

24.0 MIA Safety Services - Crystalline Silica and Silicosis

Executive Summary

Crystalline silica is an important industrial material found abundantly in the earth's crust. It is a mineral that occurs in several forms, most commonly as quartz. In the stone industry, exposure to crystalline silica often occurs as part of common workplace operations involving cutting, sawing, drilling, and crushing of natural and engineered stone products (such as in countertop fabrication). These types of exposures can lead to the development of disabling and sometimes fatal lung diseases, including silicosis and lung cancer.

The objectives of this Toolbox Talk are to alert employers and employees to the hazards crystalline silica dust and to remind employers that the only treatment for silicosis is prevention, or avoiding exposure to silica dust altogether.

Two toolbox talks are enclosed. The first reviews an actual inspection from OSHA files and the second presents the health effects of crystalline silica. Also provided are a relevant safety checklist, a standard employee meeting sign-in sheet, and a safety related "Product of the Month" feature.

Enclosed in this issue of MIA Safety Talks are the following resources:

- 24.1 TOOLBOX TALK - OSHA Inspection Summary
 - Overview
 - Description of Inspection
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- 24.2 SAFETY TOOL BOX TALK - Health Effects of Crystalline Silica
 - Overview
 - What is Crystalline Silica?
 - What are the Health Effects of Crystalline Silica?
 - How can Silicosis be Prevented?
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- 24.3 SAFETY CHECKLIST

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- 24.5 SAFETY PRODUCT OF THE MONTH

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24.1 MIA Safety Services - OSHA Investigation Summary

Refer to sign-in sheet for attendees (note: a separate meeting should be held with all absent employees).

Agenda

Inspection Type:	Referral
Type of Operation:	Cut Stone & Stone Products
Safety Monitor on Site:	No
Safety & Health Program:	No
Regular Worksite	
Inspections:	No
Training Provided:	No



Brief Description of Inspection

OSHA investigated a stone fabrication shop regarding complaints of unhealthy and unsafe working conditions. Upon entering the shop, investigators observed dust-filled air. No employees were wearing respiratory protection. Investigators sampled air quality and found it to exceed recommended Permissible Exposure Limits (PEL). Information about dust controls or hazardous material was not available to employees.

Inspection Results

Section 5(a)(1) of the Occupational Safety and Health Act of 1970: The employer did not furnish employment or a place of employment which was free from recognized hazards that were causing or likely to cause death or serious physical harm to employees in that the employer did not institute a medical surveillance program for all employees who were or could be exposed to crystalline silica at or above the Permissible Exposure Limits (PEL). Workers were exposed to respirable silica dust without the protection of an effective medical monitoring program to protect them against the early onset of silicosis.

Recommendations

Among other methods, one feasible and acceptable abatement method to correct this hazard would be to circulate an appropriate medical questionnaire to identify employees with symptoms of silicosis and refer symptomatic employees to physicians specializing in occupational or respiratory medicine for medical treatment.

Recap & Review

- What are the sources of silica dust in our shop?
- When/where are we required to wear respirators?

Reminder: Safety is the responsibility of both management and employees!

The next safety meeting is scheduled for _____ and the topic will be _____.

NOTE: This case was selected as being representative of injuries caused by improper work practices. No special emphasis or priority is implied nor is the case necessarily a recent occurrence. The legal aspects of the incident have been resolved, and the case is now closed.

24.2 MIA Safety Services - Health Effects of Crystalline Silica

Refer to sign-in sheet for attendees (note: a separate meeting should be held with all absent employees).

Agenda

Overview

Inhaling crystalline silica can lead to serious, sometimes fatal illnesses including silicosis, lung cancer, tuberculosis (in those with silicosis), and chronic obstructive pulmonary disease (COPD). In addition, silica exposure has been linked to other illnesses including renal disease and other cancers.

What Is Crystalline Silica?

Crystalline silica is an important industrial material found abundantly in the earth's crust. It is a mineral that occurs in several forms. Quartz, the most common form, is a component of sand, stone, rock, concrete, brick, block, and mortar. Many of these materials are used every day across a wide variety of industrial settings, including construction, mining, manufacturing, maritime, and agriculture.

In the stone industry, exposure to crystalline silica often occurs as part of common workplace operations involving cutting, sawing, drilling, and crushing of natural and engineered stone products (such as in countertop fabrication). These types of exposures can lead to the development of disabling and sometimes fatal lung diseases, including silicosis and lung cancer. Processes historically associated with high rates of silicosis include sandblasting, sand-casting foundry operations, mining, tunneling, cement cutting and demolition, masonry work, and granite cutting.

What are the Health Effects of Crystalline Silica?

