

Resource for Unions, Civil Society Organisations and Associations



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INTRODUCTION TO THE MODULE

Mining and mining activities are never carried out in isolation. People, communities and countries depend on the successful operation of mines. Mines do however in many circumstances (unintentionally) create unwanted conditions that may influence the health, wellbeing and environment in which people and communities live.

The Charter of Fundamental Rights in SADC states in Article 12 that every worker in the region has the right to health and safety at work and to a healthy and safe environment that sustains human development and access to adequate shelter.

This module is aimed at empowering and educating civil society actors about their role in combating lung diseases prevalent in mining communities, both as far as mining employees and entire communities are concerned. It is a resource for communities to get involved in ensuring a healthy living environment for all.

You will find information on the legal rights of mineworkers, on mining related occupational lung diseases and what controls can be applied to prevent the diseases from occurring or spreading in mines as well as on medical screening for occupational diseases.

It is a resource for unions, small-scale miners associations, community leaders and community based organizations to educate mineworkers in large and small-scale mines on dust hazards and dust-related occupational lung diseases and better lobby for the rights of mineworkers and necessary changes to the legislation in the country. They all have a role to play in the education and training of mineworkers working in large, medium, small scale and artisanal mines.

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BACKGROUND READING

It is important that civil society gets involved and participates in combating hazardous outcomes from mining and helps create an environment in which health and safety concerns can be solved to the benefit of all. Mineworkers sometimes turn to unions, civil society organisations and small-scale mining associations for advice and support around working practices, the law and compensation. Most countries pass laws to protect people working in the mines but sometimes they are not enforced effectively. There are specific laws for dangerous areas of work such as mining.

The system of international labour standards is in the form of International Labour Organisation (ILO) Conventions and Recommendations, which are adopted by the International Labour Conference held in Geneva every year. International Labour Conventions are international agreements, which countries sign up to and are legally binding. Signatory countries are supposed to align their laws and working practices with the conventions and get supervised by the international community.

There are several ILO conventions on safety and health, which fall into four broad categories:

- One category provides for the protection against specific risks such as asbestosis.
- Another category provides for protection in specific industries such as mining. The ILO Convention 176 is such an example and places responsibility for the safety and health of mineworkers firmly on employers.
- The next category focuses on protective measures that can be applied in work places to protect employees from harm.
- The final category provides a framework of policies that guide implementation such as the Occupational Safety and Health Convention (155) and the Occupational Health Service Convention (161).

In particular, Convention 176 'Safety and Health in Mines Convention', from 1995 states that employers should:

- Attempt to eliminate health hazards altogether.
- Then they should control any health or safety risk at source, minimizing the risk as much as possible.
- If this cannot be achieved, then they should try and mitigate or minimize the risk through better design of work practices.
- As a last resort the correct Personal Protective Equipment (PPE) should be provided, to protect the employee from harm.

In its section B, on the 'Rights and Duties of Workers and their Representatives', the following rights and duties of mine employees are highlighted:

- To report accidents, dangerous occurrences and hazards to the employer and inspectorate.
- To request inspections and investigations by the employer and the inspectorate.
- To refuse to work in unsafe areas of work.
- To nominate safety representatives.
- To get more information about the hazards they are exposed to.

The convention also says that employees or the mineworkers themselves should not do anything that could cause them harm or go against the law or any regulations issued by the country.

Employers must conduct risk assessments to identify the hazards that employees are exposed to and the likelihood that the harm will become a reality.

The convention also makes provision of responsibilities for the government:

- To develop a comprehensive policy on safety and health in the mining sector which has to be done in consultation with the different stakeholders.
- To pass laws, regulations and guidelines to help employers and employees implement safe mining practice.
- To operate an inspectorate to enforce the law and they are meant to inspect the mines and accidents and to compile statistics and bring about measures such as shutting down a mine until safe activities can be resumed.

Often small-scale and artisanal mines do not comply with the laws or regulations in force. The health and safety of mineworkers in this type of mines are at stake. While in some countries, the inspectorates close down small-scale and artisanal mines if there is unsafe practice going on others do not carry out regular inspections to this mining segment. It is important that inspectorates, unions, miners associations and other civil society organisations work together to bring about change for the protection of all mineworkers and the people living in peri-mining communities.

