

Health surveillance for isocyanate exposure – guide for doctors



Background

Polymeric chemicals are used in coal mines for applications including strata binding, sealing and consolidation, and void or cavity filling. Some of these products contain isocyanates.

Methylene diphenyl diisocyanate (MDI) is the most commonly used isocyanate compound in Queensland coal mines, although other isocyanates have been detected during application processes.

*Recognised standard 16: The use and control of polymeric chemicals at coal mines (RS16)*¹ provides information, guidance and direction for site senior executives (SSEs) to achieve an acceptable level of risk in the use of polymeric chemicals. This includes ensuring health surveillance of coal mine workers using, or are likely to be exposed to, these chemicals.

The purpose of this guide is to provide information to assist appointed medical advisers (AMA) and examining medical officers (EMO), performing the health surveillance.

Exposure risk

Polymeric chemicals may enter the body via inhalation, skin absorption, or ingestion. In underground coal mining, skin absorption is the primary route of exposure, particularly during mixing and pumping activities. This is due to:

- the physical and chemical properties of the product
- work processes involving set-up, application, and clean-up of equipment
- the availability of adequate ventilation
- incorrect or inconsistent use of personal protective equipment.

These tasks are often performed by specialist contractors who may work across multiple sites.

Health effects

Safe Work Australia (2020) advises that exposure to isocyanates may cause a range of acute and chronic health effects through inhalation or skin absorption.

Acute health impacts from low-level exposure may include headaches and irritation of the eyes, nose and throat. Higher levels of exposure may result in nausea, vomiting and dermatitis.

¹ Note RS16 is currently under review. The information in this guide is intended to reflect the information in the [draft version](#). The current version of RS16 is available [here](#).

Acute respiratory effects associated with higher levels of exposure include:

- acute bronchial irritation with coughing
- shortness of breath and bronchospasm
- chemical pneumonitis
- pulmonary oedema
- reactive airways dysfunction syndrome.

Chronic health effects associated with isocyanate exposure may include:

- respiratory sensitisation
- asthma
- dermatitis
- hypersensitivity pneumonitis
- interstitial pulmonary fibrosis
- liver and kidney dysfunction.

Respiratory sensitisation

Isocyanates are respiratory sensitisers. Exposure via inhalation or skin contact can lead to sensitisation and the development of work-related asthma. Once sensitised, workers may experience severe reactions following further exposure, including skin contact or inhalation of airborne concentrations well below the workplace exposure limit (WEL)². These reactions may include chest tightness, wheezing and shortness of breath. Smoking may also be a risk factor for sensitisation.

The timeframe for sensitisation varies between individuals, ranging from several weeks (often within the first two years of exposure) to up to 10 years or longer in approximately 20 per cent of cases. Exposure to higher concentrations, such as during spills, may increase the risk of sensitisation.

In sensitised workers, exposure to isocyanates may result in a reduction in respiratory capacity that occurs immediately after exposure, several hours later, or both. Some workers may become extremely sensitive to isocyanates, and the high likelihood of developing chronic work-related asthma, depending on duration of symptoms prior to cessation of exposure, places a high priority on primary prevention of sensitisation (Safe Work Australia, 2020).

Health surveillance requirements

The primary objective of health surveillance for isocyanate exposure is to monitor changes in respiratory function and to prevent progression to sensitisation in workers. RS16 requires employers to ensure health surveillance is completed for all coal mine workers who are exposed to, or likely to be exposed to, isocyanates. Health surveillance must be carried out by, or under the supervision of, an AMA in accordance with the Coal Mine Worker's Health Scheme (the Scheme).

Identifying workers at risk of exposure

Employers are required to identify, in the employer section of the health assessment form on ResHealth, that isocyanates are one of the hazards to which the worker may be exposed.

² Safe Work Australia is transitioning from workplace exposure standards (WES) for airborne contaminants to WEL. WES will continue to apply until they are replaced by WEL on [1 December 2026](#).

Doctors must review each worker's identified hazard exposures to determine whether the worker is required to undergo health surveillance for isocyanate exposure.

Timing for health surveillance

Health surveillance for isocyanate exposure must be carried out:

- before a worker is exposed to isocyanates (refer to note 1)
- six weeks after a worker has been exposed to isocyanates, or as close to the 6-week interval as practicable
- at six-monthly intervals during continued exposure (refer to note 2).

Where monitoring after 12 months shows no adverse health effects, the AMA may choose to carry out annual health surveillance (Safe Work Australia, 2020).

