

Crystalline Silica

Awareness

Crystalline silica is a natural mineral that is commonly found in stones, sands, and soils. The most common source of silica comes from the mineral quartz. There are many potential sources of crystalline silica, but products such as concrete, mortar, bricks, artificial stone, pottery, and glass are some of the most common. For many finished materials, the silica is a harmless component. When work is being performed that generates very small airborne dust particles, crystalline silica can become a serious human health hazard. When considering work that could expose students or staff to respirable silica, always contact Laboratory Safety for assistance.

The Hazard of Crystalline Silica

Very small particles of respirable silica are generated during cutting, drilling, crushing, and sanding activities. Particles are also released when powdered raw materials containing silica such as concretes or mortars are mixed. These particles are very small; generally, at least 100 times smaller than the average grain of sand. At this size, silica particulates become an airborne respirable dust that can travel deep into the human lung. Once in the lung, these particles remain in place causing irritation and irreversible scarring of tissue. The presence of these particles in the lung tissue also impairs the ability to take in oxygen. This medical condition is known as Silicosis, and it is a progressive, debilitating, and potentially fatal disease.

There are several other serious diseases besides Silicosis linked to crystalline silica exposure. These diseases include:

- Lung Cancer
- Chronic Obstructive Pulmonary Disease (COPD)
- Kidney Disease
- Autoimmune Diseases including rheumatoid arthritis, systemic lupus erythematosus, and systemic sclerosis.



X-ray of a lung showing Silicosis and progressive massive fibrosis (PMF). Photo by NIOSH

Exposure Limits for Crystalline Silica

OSHA PEL	NIOSH REL	ACGIH TLV
8-Hour Time Weighted Average	10-Hour Time Weighted Average	8-Hour Time Weighted Average
50 $\mu\text{g}/\text{m}^3$ [25 $\mu\text{g}/\text{m}^3$ Action Level]	0.05 mg/m^3	0.025 mg/m^3 (respirable particulate matter)

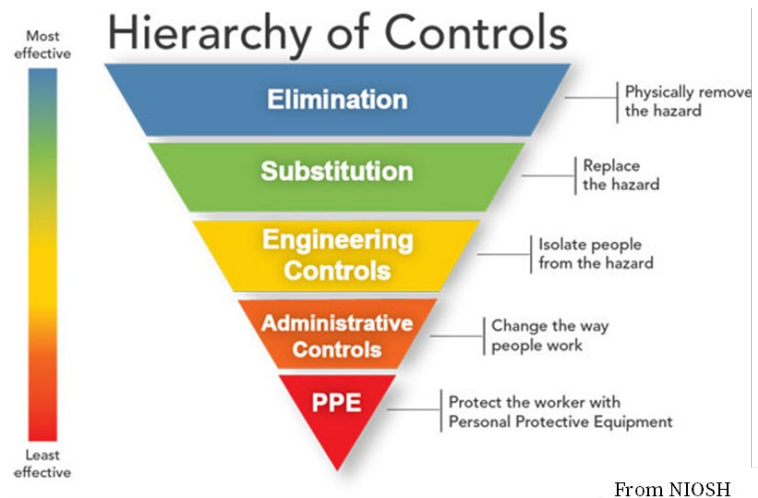


The above exposure limits are intended for industry and list the maximum amount of respirable silica dust exposure during either an 8- or 10-hour work shift. To put things into perspective, roughly the amount of silica dust that would fit on Abraham Lincoln's forehead on a penny is enough to exceed the OSHA PEL in the air of a 10x10 foot room. Silica Quartz is a known human carcinogen, and ongoing research indicates that there is likely no safe level of exposure. Crystalline silica builds up in lung tissue with each exposure over the course of a lifetime. Therefore, the best course of action is to prevent exposure wherever possible.

Limiting Crystalline Silica Exposure

There are multiple ways to limit exposure to respirable crystalline silica:

- **Elimination/Substitution:** Use alternative materials that are produced without silica quartz.
- **Design out the Hazard:** Reduce the generation of dust through engineering controls.
- **Personal Protective Equipment (PPE):** In situations where silica dust is still a concern after engineering or other controls have been implemented, proper respiratory protection should then be utilized.



Always work directly with Laboratory Safety when attempting to manage silica exposure in academic operations. Laboratory Safety can assess your specific situation and make recommendations for you to properly mitigate any hazards. If you believe that respirators need to be worn, you must work with Laboratory Safety and follow the requirements of the Rowan University [Respiratory Protection Program](#). You must be properly trained, gain medical clearance, and receive annual fit testing to use any form of air-purifying respirator.

If you have any questions or concerns related to crystalline silica exposure, contact Laboratory Safety at LabSafety@Rowan.edu or 856.256.5105.