Dust and mining

The drilling, blasting and cutting of rock as well as the loading and transport of ore produce considerable amounts of dust in a mine. It is a reality in mining that dust emissions can never be avoided fully. Mineworkers are at risk from the dust they breathe when working in the mine. The most dangerous dusts are very fine particles, which are invisible to the eye.

The most common and dangerous dust hazards in mine work are:

- Coal dust: This is produced when coal is mined in either an open cast or underground mine. Coal dust is explosive, so it can be a safety as well as a health hazard.
- Silica dust: This can be produced during rock blasting, cutting and drilling in any mining operation where the rock formation contains quartz.
- Asbestos dust: This contains thread like fibre that can penetrate and cause damage to the lungs.

What are the effects of dust?

If a critical mass of that very fine dust is inhaled and settles in the lungs, it causes the lung tissues to change. This type of lung disease is called pneumoconiosis and it has been reported as the most common type of occupational disease in mineworkers and ex-mineworkers. The body is unable to expel this fine dust from the lungs and the damage worsens over time. The disease is incurable and eventually the breathing starts getting affected. The mineworker or ex-mineworker will more and more struggle to breathe and this will eventually lead to an early death. There is a common myth among mineworkers that milk would clean the body from dust. This is not true and it is important that this message is shared with mineworkers.

The most common types of pneumoconiosis in the mines are:

- Silicosis (also called miner's phthisis), which is caused by silica dust. The silica dust particles accumulate in the tiny air sacs of the lungs. The lung tissue gets slowly destroyed and makes it difficult to breathe. Eventually the person will have an early death.
- Coal worker's pneumoconiosis (CWP) or black lung as it is commonly known as. This is caused by breathing in the coal dust and over time the lungs are damaged because the coal dust settles in the lungs. The mineworker or ex-mine worker may experience breathing and heart problems and is usually diagnosed based on x-ray findings. There is no cure for CWP and prevention is the only answer.
- Asbestosis, which is caused by asbestos dust collecting in the lungs. This also develops in the same way as silicosis but the asbestos fibres can also lead to a rare form of cancer.

The only way to determine if someone has pneumoconiosis is by x-ray conducted by an occupational health specialist. Medical doctors without specialisation are not trained to diagnose pneumoconiosis and it is very often mistaken for tuberculosis. This may lead to a situation where a mineworker suffering from pneumoconiosis gets treated over and over for tuberculosis without effect. The specialist may also undertake other lung function test and a work history of the mineworker.

If a mineworker suffers from pneumoconiosis the lungs get very irritable by the disease, which makes them sensitive to contracting tuberculosis (TB) on top of the pneumoconiosis. However, other than pneumoconiosis, tuberculosis is curable if the mineworker follows strictly the treatment regime prescribed by his or her doctor. Some patients stop treatment when they feel better but this can cause the TB to become resistant to the medication. It is important to understand the signs of TB and get tested early. The most common symptoms are persistent cough, night sweats, fever and weight loss. At a late stage of tuberculosis a patient may cough up blood as well. In most countries in SADC region a mineworker is due compensation when the diagnosis of pneumoconiosis is made. Usually mining companies pay either a levy into public compensation funds or to a private insurer. It is important that mineworkers are educated about their right to compensation.

How can the dust hazard be controlled?

For many years the mining companies did little to control the dust in mines effectively, which has led to the early death of many mineworkers.

Dust can be controlled by:

- Good ventilation of the mine.
- Extraction of dust via exhausts next to where blasting, drilling or cutting occurs.
- Watering down dusty areas using water jets.
- Wet drilling using drilling equipment that provides for water use.
- Covering rubble on conveyor belts or when moving it from one place to another.
- As a last resort, respirators or dust masks should be used by mineworkers, but this must meet particular specification to be effective.