Silicosis - Inhalation of respirable crystalline silica particles has long been known to cause silicosis, a disabling, non-reversible and sometimes fatal lung disease. Respirable crystalline silica also causes lung cancer. The International Agency for Research on Cancer (IARC) has designated crystalline silica as carcinogenic to humans, and the U.S. National Toxicology Program has concluded that respirable crystalline silica is known to be a human carcinogen. The National Institute for Occupational Safety and Health (NIOSH) has also recommended that respirable crystalline silica be considered a potential occupational carcinogen. In addition, exposure to respirable crystalline silica has been associated with other respiratory diseases, such as chronic obstructive pulmonary disease (including bronchitis and emphysema), as well as kidney and immune system diseases.

There are **three types** of silicosis:

- **Chronic Silicosis** - usually occurs after 10 or more years of exposure to crystalline silica at relatively low concentrations;
- **Accelerated Silicosis** - develops 5 to 10 years after high exposure to silica dust. Symptoms include severe shortness of breath, weakness and weight loss.
- **Acute Silicosis** - develops a few months to 5 years after exposure to very high concentrations of silica dust, causing disabling shortness of breath, weakness, weight loss, and often leading to death.

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24.2 MIA Safety Services - Health Effects of Crystalline Silica

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Lung cancer - In 1987, the IARC evaluated crystalline silica as a probable human carcinogen (Group 2A - sufficient evidence in animals but limited evidence in humans). Over the next decade, no further conclusive human evidence was brought forward but experts agreed that an excess of lung cancer could be observed in people already having silicosis.

In 1997, the IARC re-evaluated crystalline silica and concluded on the basis of literature review that inhaled respirable crystalline silica from occupational sources is carcinogenic to humans.

Other - Exposure to silica can cause other lung diseases including chronic obstructive pulmonary disease (COPD) and tuberculosis, and has been linked to renal disease and rheumatoid arthritis.

How Can Silicosis be Prevented?

Unfortunately, there is no cure for silicosis. Once the aggressive form of silicosis is present, the scarring in the lungs progresses rapidly. There is no effective medication to halt the scarring. Therefore, the only treatment for silicosis is prevention, or avoiding exposure to silica dust.

Wet cutting and grinding. Hand-held grinders with wet dust suppression deliver water to the surface to reduce airborne dust while finishing edge profiles and sink cut-outs. This method is effective for the reason that dust is kept out of the air when water combines with the stone particles created by grinding. Silica in the stone is only hazardous if it is inhaled. It is not hazardous to skin contact.

Dust collection and air filtration (vacuum dust control). Vacuum systems capture dust and silica near the source, reducing concentrations in the worker's breathing zone. Vacuum systems can be attached to hand-held or fixed saws, grinders and other tools to pull dust from the cutting point through special fittings connected directly to the tool. Some systems use hoods or shrouds mounted on the tool to capture the dust. There are also powerful air purification systems that extract the crystalline silica out of the air and deposit it into disposable cartridges. As long as the dust does not become airborne, the hazard is reduced.

Water Treatment Systems. The residual dust from cutting and grinding wet can be removed with water treatment systems which remove the particles from the water and compress them into cakes for later disposal. The system then recycles the water so that it can be returned to cutting, grinding and polishing applications. These systems virtually eliminate disposing the waste materials into local sewer systems and, because they recycle the water, significantly reduce the amount of water consumed in the plant operations.

Personal Protective Equipment. PPE against silica includes respirators and masks. Respirators should be used only when the dust controls cannot keep dust levels below the NIOSH Recommended Exposure Level. Air purifying respirators filter breathing air by preventing the inhalation of airborne dust. They form a tight seal around the face. Solid contaminants are removed by filtering media inside disposable cartridges. Their ability to remove particles is limited by the pore size of the filters.

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24.2 MIA Safety Services - Health Effects of Crystalline Silica

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What is a Respiratory Protection Program? (OSHA 29 CFR 1910.134)

In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

- Procedures for selecting respirators for use in the workplace;
- Medical evaluations of employees required to use respirators;
- Fit testing procedures for tight-fitting respirators;
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
- Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- Procedures for regularly evaluating the effectiveness of the program.

Discussion:

- What can employers/employees do to protect against exposures to crystalline silica?
- What are the symptoms of silicosis?

Recap & Review:

- What is the cure for silicosis?
- What component of granite dust are we primarily concerned about?

Reminder: Safety is the responsibility of management and employees!

Next Safety Meeting is scheduled for _____ and the topic will be _____.

24.3 MIA Safety Services - Prevention Checklist

What is Silicosis?

