HEALTH, SAFETY & ENVIRONMENTAL MANUAL	4.16 Safe Work Program – Silica in the Workplace			
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SAFE WORK PRACTICES

Silica in the Workplace

The control of worker exposure to silica, a designated substance, is required by law. It is imperative that employees understand the hazards and necessary controls associated with silica exposure.

Silica (SiO_2) is the second most common mineral in the earth's crust and is a major component of sand, rock and mineral ores. Silica exists in several forms, of which crystalline silica is of most concern.

Silica is primarily present in the form of dust. Worker exposure to silica is of particular concern because silica is the primary component of many construction and aggregate materials. Some common materials containing silica include:

- concrete, concrete block, cement, mortar, brick, asphalt
- granite, sandstone, quartzite, slate
- natural rock, stone, sand, fill, topsoil

Many activities can generate airborne dust containing silica including:

- crushing/screening, loading, hauling, and placing sand, and gravel
- breaking, drilling, grinding, and chipping of concrete or masonry structures
- demolition of concrete and masonry structures
- road construction
- sweeping, cleaning, and dismantling equipment

Exposure to silica can cause **SILICOSIS**, which is the most significant lung disease caused by breathing mineral dusts.

Legislation

The Occupational Health and Safety Act (OHSA) sets out, in very general terms, the duties of employers and others to protect workers from health and safety hazards on the job.

Silica is a Designated Substance under the OHSA. The Ministry's Designated Substances Regulation (O. Reg. 490/09) specifies occupational exposure limits (OELs) for silica.

Health Effects

The prolonged inhalation of respirable dust containing silica may result in silicosis. The severity of silicosis depends on the concentration of silica dust to which a worker is exposed and the duration of exposure.

The International Agency for Research on Cancer has concluded that crystalline silica inhaled in the form of quartz or cristobalite is carcinogenic to humans.

There are three major types of silicosis: chronic, accelerated, and acute.

SAFE WORK PRACTICES

Chronic Silicosis
Chronic silicosis is most common. Symptoms may not appear for a long time, usually more than 10 years, and may progress and worsen over a period of many years. The effects of silicosis can continue to develop even after the exposure ceases, and they are irreversible.

Accelerated Silicosis
Accelerated silicosis is almost the same as chronic silicosis. However, it develops more quickly, and the lung scars show up sooner. Accelerated silicosis can develop when exposure to large amounts of silica dust occurs over a short time period.

Acute Silicosis
Acute silicosis is a lung disease that develops rapidly. As few as 8 to 18 months may elapse from the time of first exposure to the onset of symptoms, which include progressive shortness of breath, fever, cough and weight loss. There is a rapid progression of respiratory failure.

Controlling the Hazard
Workplace exposure to silica can be controlled by several strategies depending on the existing facilities, equipment and work practices. A combination of controls are to include the following:

- engineering controls
- work practices and hygiene practices
- respirators and personal protective equipment
- training.

Engineering Controls
Engineering controls are methods to control silica at the source and minimize the amount that gets into the workplace air. They include:

- Workplace design which minimizes or eliminates the spread of dust
- Equipment selection and modifications
- Dust suppression (i.e. spraying water)
- Mechanical or natural ventilation

Work Practices and Hygiene Practices
Work practices and hygiene practices are on-the-job activities that reduce the exposure potential from contaminated surfaces and work areas.

- Housekeeping. Keep indoor areas clean and dust free (i.e. scalehouses, lunchrooms, offices)
- Dry sweeping and air-blowing are to be avoided
- Clean all dirty clothes at end of shift
- Wash hands before lunch or breaks
- No eating, drinking, smoking in dusty areas.
- Equipment air filter replacement as required

- Keep gravel roads maintained with dust control measures (i.e. water, calcium)

Personal Protective Equipment
When the engineering controls and work practices cannot lower the concentrations of silica, then personal protective equipment must be used. Primarily, respirators must be used to prevent the inhalation of dust.

- Use an appropriately rated disposable respirator when making small cuts/chipping for short amount of time (N95).
- If there is a high concentration of silica possible, half-face or full-face respirators with P100 filters will be provided.

Where respirators are provided, they need to be appropriate for the type and the concentration of airborne silica. Workers will be trained in the use and care of the respirator.

Training Requirements
Training is an important component in preventing worker exposure to silica. It is essential for training to cover the following:

- WHMIS training
- the hazards of silica, including health effects and symptoms;
- the recognition of typical operations containing silica;
- personal hygiene, respirator requirements, and work measures and procedures;

Workplace Hygiene Study
In October 2012 and July 2013 an independent consultant tested employee dust exposure in a surface mine operation. Employees were tested in the following lines of employment:
1. Wheel loader operator
2. Crusher grounds crew labourer

Based on the information from the study, general practices to follow include:
Machine Operation

- Working in a clean enclosed cab or structure does not normally require dust protection. However, in certain instances, protection can and is recommended to be used if the dust levels are high and/or the dust infiltrates into the cab of the machine.

Working Outside

- When working around operational crushing or screening plants without the protection of an enclosed cab, respiratory protection must be worn.
- Generally, a dust mask with a N, R or P rating is suitable. Typically, the 3M 8511 N95 model.
- The worker must be fit-tested for the type of respirator used.
- The supervisor may require different types of respirators depending on the specific job or task.