DUST GENERATION



Blasting



Drilling



Loading

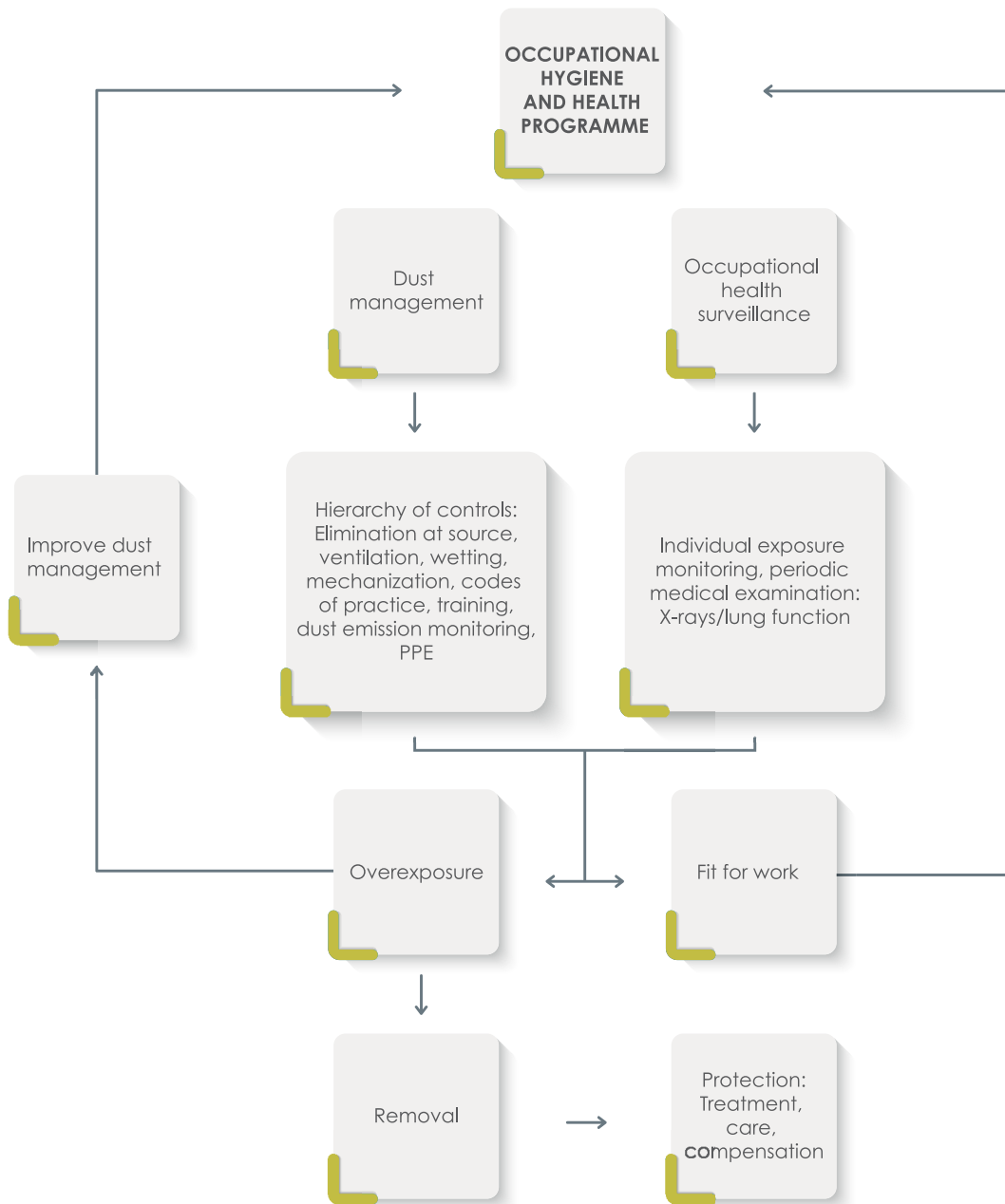


Cutting



Transporting

PREVENTION



SOCIAL PROTECTION

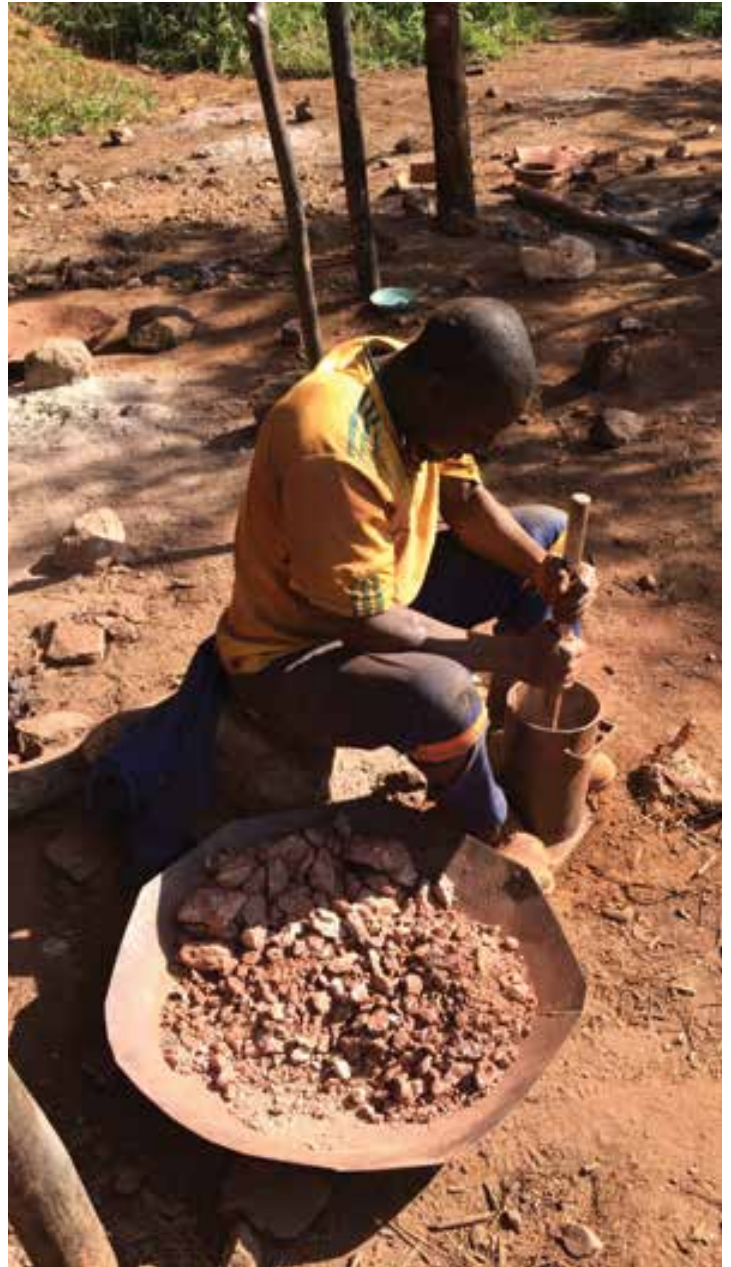
Artisanal small-scale mining

In many countries the Ministries of Minerals or Mines issue licenses for very small mining operations. This type of mining is referred to as artisanal small-scale mining. In these operations the safety and health of the employed or contracted mineworkers is more often than not at stake. The license holders don't know much about safety and health, inspections are almost never carried out and mine managers do not receive sufficient budget to put in place minimal protective systems.

Mineworkers mostly work with hand tools, without sufficient light in their areas of work, without any kind of protective clothing (boots, hard heads, gloves, goggles) not to speak of effective respirators or masks. Often women or children are tasked with crushing the rocks into gravel that can be milled further.

Underground shafts or tunnels are poorly ventilated; no exhaust systems are in place. The most common type of ventilation is a ventilator blowing in fresh air into the mine, stirring up dusts and worsening the situation for the employee underground. Where no electricity is in place generators are used to ventilate the place and pump water down to reduce dust emissions. However, without sufficient budget the generators are not used or only switched on to transport ore from tunnels and shaft to the top.

Communities where such type of mining is practiced are often protective of the practice. The mines provide for day labourer jobs and bring income to the community. It is therefore important that community awareness is raised about the dangers of that type of mining and their role in enforcing the rights of mineworkers even in these small ventures.



TOOLS FOR UNIONS, CIVIL SOCIETY ORGANISATIONS AND MINING ASSOCIATIONS

Handbook 1: Basic facts about dust protection in a large mine

What is dust?

Dust is tiny solid particles in the air.



Dust can be created from blasting...



...or drilling...



...or transporting ore.

A mineworker can breathe in harmful dust in the workplace.



Some dust particles are very small and not possible to see, for example after blasting.



The effects of dust:

Inhaled dust can accumulate in the lungs and cause lung disease. This is called pneumoconiosis and is the most common disease in miners and ex-miners. Over time the more dust a miner breathes in, the more damage it causes and breathing will be affected. If a miner gets pneumoconiosis, it can make it easier for him/her to contract TB. TB is curable but pneumoconiosis cannot be cured.



After breathing in dust over a long period of time...



