

Oregon Highway Bridge Maintenance Workshop



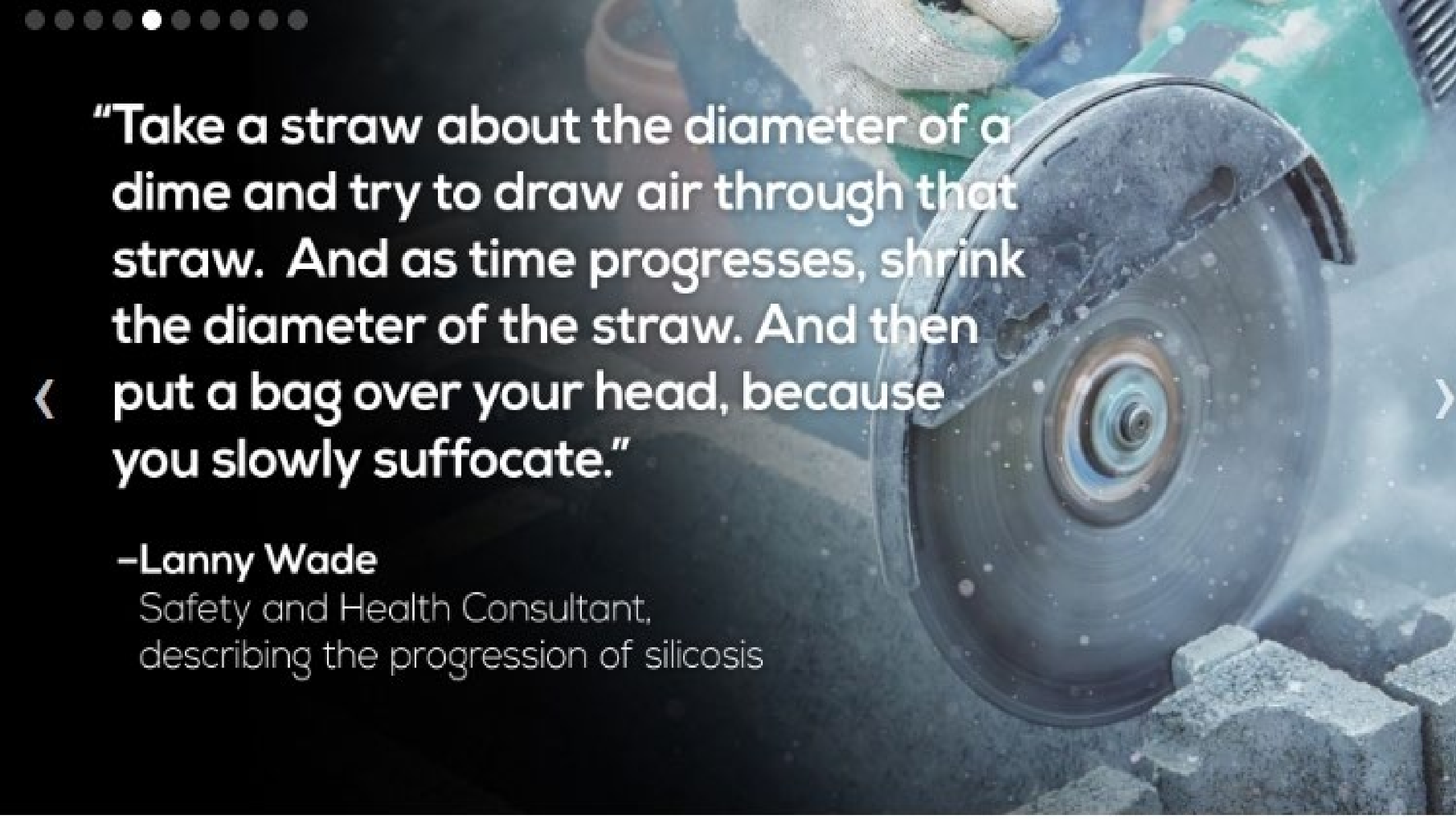
The background features a light blue gradient with decorative circuit-like lines in the corners. These lines are composed of thin blue lines with small circles at the end, resembling a stylized PCB or network diagram. They are located in the top-left, top-right, bottom-left, and bottom-right corners.

