

# OSHA's New Silica Standards

**Del Kubeldis, CIH, CSP, ARM**  
**Director of Field Operations**



# Objectives

- Briefly review health hazards associated with Silica exposure
- Review the OSHA Respirable Crystalline Silica Standard for Construction (29 CFR 1926.1153) and General Industry (29 CFR 1910.1053)
- Discuss significant differences between the Standards



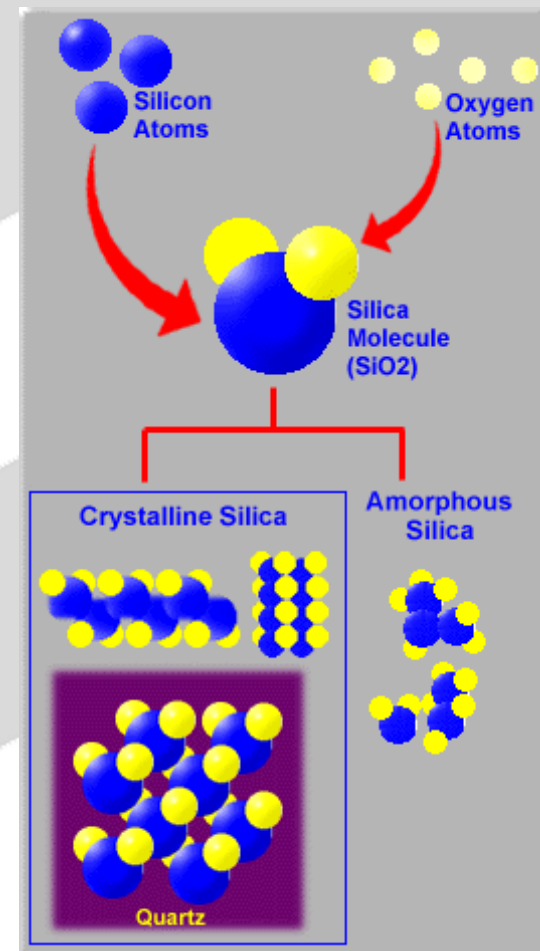
The background of the slide features a series of five horizontal, wavy bands in a light gray color, set against a white background. The bands are separated by white space and have a smooth, undulating edge, creating a rhythmic, wave-like pattern across the entire slide.

# **Review of Health Hazards**

# What is Silica?

“**Silica**” - refers to silicon dioxide

- Exists in **crystalline** or **amorphous** forms
- Crystalline silica
  - more hazardous
  - occurs as **quartz**, cristobalite or tridymite



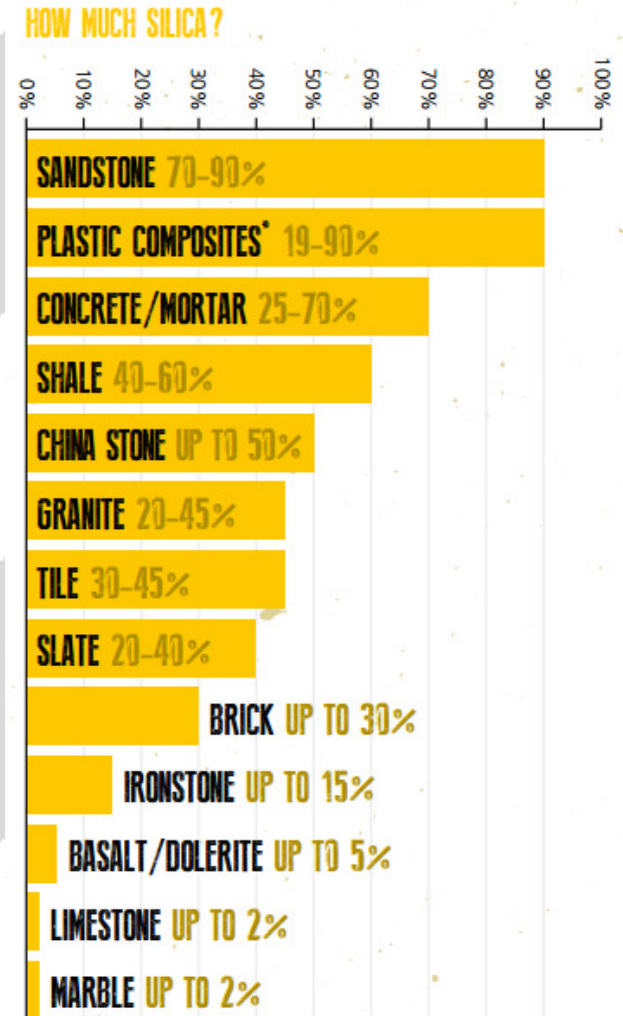
# Where is Silica Found?