...a miner may experience shortness of breath, dizziness, loss of weight and tiredness...



Eventually the miner will not be able to work and he could suffer an early death.



There are 3 main types of pneumoconiosis in mines:

- Silicosis caused by silica dust.
- Coal miner's pneumoconiosis (black lung).
- Asbestosis, which is caused by asbestos dust.

The only way to decide if a miner has one of these conditions is to have an x-ray which an employer must provide regularly.



What can be done to control dust?

Dust can be controlled by...

...covering conveyor belts where dust is created...

...as well as covering the back of trucks.



Other ways to control dust is to stop it from rising using water sprinklers...

...using cutting, drilling and grinding equipment that sprays water to trap dust...

...or installing exhaust ventilation whenever dust is created right next to the machine to take the air out of the shaft...



Dust levels must be measured in the work area using a sampler positioned in the area where the hazard occurs, or using a personal sampling device.



If all else fails, use a specific respirator designed to stop you breathing in small particles of dust, but this must be tightly fitted



What else can a mineworker do to protect himself?



A miner can report to a foreman that there are high levels of dust in his work area.



He can also remove dusty clothes at the workplace...



...and wash after his shift.



Handbook 2: Basic facts about dust protection in a small-scale mine

What is dust?

Dust is tiny solid particles in the air and sometimes very small to see.



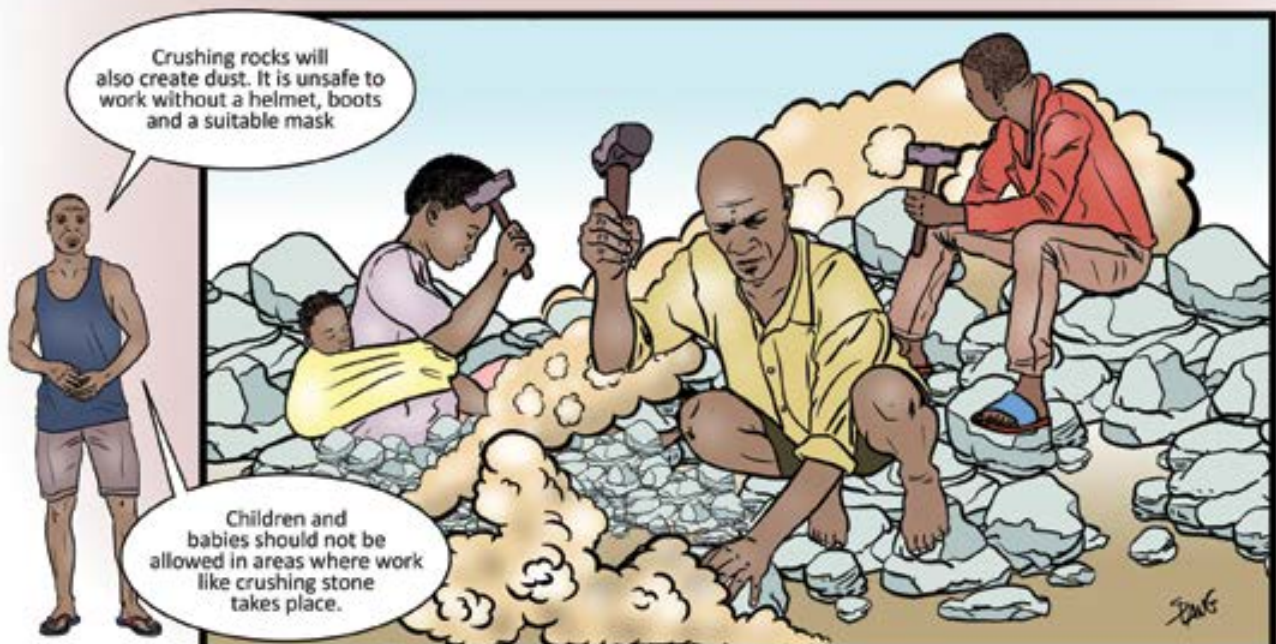
Dust can be created by blasting on a mine site.



Dust can also be created by hammering...

