting stone.

## What about using personal respiratory protective equipment?

Respiratory protective equipment (RPE) is the last line of defence in the control of airborne dust inhalation.

RPE should not be used as an isolated control in the absence of first identifying all dust sources and controlling them using the hierarchy of control. That said, while RPE does not eliminate the hazard, it does reduce the risk.

When Coal Services are conducting their dust monitoring, observations indicate a high level of RPE use by longwall operators where the wearing of RPE is typically mandated during the production cycle.

Other high-risk exposure tasks, such as continuous miner operation, service installations/retractions and open cut blast crews and field maintenance, require improvements in RPE use.

## Is fit testing of RPE important?

As respirable dust particles are very small, workers should use a tight-fitting respirator with an effective face seal. This

means workers need to be clean-shaven or only have facial hair that does not interfere with the fitting surfaces or the respirator valve. As the human face differs in size and shape, there is no ‘one size fits all’ tight-fitting respirator. Therefore, each worker should be fit tested with their RPE before undertaking dusty work.

For workers who want to keep facial hair that may interfere with the operation or proper fit of their tight-fitting respirator (e.g. a closely trimmed beard), a powered air purifying respirator may be suitable.

Training, as well as fit testing, should form part of a mine site’s overall respiratory protection program. This RPE training should include the following:

(1) Why the RPE is required for the job.

(2) When the worker should and must wear the RPE.

(3) How the RPE works.

(4) Limitations of the RPE.

(5) How to correctly put on and take off the RPE.

(6) How to fit check.

(7) How to clean and maintain the RPE.

(8) When and how to replace the filters.

(9) How and where to store RPE when not in use.

## Are there any other measures that can be taken to manage airborne dust?

As with managing any risk in the workplace, being exposed to hazardous dust particles should be managed using the hierarchy of controls, with a focus on higher order controls i.e. elimination, substitution and isolation of the hazard.

(1) Isolate or capture dust sources by sealing transfer points, BSL and crushers.

(2) Operate water sprays at appropriate locations and as near as possible to the point of breakage with sufficient water volumes, pressure and correct sizing of water jets/droplets.

(3) Ventilate the correct quantities and at the right location.

(4) Advance ventilation ducting/brattice to standard.

(5) Regularly maintain dust suppression equipment.

(6) Consider operator positioning, job rotation and automation.

(7) Control dust levels along travelling roads.

(8) Adequately train all workers in the importance of high standards, quality maintenance of equipment and reporting defective controls.

(9) Use of personal respiratory protective equipment such as respirators.

## 10. Longwall dust suppression

Mines across NSW are required to prepare plans to limit dust creation and exposure for each operating longwall panel.

Order 40 requires the Coal Services Board to review and approve these plans to ensure worker health and safety. Additionally, mines must submit an audit of these plans once longwall production commences. This is to confirm all dust abatement provisions of the Order 40 approval are in place and operational.

## 11. Standing Dust Committee

The Standing Committee on Airborne Contaminants and Occupational Hygiene (Standing Dust Committee) is an expert advisory body comprised of representatives from across the industry.

The role of the Standing Dust Committee is to be involved with the following:

(1) Monitor the results of nominated hazard sampling.

(2) Evaluate results and discuss improvement strategies.

(3) Identify hazards which may present emerging health issues.

(4) Research improved control strategies and methods for nominated hazards.

(5) Educate mine personnel in control of nominated hazards.

(6) Report back to industry stakeholders.

The Standing Dust Committee meets every two (2) months to review all dust exceedances, including factors that may be contributing to the exceedances. There is also a review of any investigations and controls that may have been implemented following exceedances. This information is also distributed across the industry via Standing Dust Committee members that represent industry stakeholders.

## 12. Key learnings from dust exceedance investigation reviews and good practice observations

The following are some key messages that have been communicated to the industry through the Standing Dust Committee regional forums.

### Consider what may harm by disease, not just injury

When conducting risk assessments, the physical harm element should also include disease as well as injury.

Start any procedure review at the original risk assessment to determine if health risks, not just safety risks, were identified for the task. The risk assessment should identify

all activities that generate dust and detail controls used to mitigate the hazard.

Follow the hierarchy of control principles to manage the risk of dust exposure just as we do to manage the risk of injury.

## Dust control is most effective when applied at the source

When applying engineering controls, focus your efforts at the source, or ‘at the point of breakage’. Once dust is airborne it is much more difficult to control.

Remember, in a single working environment, dust can be generated from multiple sources. Real time monitors can be an extremely effective tool for identifying and quantifying individual dust sources and their cumulative impact in working environments.

## Have a control plan for changing conditions

Mining conditions are very rarely ‘business as usual’ with conditions continually changing. All crews need to be clear on what needs to be done differently to control risk in changing conditions, e.g. task rotation when cutting additional stone with the bolter miner.

If mining conditions change and there is uncertainty as to what needs to be done — stop and ask.

Every site should develop Trigger Action Response Plans (TARPs) and communicate them as a guide for adequately controlling changing conditions.

## Decide what checks are required to ensure controls work as intended

Operational checklists can verify the health of your dust controls. There needs to be a current, dedicated and implemented plan to inspect, maintain and monitor all dust controls. Engineering controls require regular review therefore standards should have continual maintenance. This requires a sustained effort.

## Leadership is key

Leaders, supervisors and the more experienced workers within a group determine the work standards culture, whether good or bad. Therefore, leaders and experienced workers can influence the actions and attitudes of fellow workers, e.g. accept or reject poor dust control standards.

Dust control should be a high standard for mine culture. These standards then become part of everyday work life for the mine operation. ‘The way we do things around here’.

## Complacency is the enemy

Avoid ‘normalising’ the dust. If you ignore it – you accept it. If it’s dustier than usual, there’s probably a very good reason. Don’t ignore it – investigate it.

**WARNING:** The health impacts of dust exposure are not immediate. This latency period is fertile ground for growing complacency.
Complacency is the enemy.
Dust disease is 100% preventable.

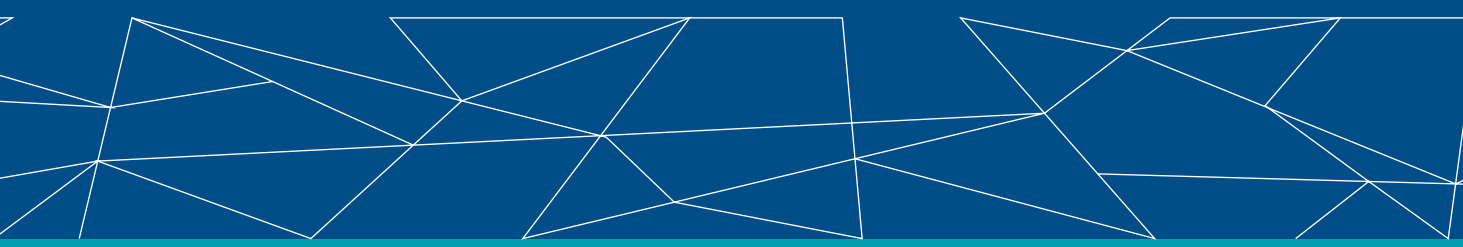
## 13. Further information

The Standing Dust Committee endeavours to provide the industry with the latest information on airborne dust. Publications, including this booklet, can be viewed on the Coal Services website at www.coalservices.com.au.

Coal Services can also provide information sessions on a range of occupational health exposure issues.

Further information and training may also be provided by your employer.

To keep up-to-date with the latest advice on airborne dust exposure and other mine safety information, visit the NSW Resources Regulator website at www.resourcesregulator.nsw.gov.au/safety-and-health/topics



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