Additionally, a follow-up health surveillance must be conducted as soon as practicable if:

- a worker shows or reports adverse health effects or symptoms potentially related to isocyanate exposure, such as skin irritation or respiratory symptoms; or
- there has been a significant spill, loss of containment or other incident resulting in actual or suspected excessive exposure.

The AMA should determine the appropriate components of the assessment, including whether biological monitoring is indicated.

Note 1: If more than 12 months have elapsed since the pre-exposure health surveillance and the worker has not commenced isocyanate work, the worker must undergo a further pre-exposure health surveillance before exposure commences. Previous health surveillance results remain relevant and should be retained for longitudinal comparison; however, they do not replace the requirement for a current pre-exposure assessment where more than 12 months has elapsed.

The 12-month period provides a practical, clinically informed benchmark to ensure the pre-exposure health surveillance reflects the worker's current health, respiratory function and occupational exposure history at or close to the commencement of exposure.

The further pre-exposure health surveillance should include all the components of health surveillance for isocyanates listed above. Spirometry should be completed even where recent acceptable spirometry has been undertaken for another health surveillance purpose, including under the Scheme. This provides a lung-function measurement close to the commencement of isocyanate exposure, contributes to the worker's longitudinal respiratory record, assists the AMA to distinguish genuine change from normal variability, and strengthens the baseline for assessing subsequent changes.

The AMA should consider the results of the current pre-exposure health surveillance together with all relevant previous health surveillance information, including the previous pre-exposure health surveillance and the Scheme health assessments, when determining the worker's pre-exposure respiratory status.

Note 2: Where exposure occurs intermittently or as discrete campaigns separated by prolonged periods without exposure, the employer should undertake a risk assessment, in consultation with the AMA, to determine the appropriate timing of further health surveillance. The risk assessment should consider the worker's exposure history, previous health surveillance

findings, relevant exposure and biological monitoring results, and the likelihood of future exposure.

Where monitoring after 12 months shows no adverse health effects, the AMA may choose to carry out annual health surveillance (Safe Work Australia, 2020).

If a worker changes employers, previous health surveillance results may be relied upon where they are current, and the new AMA considers them appropriate. AMAs must ensure the next health surveillance for exposure to isocyanates is scheduled in accordance with the timeframe stated above.

Carrying out health surveillance

Health surveillance for isocyanates must include:

- collection of demographic information and occupational and medical history
- spirometry
- a respiratory questionnaire, including smoking history
- skin examination for work-related dermatitis
- follow-up tests or reviews, in accordance with the current [Mine dust lung disease clinical pathways guideline](#), to investigate abnormalities detected.

Previous work history with isocyanates and symptoms of sensitisation should be investigated and comparison with earlier health surveillance results may assist in identifying longitudinal decline and the development of occupational diseases, such as occupational asthma and work-related dermatitis. AMAs should also review biological monitoring results supplied by the employer where available.

When reviewing occupational and medical history, AMAs should investigate the workers' previous exposure to isocyanates and any symptoms suggestive of sensitisation. Workers with the following conditions may be at greater risk of adverse health effects from exposure to isocyanates:

- sensitisation
- asthma
- hay fever
- recurrent acute bronchitis
- interstitial pulmonary fibrosis
- pulmonary tuberculosis
- occupational lung disease
- impaired lung function (Safe Work Australia, 2020).

Completing the health assessment

AMAs must consider the findings of health surveillance when determining a worker's fitness for work. The AMA may also make recommendations for remedial measures, including review of workplace controls to ensure an acceptable level of risk for the worker. The AMA must also ensure that the worker undergoes subsequent health surveillance for isocyanate exposure at the relevant interval outlined above.

Where relevant, the AMA will discuss with the worker to seek further advice regarding the treatment or management of a medical condition from their treating medical practitioner.

Further information

[AIOH Position Paper. Isocyanate compounds - potential occupational health effects \(2022\).](#)

[Guide to handling isocyanates. Safe Work Australia \(2022\).](#)

[Model Code of Practice: Managing risks of hazardous chemicals in the workplace. Safe Work Australia \(2023\).](#)

[Workplace exposure standards for airborne contaminants. Safe Work Australia \(2025\).](#)

References

Safe Work Australia. (2020). *Health monitoring for isocyanates*. Retrieved from Safe Work Australia:
https://www.safeworkaustralia.gov.au/system/files/documents/2002/health_monitoring_guidance_-_isocyanates.pdf