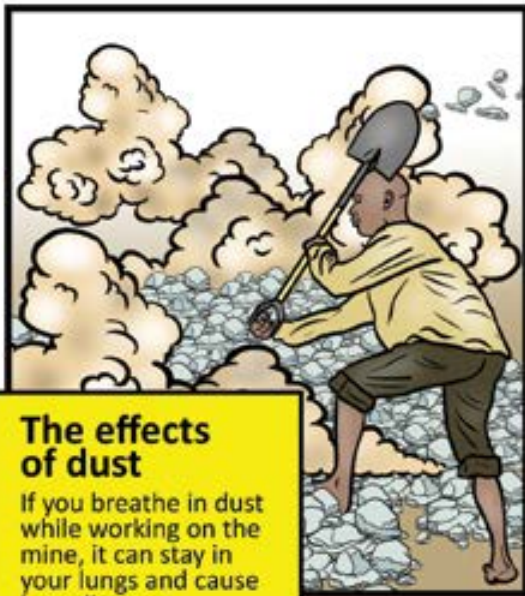


...or by carrying ore in open sacks.



Crushing rocks will also create dust. It is unsafe to work without a helmet, boots and a suitable mask

Children and babies should not be allowed in areas where work like crushing stone takes place.



The effects of dust

If you breathe in dust while working on the mine, it can stay in your lungs and cause lung disease.



You may have shortness of breath, dizziness, loss of weight and tiredness.



The disease caused is called pneumoconiosis and it can make it easier for you to contract TB. TB is curable but pneumoconiosis cannot be cured.



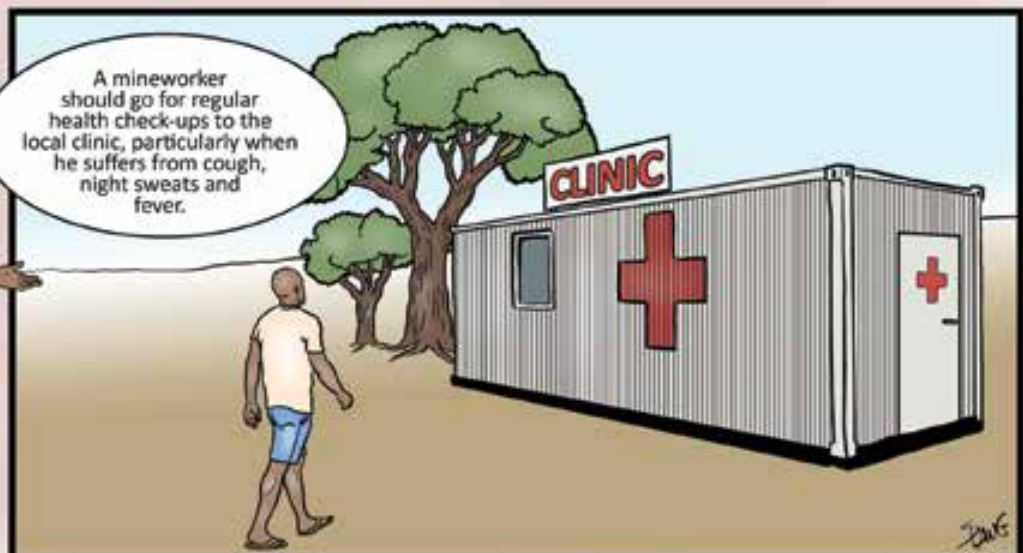
What can be done to control dust?

Let dust settle after blasting and use water to damp down dust to stop it from rising...



...and install exhaust ventilation whenever dust is created.







TB in the Mining Sector Southern African Programme (TIMS)

Wits Health Consortium (WHC) | 24 St Andrews | Parktown | Johannesburg 2193 | South Africa | www.iimssa.co.za
Key contributors: Health Focus | www.health-focus.de

Controls: Reducing Dust Levels

The danger/risk of lung disease from dust (Silicosis or Coal Worker's Pneumoconiosis, CWP) is directly related to the amount of dust that enters the lungs. Therefore, prevention depends on reducing the amount of dust breathed by miners/workers.

An effective prevention programme requires:

- Use of engineering controls and their proper maintenance to reduce worker exposures to airborne dust. Examples of controls include: ventilation and dust collection system (figure 1), water sprays (figure 2), wet drilling, enclosed cabs and drill platform skirts.
- Replace crystalline silica materials with safer substitutes, whenever possible.
- Reduce the drop height between material discharge / transfer points on conveyor belts and hoppers. Limiting the distance that materials fall through the air can help reduce dust.
- Limit the number of workers, and the time workers must spend in areas where dust and silica levels may be elevated, and consider ways to perform dusty operations remotely to completely remove employees from these areas.
- Apply water (preferably with dust suppression chemicals) to roads and around the worksites to reduce the dust.
- Sampling of workplace air to determine dust exposure levels, to help determine where controls may be necessary and to monitor the effectiveness of engineering controls.