RESPIRABLE CRYSTALLINE SILICA

Safety Training for Bridge Maintenance Activities

LEARNING OBJECTIVES

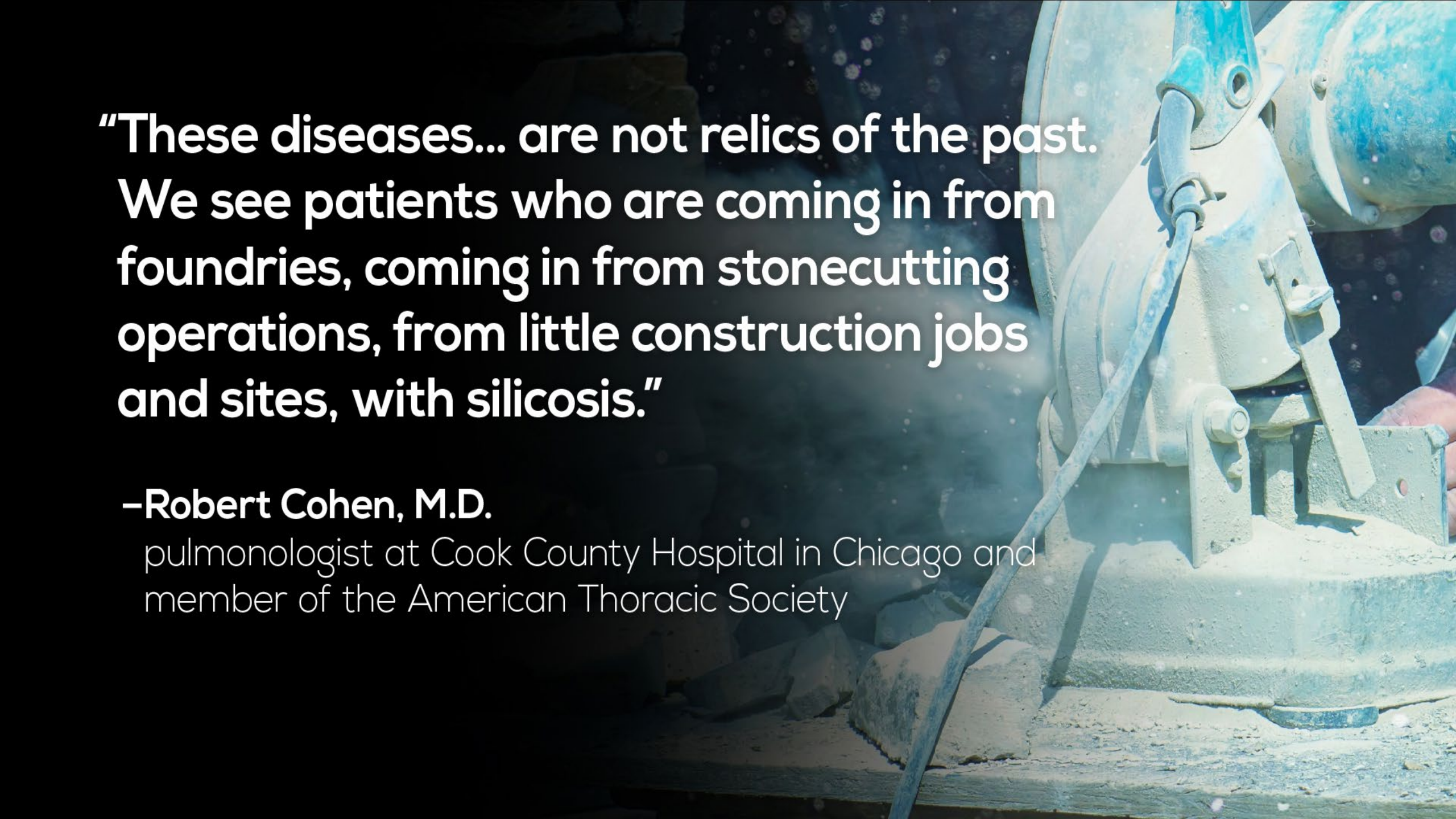
1. Understand the risks of Respirable Crystalline Silica exposure



