



Washington State Department of  
Labor & Industries

## Silica – it's more than just dust!

The health hazards of silica (quartz)  
in construction work



Division of Occupational Safety & Health (DOSH)



## Purpose of this training

The purpose of this training is to alert your employees to the serious health hazards of silica dust. The DOSH hazard communication regulations require training employees exposed to hazardous chemicals and dusts including silica.

DOSH also regulates employee exposure to silica by setting a “permissible exposure limit” for silica in the air which cannot be exceeded. If this limit is exceeded, employers are required to control employee exposure by reducing dust levels or providing respirators.

Silica exposure can occur during sandblasting, grinding or cutting concrete or bricks, rock drilling, and sand and gravel operations.



# How to Use this PowerPoint Program

- Users with PowerPoint can download, edit, and use the program for training with a laptop and multimedia projector.
- Additional information is found in the Notes section of this presentation. You can read the text in quotations, or use your own words.
- If you want to print out this program, the PDF file uses less computer memory and prints faster.

## Silica – What topics will be covered

What is silica?

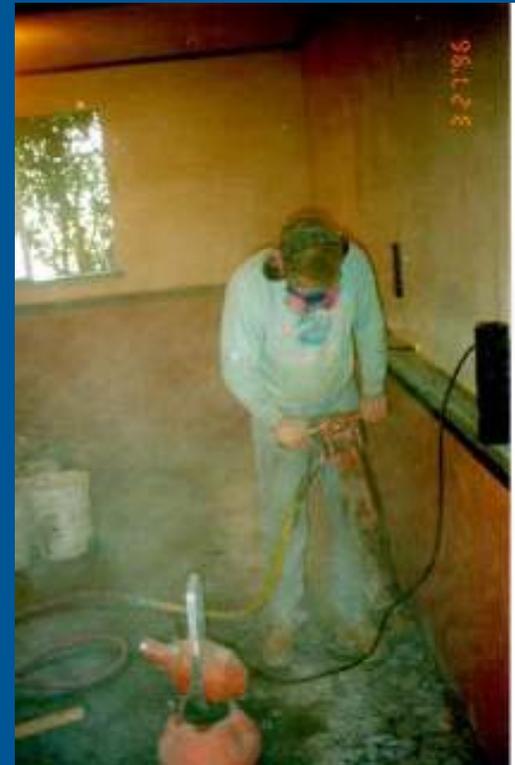
What are its health hazards?

What are the human exposure limits?

Where is it used or found in construction?

How can it be controlled?

What about respirators?



# What is Silica?

Silica is Quartz

Quartz (silica) is found naturally in almost all rock, sand and soil.



It is also found in concrete products and bricks.



It is sometimes found in sandblasting (abrasive blasting) grit and is called "silica sand".



# Silica Health Hazards

Inhaled silica dust scars the lungs

A lung disease called "**silicosis**" is caused by breathing of dust containing silica.

The dust causes "fibrosis" or scar tissue formation in the lungs. →

This reduces the lung's ability to extract oxygen from the air.

**There is no cure.**



# Silica Health Hazards

What are the symptoms of silicosis?

Early stages go unnoticed.

Continued exposure results in shortness of breath during exercise.

Prolonged high exposure can lead to extreme shortness of breath, chest pain, respiratory failure and death.



# Silica Health Hazards

## Other Health Effects

- Susceptibility to other lung diseases and infections such as tuberculosis.
- Acute silicosis may develop after very short periods of high exposure.
- Chronic silicosis develops after many years of lower levels of exposure.



# Silica Exposure Limits

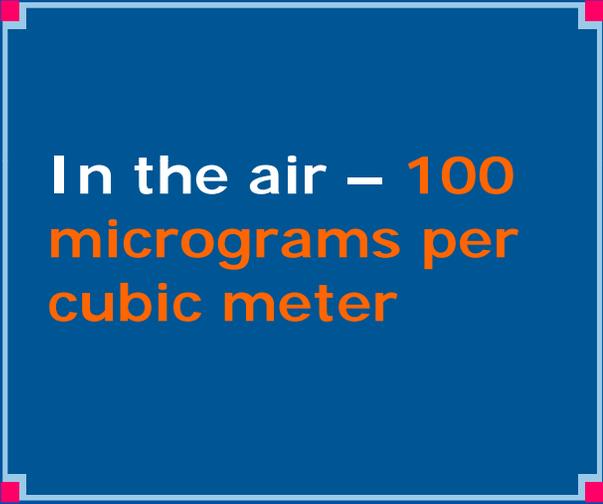
Is there a safe limit for silica?