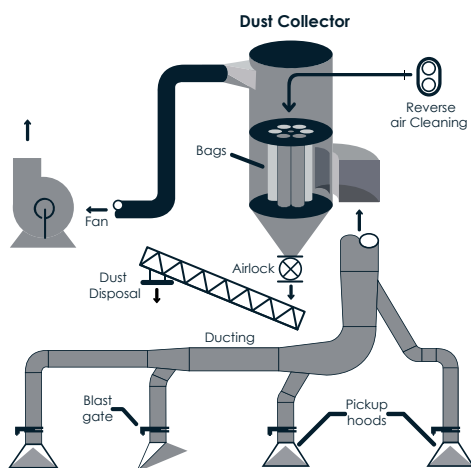


Figure 1 - dust collection system



Figure 2 - water sprays on dusty road

Dust collection systems (see Figure 1) utilise ventilation principles to carry a dust-filled air stream through ductwork to a collection and isolation point. The system relies on four main components in order to effectively capture and collect the dust. These four main components are: an exhaust hood to capture dust emissions at their source, a system of ducts to transport the captured dust to the dust collector, a dust collector in which to store the removed dust, and a fan and motor system to provide the required suction for the system. Careful attention must be given to the selection and implementation of each component, as poor performance of one component will adversely affect the entire system.

The basic rules to be followed if the control of dust exposure is to be effective include:

- Keeping the dust generation to a minimum.
- Preventing it from contaminating the atmosphere by controlling it at source.
- Reducing the amount of dust present in the air.
- Removing the worker from the dust laden air.
- Placing a barrier between the worker and the dust laden air.
- Ensuring that the installed systems for dust control are working at maximum efficiency for the maximum period.

NB. For dust control to be effective regular maintenance & service of the equipment is required.



Silica dust: health hazards

Silica is a natural substance found in concrete, bricks, rocks, stone, sand and clay.

Silica dust is created when materials containing silica are cut, ground, drilled or otherwise disturbed. If the silica particles in this dust are of a crystalline structure and are small enough (respirable crystalline silica or RCS), they can be breathed deep into the lungs and cause damage.

NOTE: The dust that can be breathed in is not always visible to the naked eye.



Where can workers be exposed?



Industries and activities which may expose workers to RCS include:

- Construction – concrete, stone, bricks, mortar, fibre cement products
- Quarrying
- Mining
- Concrete manufacture
- Brick and tile manufacture
- Foundries
- Abrasive blasting
- Monumental masonry work
- Activities such as concrete drilling, cutting, grinding, fettling, mixing, handling, dry shovelling and tunnelling.



How does exposure to silica dust harm your health?



Healthy lungs

Unhealthy lungs

The following lung diseases can develop from breathing in respirable crystalline silica dust:

- Silicosis: Breathing in RCS can cause scarring of the lung tissue, a condition referred to as silicosis. This scarring can result in shortness of breath. There is no cure for silicosis and health effects may continue to develop even after you have stopped/left work.
- Tuberculosis: Since silicosis affects lung function, it makes one more susceptible to lung infections like tuberculosis. In addition, smoking causes lung damage and adds to the damage caused by breathing silica dust.
- Lung cancer: If a worker has a lengthy exposure to high levels of RCS, lung cancer may develop
- Chronic Obstructive Pulmonary Disease (COPD): COPD is a term that refers to a chronic lung condition that may result from breathing in RCS. It can lead to breathing difficulties.
- Kidney Disease: There is evidence that silica exposure can cause kidney disease.



Wearing dust masks

When engineering and work practice controls are not feasible, while they are being implemented, or when they do not reduce silica dust levels below the Occupational Exposure Limit (OEL), employers must provide workers with dust masks. Whenever dust masks are used, the employer must implement a dust mask programme. This programme must include proper dust mask selection, fitting and training.

