

## **SILICA**

### **WHAT IS SILICA?**

Free silica exists in two main forms; amorphous silica and crystalline silica.

Crystalline silica is one of the most common minerals found on the surface of the earth. It may be found in a variety of forms the most common of which is quartz. Other types of crystalline silica include tridymite and cristobalite.

Amorphous silica is the term used to describe forms which have no regular crystal structure. It includes a wide range of different types of which fossilized skeletal remains of marine organisms is the most common.

While there is some scientific evidence that amorphous silica may occasionally cause adverse health effects, most silica-related disease has been a result of breathing of crystalline silica. This fact sheet focuses on crystalline silica.

### **WHERE ARE WORKERS POTENTIALLY EXPOSED TO SILICA?**

Workers are possibly exposed to crystalline silica dust in many trades and industries, including mining, tunnelling, quarrying, masonry, metal foundries and ship and bridge repair. Activities that can produce significant amounts of crystalline silica include: mining, tunnelling, quarrying, masonry, metal foundries and ship and bridge repair. Activities that can produce significant amounts of crystalline silica include:

- Drilling, chipping and hammering of rock or materials containing silica
- Blasting, crushing, loading, shovelling and dumping of rock or materials containing crystalline silica.
- Abrasive blasting using crystalline silica or material containing crystalline silica
- Demolition of materials containing crystalline silica
- Dry sweeping of materials containing crystalline silica
- Using compressed air to clean material containing crystalline silica

- Removal of alumino-silicate based ceramic fiber insulation that has been subjected to high temperature
- Glass making
- Bleaching earth in cooking oil refinery, fruit juice factories.
- Jeans material fading by blasting

It should be noted that even materials containing silica in small amounts can be a hazard if they are used in ways that produce high dust levels.

### **WHY IS SILICA A HEALTH HAZARD?**

Breathing dust containing free crystalline silica is a potential health hazard because it may allow some of the smaller particles of silica to deposit in the lungs. The body tries to break down the particles to remove them from the lung. Foreign body reaction in the lung gradually destroys the lung function. While the body tries to remove the particles, tissue may be damaged. The damaged tissue forms hard inelastic scar tissue in the lungs which may lead to a disease known as silicosis. The accumulated dust and scar tissue form small masses that are scattered throughout the lungs. These small masses may join together forming large masses of scar tissue. These scars make the lungs stiff and interfere with the transfer of oxygen into the blood. The heart must work harder to pump blood through the stiff lungs. This added strain may lead to failure of the right side of the heart.

The damage to the lungs depends on:

- The type of silica inhaled
- Amount of dust inhaled
- Length of time exposed to the silica dust
- Length of time the silica was permitted to react with the lungs
- Individual susceptibility
- Presence of pulmonary infections
- How freshly sawed, hammered or treated in a way that produces airborne dust the silica particles are

- Smoking

Silicosis may be chronic, accelerated or acute.

### **WHAT IS CHRONIC SILICOSIS?**

Chronic silicosis develops after many years of exposure. Symptoms may not appear until 10 to 20 years, or more, after the first exposure has occurred.

### **WHAT IS ACCELERATED SILICOSIS?**

Accelerated silicosis results from exposure to high concentrations of crystalline silica and develops 5 to 10 years after first exposure.

### **WHAT IS ACUTE SILICOSIS?**

Acute silicosis is a lung disease that develops quickly. It may develop in individuals who are exposed to extremely high levels over a short period (from a few weeks to four or five years).

Accelerated and acute silicosis rarely occurs nowadays.

### **WHAT ARE THE SYMPTOMS OF SILICOSIS?**

Silicosis progresses through a number of stages. In the early stages, workers afflicted with the disease may experience no symptoms.

As the disease progresses the following symptoms may be experienced:

- Wheezing
- Frequent dry cough
- Shortness of breath
- Increased tiredness
- Chest x-ray reveals scars
- Decreased lung function

**SILICOSIS IS NOT TREATABLE AND MAY DEVELOP EVEN IF YOU ARE**

## **NO LONGER EXPOSED TO SILICA.**

### **OTHER HAZARDS**

Other possible complication associated with crystalline silica include: bronchitis, increased risk of tuberculosis, increased risk of lung cancer, connective tissue disease (scleroderma) and kidney disease. All this have the end stage of COPD ( chronic obstructive pulmonary disease)

### **HOW CAN I PROTECT MYSELF FROM EXPOSURE TO CRYSTALLINE SILICA?**

- Workers must be trained on the health effects of crystalline silica and on the work practices and protective equipment used for controlling exposure.
- Generation of silica dust should be anticipated so that plans can be made to control the dust.
- Employers are required to offer a medical surveillance program for workers exposed to crystalline silica. Chest x-rays, occupational history and lung function tests are used to assess the state of the lungs and to aid in the diagnosis of silicosis.
- If possible, less hazardous abrasive materials containing less than 1% silica should be used to prevent worker exposure to crystalline silica. Engineering control methods such as local exhaust ventilation, wet drilling, or wet sawing should be used to control worker exposures to crystalline silica dust. Engineering control equipment must be maintained in good working order if it is to operate efficiently.
- Either the process or the worker can be isolated so there is minimal exposure to crystalline silica dust. Sand blasting small pieces of equipment in a blasting cabinet is an example of isolating the process. The use of a positive pressure cab with air conditioning and filtered air supply is an example of isolating the worker.
- Respiratory protection should only be worn if engineering controls are not feasible. Ensure the correct selection, use and care of respirators.
- Air monitoring should be conducted periodically to ensure workers are being

protected. In Ontario, the exposure limit for respirable crystalline silica is set at 0.2 mg/m<sup>3</sup>. However, employers are required to try and achieve a level of 0.1 mg/m<sup>3</sup>.

- If possible, workers should shower before leaving the workplace.
- Workers should wear disposable or washable coveralls when coming into contact with silica.