“Take a straw about the diameter of a dime and try to draw air through that straw. And as time progresses, shrink the diameter of the straw. And then put a bag over your head, because you slowly suffocate.”

–Lanny Wade

Safety and Health Consultant,
describing the progression of silicosis



“These diseases... are not relics of the past. We see patients who are coming in from foundries, coming in from stonecutting operations, from little construction jobs and sites, with silicosis.”

–Robert Cohen, M.D.

pulmonologist at Cook County Hospital in Chicago and member of the American Thoracic Society

A photograph showing a worker in a white hard hat and safety harness operating a red scissor lift. The worker is positioned in the lift's basket, which is extended against a brick wall. The lift's hydraulic arms and platform are visible. The background is a clear, bright sky.

**Protecting Workers From
Silica Hazards in the Workplace**

RESPIRABLE CRYSTALLINE SILICA

Exposure Can Cause:

Silicosis

Lung Cancer

Chronic Obstructive Pulmonary (COPD) Disease

Kidney Disease

Autoimmune Disease

LEARNING OBJECTIVES

1. Understand the risks of Respirable Crystalline Silica exposure
2. Understand the OSHA requirements for silica safety

OSHA REQUIREMENTS

Protect workers from respirable crystalline silica exposures above the **Permissible Exposure Level** of 50 $\mu\text{g}/\text{m}^3$, averaged over an 8-hour day;

Silica Dust Exposure

HOW much is TOO much?

The amount of silica dust that can fit on Abraham Lincoln's forehead on a penny would leave your workers overexposed in a 10x10 foot room.



NE[®]SiLEX[®]
Silica Dust Suppressant

OSHA REQUIREMENTS

Establish and implement a **Written Exposure Control** plan that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur;

Silica Exposure Control Plan For:
Concrete Repair

Company: Clackamas County Bridge Maintenance

Person Completing the Plan/Title:
Douglas McLain

Jobsite/Project: Eagle Creek, Old State Hwy Bridge

Description of Work: Repairing damaged concrete post.

Competent Person: Allen Jones

Material: Concrete

Task: Cutting/sawing

Equipment and Control(s): Hand-Held Cutter with Dust Extraction (Table 1 Entry)

Task/Control Description: Prepping damaged concrete post for repair. Hand held 4" grinder with dust extraction

Safety of Others: Rural area, all personnel other than the Traffic Control personnel on site are silica trained. Traffic Control personnel will prevent pedestrians from entering work zone

Worker Training: All personnel other than the traffic control personnel on site are silica trained.

Housekeeping: Any residue will be cleaned up with silica vacuums.

Medical Surveillance: None

Other Considerations: Assure all equipment if functioning properly

OSHA REQUIREMENTS

Designate a **Competent Person** to implement the written exposure control plan;

Competent person means an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has **authorization** to take prompt corrective measures to eliminate or minimize them.

OSHA REQUIREMENTS

Restrict housekeeping practices that expose workers to silica, such as use of compressed air without a ventilation system to capture the dust and dry sweeping, where effective, safe alternatives are available;

OSHA REQUIREMENTS

Offer medical exams—including chest X-rays and lung function tests—every three years for workers who are required by the standard to wear a respirator for **30 or more days per year**;

OSHA REQUIREMENTS

Train workers on the health effects of silica exposure, workplace tasks that can expose them to silica, and ways to limit exposure;

OSHA REQUIREMENTS

Keep records of workers' silica exposure and medical exams.