Selection of dust masks

If dust mask are provided, use at least a NIOSH-approved N95 or FFP3 dust mask. If the silica dust level is more than 10 times the dust limit (OEL), a half-face dust mask is not protective and a dust mask that offers a greater level of protection (e.g., a full-facepiece dust mask, which will protect workers at silica levels up to 50 times the dust limit (OEL) must be used. Full-face powered air-purifying dust masks (PAPR) provide more protection than half-face air-purifying dust mask. In general, workers find PAPRs to be more comfortable.

How to use the dust mask

Requirements for use

1. When using a dust mask, it is important that it is well-maintained, equipped with new filters when necessary, properly fitted, and approved for use in silica-containing dust.
2. To ensure a tight facial seal, you cannot have a beard (must be clean shaven).

So HOW do I fit my mask correctly ?



Edges tight? ✓

Chin snug? ✓

✓ Nose clip shaped?

✓ Clean Shaven?

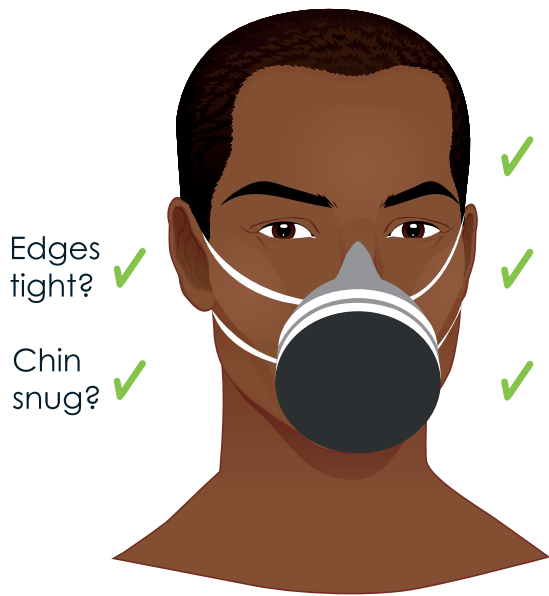
✓ Straps in place?

For FILTERING FACEPIECE (FFP) (disposable mask)

- ✓ Clean shaven at start of your shift
- ✓ Always check the fit before every use:
 - Fit around the nose/nose clip where applicable.
 - Fit around the chin
 - Check the position of straps
- ✓ Carry out a 'Fit-check'



So HOW do I fit my mask correctly ?



Edges tight? ✓

Chin snug? ✓

✓ Fit around the nose

✓ Clean Shaven?

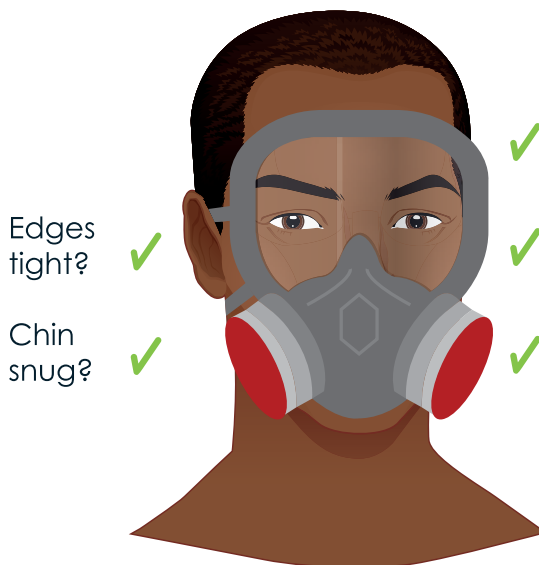
✓ Straps in place?

Check the filter(s) are attached Correctly

For **HALF-FACE** mask

- ✓ Clean shaven at start of your shift
- ✓ Always check the fit before every use:
 - Fit around the nose
 - Fit around the chin
 - Check the position of straps
- ✓ Carry out a 'Fit-check'

So HOW do I fit my mask correctly ?



Edges tight? ✓

Chin snug? ✓

✓ Fit around the face

✓ Clean Shaven?

✓ Straps in place?

Check the filter (s) are attached Correctly

For **FULL-FACE** mask

- ✓ Clean shaven at start of your shift
- ✓ Always check the fit before every use:
 - Fit around the nose where applicable
 - Fit around the chin
 - Check the position of straps
- ✓ Carry out a 'Fit-check'

REMEMBER

"There are many types of dust masks so make sure you pick one that fits you best".