The safest amount of silica in the air is zero.

This is the legal limit set by L & I - DOSH.

The legal limit is called a "permissible exposure limit" or "PEL".

This limit is for respirable (fine) dust.



In the air – **100 micrograms per cubic meter**

**Rule-of-thumb: if dust containing silica is visible in the air, it's almost always over the permissible limit.**

# Silica Exposure in Construction

Silica is found in many construction jobs



- Abrasive blasting (sand blasting)
- Rock drilling
- Concrete & masonry building construction
- Earthwork and rock crushing
- Masonry or concrete building demolition
- Road construction and repair

# Silica Exposure - Sandblasting

Sandblasting with silica sand creates extremely high levels of silica dust.

Sandblasting on concrete with any kind of grit produces high levels of silica dust.

Sandblasting always requires the use of a respirator.



**He needs an abrasive blasting respirator!**

# Silica Exposure – Rock Drilling



Drilling without water

Your actual exposure will depend on the wind, where you stand and if you use water to control the dust.

Rock drilling without water produces large amounts of dust.



Drilling with water

# Silica Exposure in Construction

## Concrete Work

### Jack-hammering



**Generates moderate to heavy amounts of dust**



### Power sanding



**Generates heavy amounts of dust**

# Silica Exposure –Concrete Highway work

Drilling concrete pavement dry



**Generates moderate amounts of dust**

# Silica Exposure – concrete cutting without water



**Generates large amounts of dust**

# Silica Exposure – brick and cinder block cutting



Without water



With water

**Generates moderate to heavy amounts of dust without water.**

# Silica Exposure - Tuckpointing



**Generates heavy amounts of dust without water**

# Silica Exposure – cutting concrete siding with power saws

On some new construction, a lightweight concrete siding (hardiplank) is being used.

Cutting this siding with a power saw without water or ventilation can result in silica overexposure.



# Our Worksite Silica Exposure

You may be exposed to silica during the following job activities and/or locations:

# The Risk of Silica Exposure

- When dust is controlled, exposures are low.
- When dust is uncontrolled, exposures are high.
- Many exposures are for short time periods, but at very high concentrations.
- Short, high exposure can still exceed permissible limits and cause lung damage.

# Silica dust exposure can be controlled by use of water or exhaust ventilation



**Using water to cut concrete and bricks**



**Concrete sander with exhaust ventilation**

# Silica Exposure Control - Sandblasting

The best control is to **not** use silica sand.

Substitutes include garnet, glass beads, aluminum oxide, or iron oxide.

If silica sand is used, keep other workers away from area.

If workers must be in the area, they will need to wear respirators too.



# Silica Exposure Control

Avoid dry sweeping and use of compressed air on concrete



Both these activities can stir up large amounts of dust.  
Use a vacuum with high efficiency filters when possible.

# Our Worksite control measures

Water or exhaust ventilation is required on the following jobs or tasks:

# Silica and Use of Respirators

Respirators must be used if silica dust can't be controlled with water or ventilation

either



**Air-purifying respirator  
with dust cartridge**

or



**Supplied air respirator**

# Sandblasting Respirators (Abrasive blasting hoods)

Sandblasting with silica sand requires a full sandblasting hood.

The sandblaster helper will also need a respirator. Nearby employees may need respirators, also.



# Our worksite respirator requirements

Respirators are required for the following jobs or tasks:

# Respirators Must Fit Properly

Respirators must fit properly to prevent leaks around the edges.

Fit-testing must be done before first wearing a respirator.

Beards are **not allowed** when wearing a respirator.



# Employees using respirators must be trained

Training is required by OSHA for anyone who wears a respirator.

If you don't know how to use a respirator properly, you may think your respirator is providing protection when it is not.





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# Silica in Construction

The next slides are optional quiz questions

# Silica in Construction Quiz

## Question 1

Where is silica found?

- a) In polluted air in big cities.
- b) In concrete, bricks and sand.
- c) In certain chemicals.

# Silica in Construction Quiz

## Question 2

Why is dust containing silica so dangerous?

- a) Because it can cause permanent damage to the lungs.
- b) It can make it hard to see.
- c) It can get in your eyes and damage them.

# Silica in Construction - Quiz

## Question 3

Why must you be clean-shaven to wear some respirators?

- a) The respirator will slide off a beard.
- b) We want a clean-cut look in this company.
- c) Some respirators will leak even with short stubble.
- d) Beards interfere with breathing through a respirator.