## Naturally Occurring

Quartz – 2nd most common mineral in earth’s crust

## Manufactured products:

- Concrete products
- Bricks and blocks
- Common construction materials



# Silicosis

**One of oldest known occupational diseases...**

- Reports date to ancient Egypt and Greece
- Recognized in knife grinders and potters in the 18th century
- Later known by associated trade as “grinders’ asthma”, “masons’ disease” and “miners’ phthisis”

**All Silicosis!**



**2,000 yr. old quarry**



**Ancient pottery makers**

# Silicosis

## Symptoms

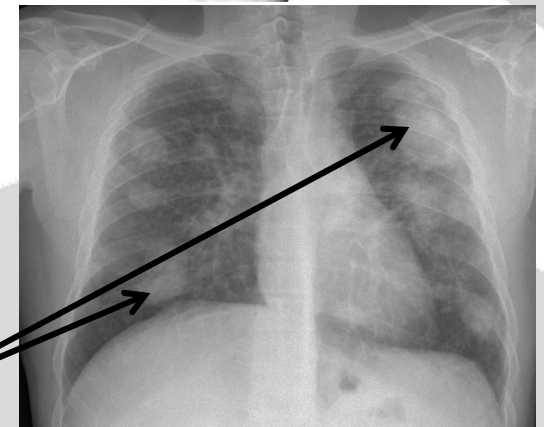
- Dry, non-productive cough
- Initial breathlessness during exercise, which progresses to shortness of breath during normal activity
- Progresses to lung scarring and failure

## Diagnosis

- Incurable
- Causes significant impairment or death



Healthy Lung

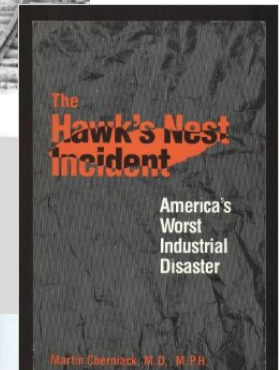


Scarred Lung

# Silicosis

- **Acute silicosis** (1-3 yrs.)
- **Accelerated silicosis** (3-10 yrs.)
  - 36-yr old, sandblasted for 36 months, died 11 yrs. after exposure
  - 30-yr old, sandblasted for 48 months, died 10 yrs. after exposure
- **Chronic silicosis** (20-25 yrs.)

**Silicosis is a single disease w/single cause – breathing crystalline silica dust**

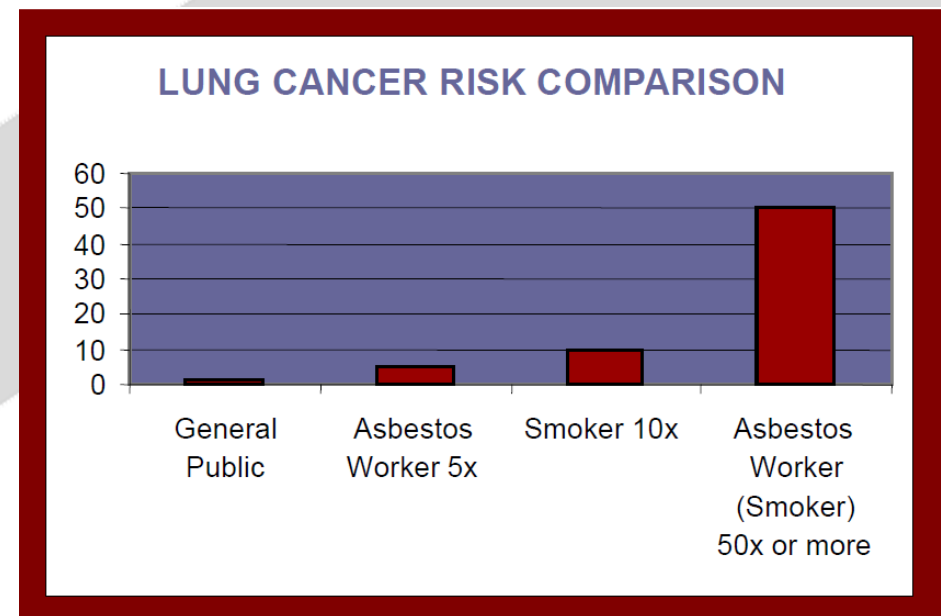




# Other Health Hazards of Silica

## Occupational Carcinogen

- IARC Group 1 for lung cancer
- “Known Human Carcinogen”
- Same as benzene, asbestos and vinyl chloride
- Some evidence of “synergy” w/cigarette smoking similar to asbestos exposure

