Safety Health and Environment Standards

Code of Practice

Respirable Crystalline Silica
Generic Template
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Section 1.0 Introduction

1.1 Purpose

This standard has been developed for the safe use, handling, storage and disposal of crystalline silica-containing materials for ARHCA member companies. Member companies are responsible for managing the hazards associated with respirable crystalline silica according to this code of practice. This standard is intended to assist ARHCA member companies in meeting the requirement for the code of practice under Alberta Occupational Health and Safety Code. In conjunction, with the code of practice, the ARHCA has developed the ARHCA Silica & Dust Exposure Control handbook to assist members.

This code of practice has been developed to assist ARHCA member companies in mitigating the silica hazard on their worksites.

1.2 Applicability

This standard is applicable to all workers at ARHCA member companies, including ARHCA employees, contractors, sub-contractors, and vendors. It applies wherever workers may be exposed to respirable crystalline silica throughout ARHCA member companies' operations.

1.3 References

- Alberta Occupational Health and Safety Code,
- CSA Standard Z94.4-02, Selection, Use, and Care of Respirators
- Alberta Occupational Health and Safety Bulletin Crystalline Silica at the Work Site (CH059) - NOV 2009

1.4 Definitions

"Crystalline silica" is a naturally occurring mineral composed primarily of silicon dioxide.

"Occupational Exposure Limit (OEL)" means the occupational exposure limit established in Schedule 1, Table 2 of the Alberta Occupational Health and Safety Code; the concentration of a substance to which it is believed that nearly all workers can be repeatedly exposed, work day after work day for their entire working life without experiencing adverse health effects resulting from exposure to that substance.

"Respirable crystalline silica" is a crystalline silica particle less than 10 micrometers (um) in size that can be inhaled deeply into the gas-exchange region of the lungs.
A "silica-restricted area" is an area of a work site where there is reasonable likelihood that the airborne concentration of respirable crystalline silica exceeds or may exceed the OEL.

A "silica-exposed worker" is a worker who may reasonably be expected to work in a silica-restricted area at least 30 work days in a 12-month period.

Section 2.0
Potential Sources of Respirable Crystalline Silica Exposure

Silica is a naturally occurring mineral composed primarily of silicon dioxide (SiO2). Silica is abundant in the environment as it is a basic component of sand, rock and many other geological materials. There are several forms of crystalline and non-crystalline silica. Crystalline quartz is the most common form of crystalline silica. Airborne respirable (less than 10 micrometres (µm) in particle size) crystalline silica that poses the greatest concern for human health.

Crystalline silica is found in a wide variety of products, however the activities where exposure to airborne respirable silica dust are of most concern include:

- Mining, drilling, blasting, crushing, excavation or disruption of rock, sand, dirt or soil
- Cutting, grinding, sanding, jackhammering, chipping, demolition or blasting of silica-containing construction materials such as concrete, cement, asphalt, mortar, grout, plaster, masonry, tiles, brick, and refractory brick, glass and fiberglass
- Abrasive blasting with silica-containing materials

For ARHCA member companies, the highest potential for respirable crystalline silica exposure occurs in areas where heavy equipment work and windy conditions give rise to airborne respirable crystalline silica dust. Such sites may include: sand and gravel operations, asphalt plants, road construction & repair activities and paving, concrete cutting and abrasive blasting.

Section 3.0
Health Effects of Crystalline Silica

The adverse health effects associated with respirable crystalline silica are a result of these particles being deposited deep in the lungs. Silicosis is the most common health effect associated with silica exposure.

Silicosis is a non-reversible, preventable disease involving severe scarring of the lungs. When respirable crystalline silica particles are inhaled their small size allows them to deposit in the air-exchange areas deep in the lungs. The body's attempts to rid the lungs of the foreign silica particles results in inflammation and the formation of fibrotic nodules and scar tissue around the trapped particles. Scar tissue makes the lung tissue hard and stiff. Scarred lung tissue cannot
transfer oxygen into the blood normally. As more scar tissue if formed, the condition progressed to silicosis.

The risk of developing and the severity of silicosis depend on the concentration of respirable crystalline silica to which an employee is exposed and the duration of exposure. There are three types of silicosis: chronic, accelerated and acute. Chronic silicosis, the most common type of silicosis, usually results from long-term exposure (ten or more years) to low levels of crystalline silica and may develop 10-30 years after exposure. Accelerated silicosis can develop 5-10 years after exposure to higher concentrations of crystalline silica. Acute silicosis can occur after only weeks or months of exposure to very high levels of crystalline silica and progresses quickly.

Workers with silicosis may not show symptoms at first but as the disease progresses, shortness of breath and coughing develop and it may become difficult and painful to breathe. Symptoms can worsen over time and may lead to death. Silicosis can progress even though exposure to crystalline silica has stopped. Those with silicosis have an increased risk of contracting respiratory infections such as pneumonia, emphysema and tuberculosis and have an increased risk of developing lung disease. Silica is classified as a carcinogen by the ACGIH (American Council on Governmental Industrial Hygienists).