LEARNING OBJECTIVES

1. Understand the risks of Respirable Crystalline Silica exposure
2. Understand the OSHA requirements for silica safety
3. Identify silica hazards in the workplace

Common Bridge Maintenance Tasks found in OSHA Table 1

- (ii) Handheld power saws (any blade diameter)
- (iv) Walk-behind saws
- (vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)
- (x) Jackhammers and handheld powered chipping tools
- (xii) Handheld grinders for uses other than mortar removal
- (xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials
- (xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading, or fracturing silica-containing materials

Common Bridge Maintenance Tasks Not in OSHA Table 1

Sweeping Streets and Bridge Decks

Broce Broom Operation

Needle Guns

Mixing of Concrete and other Silica-Containing Products

Air Wand Operation for Crack Sealing and other tasks

Back Pack Blower / Leaf Blower Operations

Sandblasting Concrete and other Silica-Containing Materials

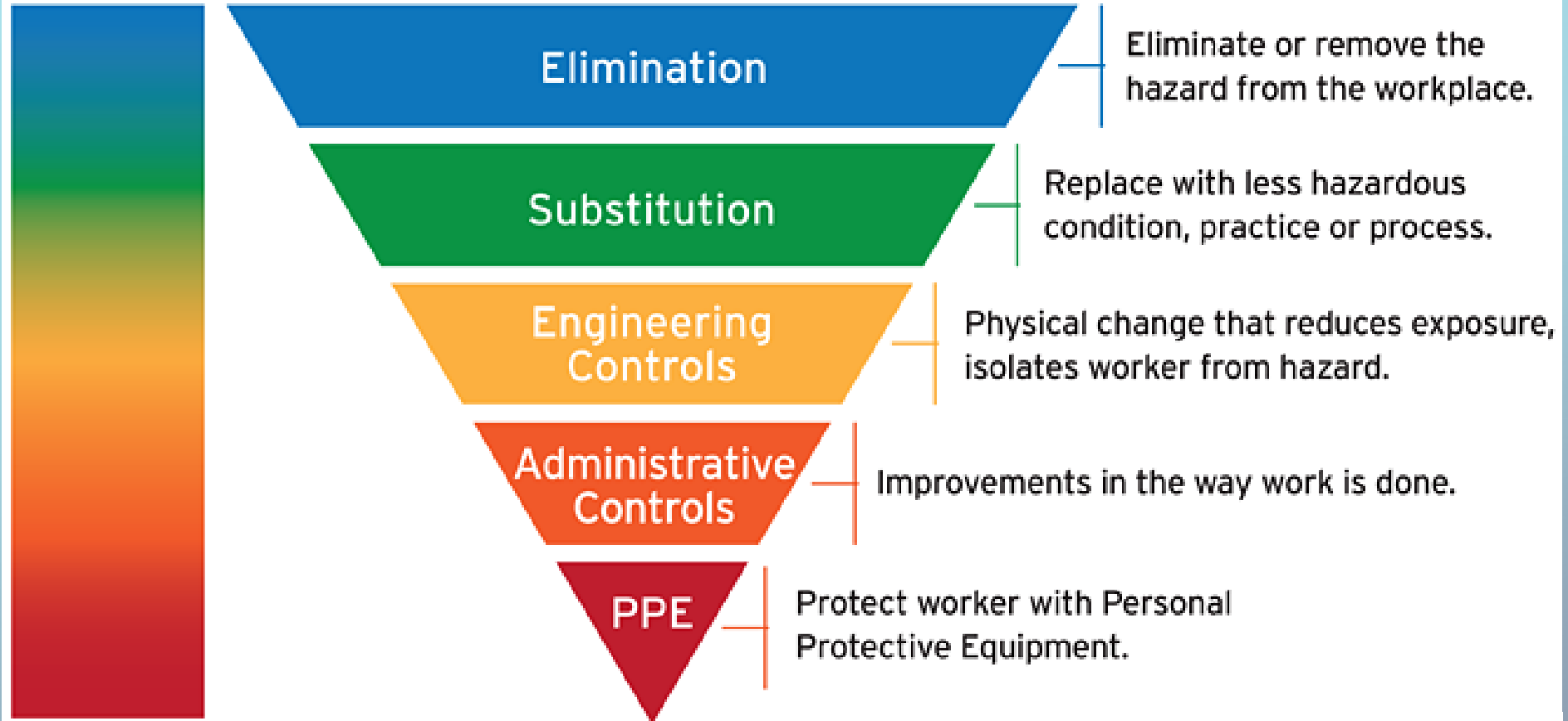
Handling Materials Containing Silica

LEARNING OBJECTIVES

1. Understand the risks of Respirable Crystalline Silica exposure
2. Understand the OSHA requirements for silica safety
3. Identify silica hazards in the workplace
4. Identify specific steps that we can take to reduce our exposure to silica hazards

MOST
Effective
Reliable
Sustainable

HIERARCHY OF CONTROLS



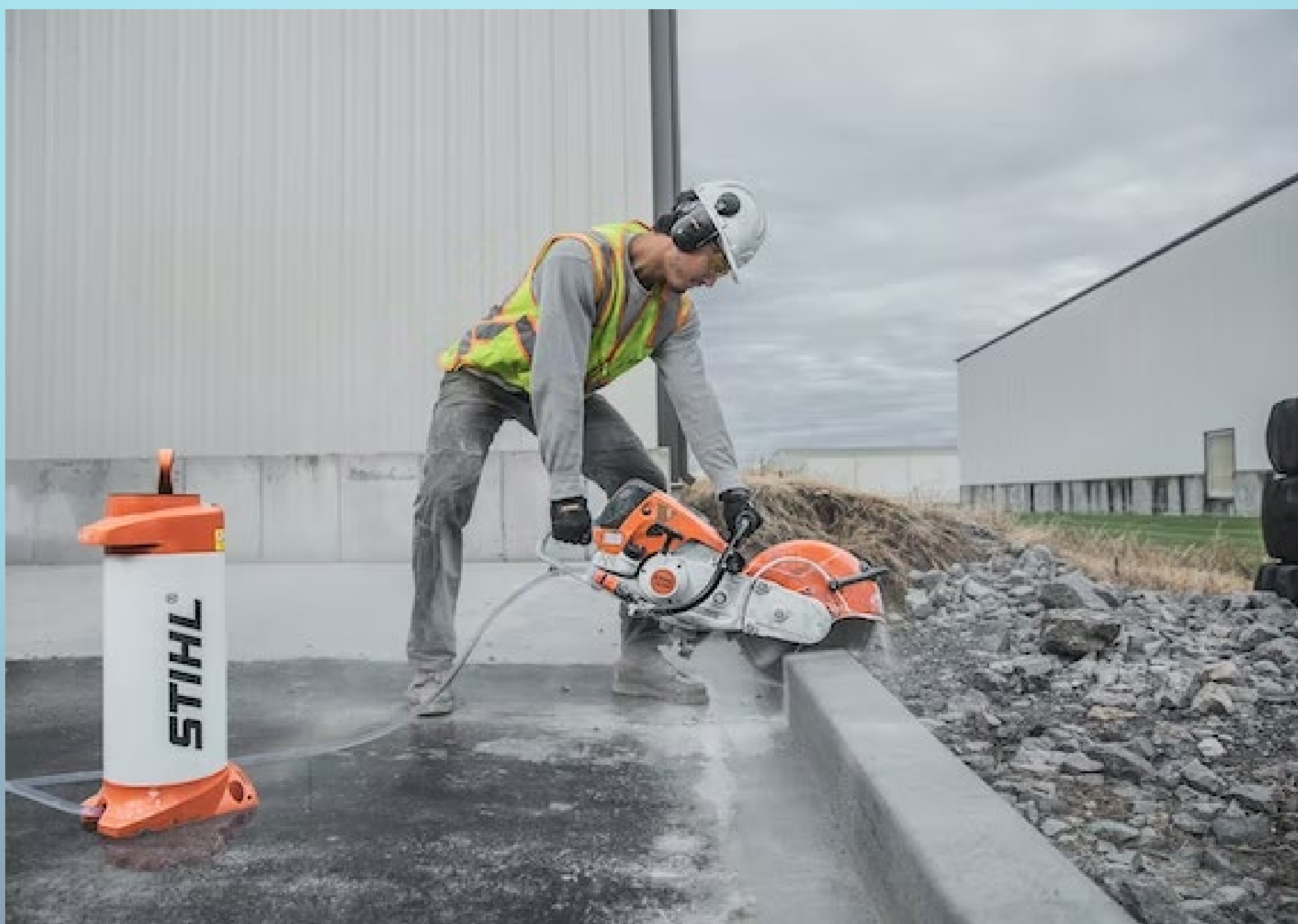
LEAST
Effective
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Sustainable