Silicosis is a disabling, nonreversible and sometimes fatal lung disease caused by overexposure to respirable crystalline silica. Overexposure to dust that contains microscopic particles of crystalline silica can cause scar tissue to form in the lungs, which reduces their ability to extract oxygen from the air we breathe. Typical sand found at the beach does not pose a silicosis threat.

Each year, more than 250 American workers die with silicosis. There is no cure for the disease, but it is 100 percent preventable if employers, workers and health professionals work together to reduce exposures.

What Can You Do to Prevent Silicosis?

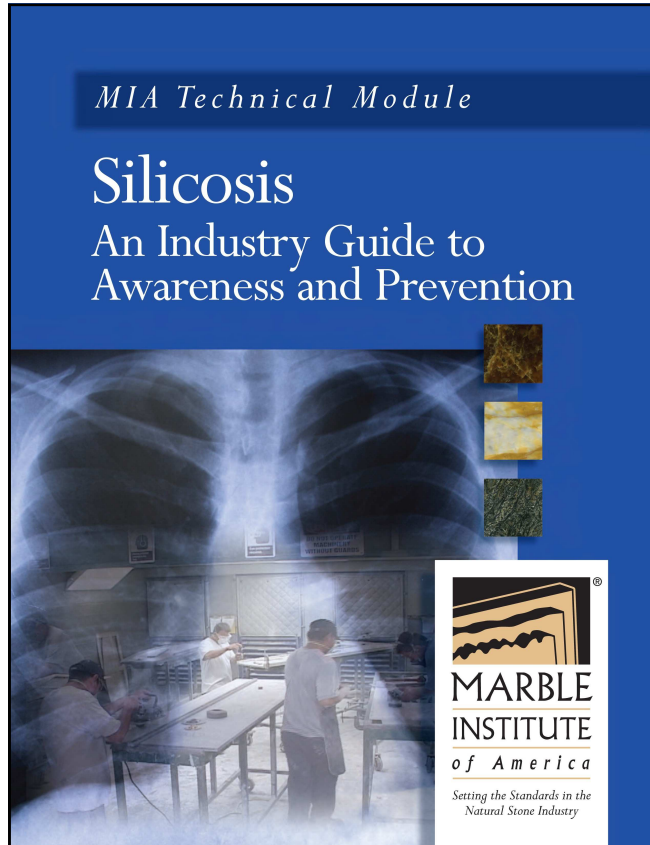
- Work with your employer to prevent silicosis at your worksite.
- Use engineering controls installed by your employer to reduce silica dust levels, and make sure they are properly maintained. Tell your employer when they aren't working properly.
- Minimize dust by following good work practices, such as removing dust with a water hose or vacuum with a high-efficiency particulate filter rather than blowing it clean with compressed air, or by wet sweeping instead of dry sweeping.
- Suggest to your employer to substitute less hazardous materials than crystalline silica for abrasive blasting.
- Wear, maintain, and correctly use approved particulate respirators when engineering controls alone are not adequate to reduce exposures below permissible levels. Beards and mustaches interfere with the respirator seal to the face, making most respirators ineffective.
- If you must sandblast, use type CE positive pressure abrasive blasting respirators.
- Participate in air monitoring, medical surveillance, and training programs offered by your employer or when required by law.
- Talk to your employer, employee representative, or union if you are concerned about the dust in your workplace. Ask for the results of air sampling done at your worksite.
- As a reminder, whenever you work with toxic materials, it is always a sound practice to:
 - Change into disposable or washable work clothes at your worksite, if possible; shower, where available; and change into clean clothing before leaving your worksite.
 - Avoid eating, drinking, or using tobacco products in work areas where there is dust or other toxic materials.
 - Wash your hands and face before eating or drinking.

It cannot be said too often, or with too much emphasis: Protecting the workplace and employees from respirable crystalline silica – and eventually silicosis – should be one of the most important objectives of every company in the natural stone industry.

24.5 MIA Safety Product of the Month - April 2013

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STONE INDUSTRY SAFETY SERVICES



Silicosis:

An Industry Guide to Awareness and Prevention

This technical module is devoted to the subject of silicosis. It illustrates how you and your employees can eliminate the threat of silicosis in the workplace. It covers the particulars of prevention, including the equipment and procedures required to eliminate silicosis as a threat. It includes sections on wet cutting and grinding, and water treatment systems.

Item #10720: From MIA, 2008, 12 pp / technical module

Member Price: \$12 US (1-4), \$10 US (5-20), \$8.50 US (21-50), \$6 US (51+)

Retail Price: \$17 US (1-4), \$15 US (5-20), \$13.50 US (21-50), \$11 US (51+)

NOTES: