



Controlling Exposures to prevent occupational lung disease in the construction industry



Concrete Sprayer

HAZARDS AND RISKS

During tunnelling works, sprayed concrete lining (SCL) is applied to the surfaces of the tunnel to provide reinforcement of the excavated area, and is usually repeated a number of times to apply various layers (such as waterproofing), typically using a robotic spraying rig. This process can generate a large quantity of airborne dust which, if inhaled, exposes workers to respiratory health risks. The highest risk to a concrete sprayer's health is likely to be from breathing in dust, and in particular, silica dust.

Construction dust

Construction dust is a general term and includes dust from soil and building materials. Breathing in any dust over time can cause serious lung diseases such as chronic obstructive pulmonary disease (COPD) which is an umbrella term for a number of conditions including chronic bronchitis and emphysema.

Respirable crystalline silica (RCS)

Silica occurs as a component of concrete, and is often present in the consumable materials used during concrete spraying. Inhaling fine silica dust (RCS) over time can lead to serious, life-limiting and irreversible lung diseases such as silicosis, COPD, and lung cancer; these diseases can cause permanent disability and early death.

CONTROL OPTIONS

Elimination/prevention

- Preventing exposure to silica is the most effective control measure of all. It may be possible that silica can be eliminated or greatly reduced by using non-silica or low silica materials for spraying.

Engineering controls

- As concrete spraying is often undertaken in tunnels, it can be difficult to implement local exhaust ventilation (LEV) controls.
- Use of de-duster units (air scrubbers positioned directly behind the work area) can reduce exposures.
- Dilution ventilation – forced provision of fresh air to the spraying face to dilute any dust generated – should also be considered in any enclosed environments.

Safe working methods

- Access to areas where spraying is undertaken must be strictly controlled (using physical barriers) and signage used to highlight the necessary controls.
- In most cases it is possible to control exposure to RCS by using a wet mixture that reduces the amount of airborne dust generated; this "wet" method, where additional water is mixed with the concrete before being sprayed, has generally replaced the older industry methods of concrete application.

PPE

- Engineering control techniques may not always be suitable for the task, so respiratory protective equipment (RPE) may be necessary.
- RPE should be selected in accordance with CSA Z94.4-11 *Selection, Use and Care of Respirators*.

MANAGING THE RISK

Training & communication, supervision, maintenance & testing of controls and **air monitoring*** are all vital aspects of managing the risk, in addition to health surveillance which can be a requirement in certain circumstances.

See our introductory [Respiratory Health Hazards in Construction Fact Sheet Series: Overview](#) for more information about what things to consider and implement.

Air monitoring*

Air monitoring is a specialist activity. It may be needed as part of an exposure risk assessment, as a periodic check on control effectiveness and to assess compliance with relevant occupational exposure limits, or where there has been a failure in a control (for example if a worker reports respiratory symptoms).

A qualified occupational hygienist or occupational hygiene technologist can ensure exposure monitoring is carried out in a way that provides meaningful and helpful results.