OSHA Table 1—Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤ 4 hours/shift	>4 hours/shift
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	-When used outdoors	None	APF 10
	-When used indoors or in an enclosed area	APF 10	APF 10

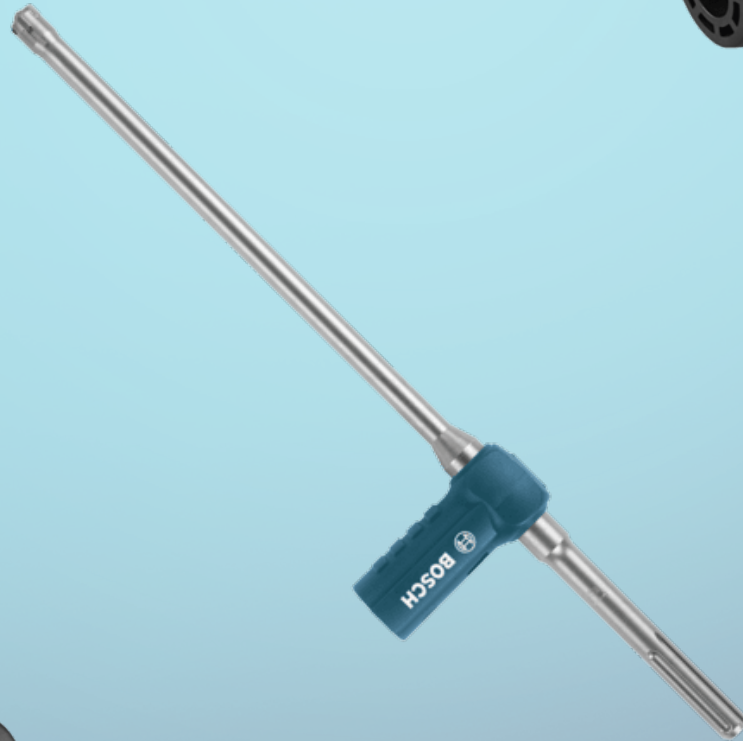
Table 2: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
3. Needle Guns	<p>For tasks performed outdoors only:</p> <p>Use needle gun equipped with integrated water delivery system that continuously feeds water to the working surface.</p> <p>Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</p> <p>OR</p> <p>Use needle gun equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</p> <p>Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	None	None
		None	None









Major Types of Respirators

Air-purifying respirators, which remove contaminants from the air.



Half mask/Dust mask
APF=10
Needs to be fit tested



Half mask (Elastomeric)
APF=10
Needs to be fit tested



Full facepiece (Elastomeric)
APF=50
Needs to be fit tested



**Loose-Fitting Powered
Air-Purifying Respirator (PAPR)**
APF= 25



**Hood Powered Air-Purifying
Respirator (PAPR)**
APF= 25

Atmosphere-supplying respirators, which provide clean air from an uncontaminated source.



