Resources Regulator
Department of Regional NSW

Fact sheet

Airborne contaminants – coal mines

February 2024

Introduction

Airborne contaminants are generated during coal mining activities such as extraction, drilling, crushing, hauling and stockpiling coal and other rock containing materials. Additionally, airborne contaminants are generated by diesel-powered engine emissions that contain a range of chemicals, gases and diesel particulate matter. Workers in coal mines may be exposed to airborne contaminants such as coal dust and crystalline silica, or from mining equipment emissions.

Exposure standards

In NSW mines, no person is to be exposed to airborne dust and diesel particulate matter that exceeds an 8-hour time weighted concentration of:

- 3 mg/m^3 (or 1.5 mg/m^3 in the case of a coal mine) for respirable dust[1].
- 10 mg/m^3 for inhalable dust[2].
- 0.1 mg/m^3 for diesel particulate matter (measured as elemental carbon).

Exposure standards for individual substances also must be satisfied within these overall limits.

- The exposure standard for crystalline silica is 0.05 mg/m^3.

Health risks

In coal mining, coal and crystalline silica dust occur at both an inhalable and respirable fraction. Normally dust of the larger inhalable fraction is considered an irritant as it is deposited in the upper respiratory tract. The smaller respirable fraction of dust and diesel emission contaminants represents a serious health risk to those exposed.

The smaller respirable-sized particles can penetrate the deeper regions of the lung where gas exchange takes place. As such, coal and silica dusts and diesel exhaust emissions at the respirable

[1] Measured in accordance with Australian Standard, AS 2985-2009

[2] Measured in accordance with Australian Standard, AS 3640-2009

fraction can cause pneumoconiosis (in the case of coal), silicosis (in the case of crystalline silica) and lung cancer (in the case of diesel exhaust). These lung diseases are disabling and can often be fatal.

Your obligations

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 contaminants, so far as is reasonably practicable, for example by using alternative mining processes. If it is not reasonably practicable to do so, then risks must be minimised and controlled so far as is reasonably practicable.

The Work Health and Safety Regulation 2017 prescribes workplace exposure standards for airborne contaminants[3] which must not be exceeded in respect of a person at any workplace.

The Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 requires a mine operator to manage risks and implement a range of control measures including:

- implementing a principal hazard management plan for air quality or dust or other airborne contaminants (sections 27-30)
- ensuring the exposure standards for dust and diesel particulate matter are not exceeded (section 41)
- implementing a ventilation control plan to ensure effective ventilation in underground mines (section 65)
- implementing air quality monitoring (sections 40- 44) and maintaining minimum air quality and ventilation standards in underground mines (sections 57-67 and 75).
- reporting exceedances of the exposure standard for dust (inhalable and respirable), diesel particulate matter and crystalline silica (section 124).

Also, operators of coal mines must:

- undertake certain actions if air quality or safety standards are not met, such as withdrawing workers from a place of risk and preventing re-entry in underground mines (section 79).
- ensure sampling and analysis of airborne dust is carried out under, and in accordance with, a licence, and at the locations and frequency as prescribed (section 89, schedule 6 and part 10).

Additionally, Order 42 under the *Coal Industry Act 2001* provides for Coal Services Pty Ltd to conduct airborne dust monitoring at coal mines consistent with the provisions for sampling and analysis under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022.

[3] Workplace Exposure Standards for Airborne Contaminants published by Safe Work Australia

Elimination and control

To reduce worker exposure to appropriate levels, more than one control measure may be required. Control measures fall into 3 categories, which include:

1. minimise airborne contaminant generation at the source
2. minimise airborne contaminant generation throughout the work environment
3. minimise exposure to individuals at risk.

Whatever strategy is adopted, it should be under-pinned by the hierarchy of controls, so that occupational exposure to airborne contaminants can be controlled. The process used to extract coal is an important consideration in minimising the airborne contaminants generated.

The design, implementation and operation of ventilation systems also play a critical role in minimising the risk posed by airborne contaminants in underground mines.

Dust suppression and separation/positioning of people by distance or barriers from the airborne contaminants generated may also prevent or minimise exposure, such as positively pressurised and filtered operator cabs.

The use of diesel exhaust filters, plant and fuel selection, along with scheduled plant maintenance activities, are an important consideration in minimising diesel exhaust emissions being emitted into the work environment.

The above methods to control workplace exposure to airborne contaminants are now readily available, as are commonly employed atmospheric monitoring and health surveillance strategies.

Targeted assessment program

The Regulator will conduct targeted assessments to ensure that workplace areas of mines with elevated exposure risks are employing a range of these measures to control the exposure risk of workers.

The management of airborne contaminants at mines will be the subject of targeted assessments by the regulator. The assessments will focus on how the mine prevents worker exposure to harmful airborne contaminants in the respirable fraction, specifically respirable coal dust, crystalline silica and diesel particulate matter.

Key categories assessed are:

1. identification, assessment and risk controls for airborne contaminant hazards.
2. preventative controls (controlling dust and particulate matter at the source)
3. mitigating controls
4. monitoring worker exposure (hygiene and health monitoring)
5. verifying the effectiveness of controls.

What should you do

Review your strategy and capacity to manage respirable coal, crystalline silica and diesel particulate matter airborne contaminants to ensure it complies with the legislation. Sites should ensure their approach to the management of this hazard is in line with the available guidance material and reflects accepted, effective control practice.

More information.

For more information and guidance on managing mining hazards and risks associated with exposure to airborne contaminants view the following resources:

- Guide - Airborne contaminants PHMP (NSW Resources Regulator)
- Booklet – Protecting against airborne dust exposure in coal mines 8th Edition (Coal Services)
- Position paper - Implementing an exposure standard for diesel particulate matter in NSW mines (NSW Resources Regulator)
- Guidance on the Interpretation of Workplace Exposure Standards for Airborne Contaminants (SafeWork Australia)
- Australian Standard AS 2985-2009 - Workplace atmosphere - method for sampling and gravimetric determination of respirable dust
- Australian Standard AS 3640-2009 - Workplace atmosphere - method for sampling and gravimetric determination of inhalable dust