Section 4.0
Occupational Exposure Limits (OELs)

Worker exposure to respirable crystalline silica is to be kept as low as reasonably practicable and may not exceed the Occupational Exposure Limit (OEL) established under the Alberta Occupational Health and Safety Code Schedule 1, Table 2. The 8-hour OEL for crystalline silica (quartz and cristabolite) is 0.025 mg/m³. While there is a requirement in Section 17 of the OHS Code to adjust the OEL for work shifts longer than 8 hours, this is not mandated for crystalline silica. Please refer to the Explanation Guide for details. (At the time of publication of this Code of Practice, the AB Government was intending on publishing the over-8-hour exemption in the Code.)

Section 5.0
Respirable Crystalline Silica Exposure Management

Section 5.1
Responsibilities

5.1.1 Member Company (insert name here) Responsibilities

It is the responsibility of the member company (insert name here) to ensure that:
5.1.1.1
Crystalline silica-containing materials are replaced by less harmful materials where alternatives are available and it is reasonably practicable to do so.

5.1.1.2
Silica-restricted areas within each business unit are properly identified as per section 5.2 of this Standard.

5.1.1.3
Engineering controls, such as ventilation or wet methods, are considered first where reasonably practical to reduce respirable crystalline silica release into the air.

5.1.1.4
Administrative controls and personal protective equipment (PPE) are used to reduce worker exposure when the concentration of airborne respirable crystalline silica cannot be reduced below the OEL through the use of engineering controls.

5.1.1.5
Workers and contract employees who are required to work in silica-restricted areas are educated in the hazards of respirable crystalline silica exposure and trained on the specific work site procedures and controls applicable to the work site.

5.1.1.6
A hazard assessment is conducted as part of the pre-job planning before the start of activities that have the potential of exposing workers to respirable crystalline silica.

5.1.1.7
Team leaders conduct pre-job meetings with all workers and contractors.

5.1.1.8
Respirator users are trained and fit-tested as per company PPE code of practice or policy.

5.1.2 **Worker Responsibilities**
- Knowing the hazards of silica dust exposure
- Using the assigned protective equipment in an effective and safe manner
- Working in accordance with the project/task specific Exposure Control Plan (ECP)
- Reporting *(immediately)* to their supervisor, any hazards *(i.e. unsafe conditions, unsafe acts, improperly operating equipment, etc.)*

5.1.3 **Health Assessment Responsibilities**
- Health assessments as per company requirements and/or silica & dust exposure control plan.
Section 5.2
Personnel Training

All personnel involved in operations that may expose them to crystalline silica must be trained in:

- The health hazards associated with respirable crystalline silica exposure
- Activities and materials that produce crystalline silica dust hazards - Material Safety Data Sheets (MSDS)
- Engineering, administrative controls and work practices in place at the work site to protect workers
- The proper use of respirators and personal protective equipment
- The importance of maintenance and good housekeeping
- Work procedures to be followed to reduce exposures
- Procedures to follow in an emergency
- Personal hygiene practices and decontamination procedures to reduce exposure
- Proper waste handling and disposal procedures
- The requirements of this Standard

Section 6.0
Personal Protective Equipment (PPE)

- Refer to company’s PPE code of practice or policy

Section 7.0
General Work Procedures

Companies should develop procedures to address the following points:

- Housekeeping
- Decontamination
- Ventilation systems in buildings and machines
- Hygiene
- Dust Control
- Material handling and storage
- Environmental factors
- Other areas as per the member company’s operations
Addendum

(Note: information in this Addendum is for the assistance of companies. It provides additional ideas/suggestions when developing a code of practice.)

Section A.1.0
Warning Signs

Warning signs, as shown in Figure 1, must be posted at the entrances of silica-restricted areas. The warning signs must specify:

- Respirable crystalline silica is present in the area
- Entry is restricted to authorized personnel
- Required personal protective equipment that must be worn by workers in the area
- Eating, drinking and smoking are prohibited in the area

Figure 1:
Respirable Crystalline Silica Warning Sign
Section A.2.0  
Respiratory Protection

A.2.1  
Temporary silica-restricted areas, resulting from short-term dust generating activities involving silica-containing materials, are to be flagged with red "Danger Do Not Enter" warning tape and tagged to identify the hazard. The tag must state the same information as is required in section 5.2.1 of this Standard for a warning sign.

A.2.2  
Where activities that may generate respirable crystalline silica-containing dust are conducted within the vicinity of an occupied building, precaution may need to be taken to limit the introduction of dust into the building ventilation system.

A.2.3  
Prevention of exposure to other workers or members of the public who may be outside the work area may need to be considered.

A.2.4  
Warning signs and flagging and tagging must remain in place as long as the respirable crystalline silica exposure hazard exists.

Section A.3.0  
Protective Clothing

A.3.1  
For work occurring in silica-restricted areas, the type of protective clothing required will be determined during the hazard assessment conducted prior to the start of a job.