**Full Facepiece Supplied-Air Respirator (SAR)
with an auxiliary Escape Bottle**
APF=1,000
APF = 10,000 (if used in "escape" mode)
Needs to be fit tested



**Full Facepiece Abrasive Blasting
Continuous Flow**
APF=1,000
Needs to be fit tested



**Full Facepiece Self-Contained
Breathing Apparatus (SCBA)**
Pressure demand mode is APF=10,000
Needs to be fit tested

HOUSEKEEPING

When cleaning silica dust:

- Avoid dry sweeping/brushing. Wet down dust before sweeping.
- Don't use compressed air without a ventilation system to capture the dust. Use silica vacuum rather than compressed air.
- Don't eat, drink, smoke, while near silica dust.
- Don't take dust home.

YOUR RESPONSIBILITIES

Identify any Respirable Crystalline Silica sources

Follow the Written Control Plan

Assure that your equipment is functioning properly

Use appropriate PPE

If dust is not being properly controlled, stop work and improve control method(s) with Competent Person and/or management.

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

1. Which of the following is true about silica?

- A. Silica occurs naturally
- B. Silica is a chemical compound
- C. Silica is a common mineral
- D. All of the above is true

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

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Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

2. Crystalline silica is a mineral found in many materials, except which of the following?

- A. Stone
- B. Rock
- C. Paper
- D. Brick

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

2. Crystalline silica is a mineral found in many materials, except which of the following?

- A. Stone
- B. Rock
- C. Paper**
- D. Brick

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

3. Which of the following statements is true regarding respirable dust:

- A. Particle size is greater than 10 microns.
- B. You can expel it from the body by coughing, sneezing, blowing your nose.
- C. Can penetrate deep into your lungs.
- D. All of the above statements are true

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

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Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

4. Which of the following factors are able to determine if the exposure is hazardous?

- A. Route of exposure: contact, ingestion, inhalation
- B. Toxicity: how much substance is needed to cause harm
- C. Interaction: being exposed to other substances at the same time can lead to negative interactions (smoking)
- D. All of the above

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

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- D. All of the above**

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

5. Once respirable crystalline silica reaches a worker's lung, it can cause many diseases directly except:

- A. Silicosis: an incurable lung disease that can lead to disability and death.
- B. Lung cancer.
- C. High blood pressure.
- D. Kidney disease.

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

5. Once respirable crystalline silica reaches a worker's lung, it can cause many diseases directly except:

- A. Silicosis: an incurable lung disease that can lead to disability and death.
- B. Lung cancer.
- C. High blood pressure.**
- D. Kidney disease.

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

6. Which of the following is NOT a preferred way to control silica?

- A. Apply water where silica dust is made
- B. Remove silica dust at or near the point where the dust is made
- C. Isolate the work process or the worker
- D. Wear company required PPE jacket

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

6. Which of the following is NOT a preferred way to control silica?

- A. Apply water where silica dust is made
- B. Remove silica dust at or near the point where the dust is made
- C. Isolate the work process or the worker
- D. Wear company required PPE jacket**

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

7. Engineering controls (such as changing equipment) are more effective at reducing the risk of silica exposure than PPE.

- A. True
- B. False

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

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A. True

B. False

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

8. Workers should change into clean clothing before leaving the worksite because contaminated clothing has been found to significantly contribute to silica exposures.

A. True

B. False

Respirable Crystalline Silica
Safety Training for Bridge Maintenance Activities
Post Training Test

8. Workers should change into clean clothing before leaving the worksite because contaminated clothing has been found to significantly contribute to silica exposures.

A. True

B. False

RESPIRABLE CRYSTALLINE SILICA

RESOURCES:

OSHA's Crystalline Silica Rule: Construction

71 page guide

Silica-Safe.org

Website with free information including Written Control Plan Templates