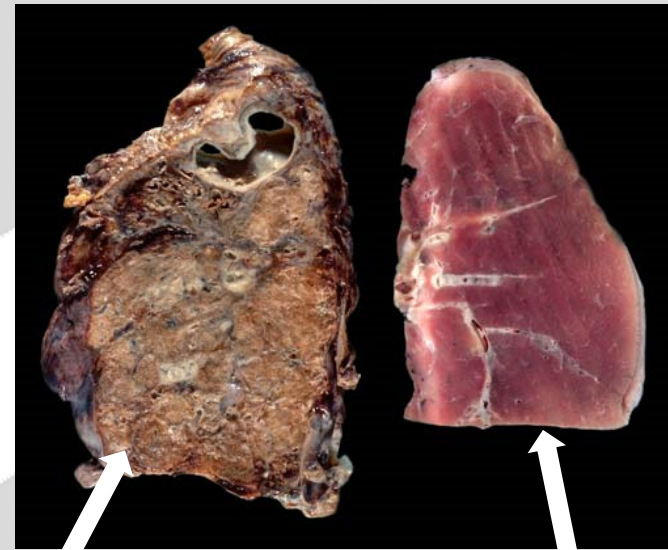


**Asbestos Synergistic Effect**

# Other Health Hazards of Silica

## Also linked with:

- Tuberculosis, emphysema, and pneumonia
- Stomach and other cancers
- Chronic renal (kidney) disease



Lung with Silicosis  
and Tuberculosis

Healthy Lung

# Silica Exposures – Where?

## General Industry

- Foundries
- Manufacturing



## Construction

- Building Trades
- Heavy/Highway



## Oil/Gas

- Fracking



## Mining

- Rock crushing

OSHA estimates 2.3 M workers exposed to Silica – **2.0 M in Construction**

# Silica Exposures - Construction

## Some operations/tasks with exposure:

- Abrasive/sand blasting (High Risk)
- Stone, brick, and concrete block cutting, blasting, chipping, grinding, and sawing
- Cement/concrete mixing or cutting
- Demolition
- Jackhammer operations
- Milling and crushing operations

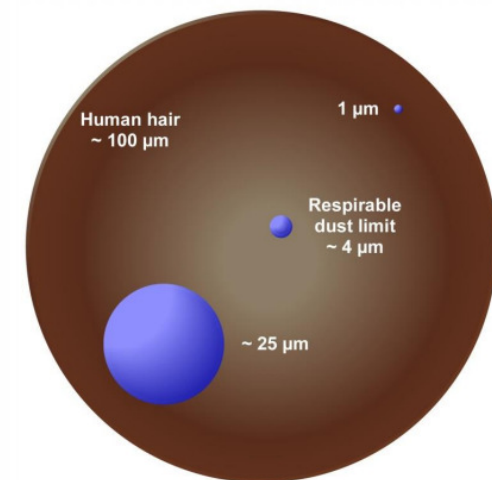


# OSHA's Silica Standards

**“Occupational Exposure to Respirable Crystalline Silica” standards (1926.1153 and 1910.1053) - published in FR 3/24/16**

## Why Needed Per OSHA?

- **Current PELs adopted in 1971 and not protective of workers**
- **Since 1971 NTP, IARC, and NIOSH identified Silica as human carcinogen**



The background of the slide features several horizontal, wavy bands of a light gray color, creating a dynamic, layered effect. The bands are separated by white space and curve gently across the width of the slide.

# **Overview of OSHA Construction Standard**

# OSHA's "Respirable Crystalline Silica (RCS)" Standard

## Similar in format to other Health Standards...

- a) Scope/Application
- b) Definitions
- c) Specified Exposure Control Methods (a.k.a., "Table 1")
- d) Alternative Exposure Controls Methods
- e) Respiratory Protection
- f) Housekeeping
- g) Written Exposure Control Plan
- h) Medical Surveillance
- i) Communication of silica hazards to employees
- j) Recordkeeping
- k) Dates



# a) Scope/Application

## The standard applies to...

- “...all occupational exposures to RCS in construction work...”
- Std. does NOT apply if worker exposure < Action Level (AL) “**under any foreseeable conditions**”
- AL = 25  $\mu\text{g}/\text{m}^3$  as 8-hour Time-Weighted Average (TWA)
  - Tuckpointing?
  - Saw-cutting concrete?
  - Equipment Operator?
  - Superintendent?





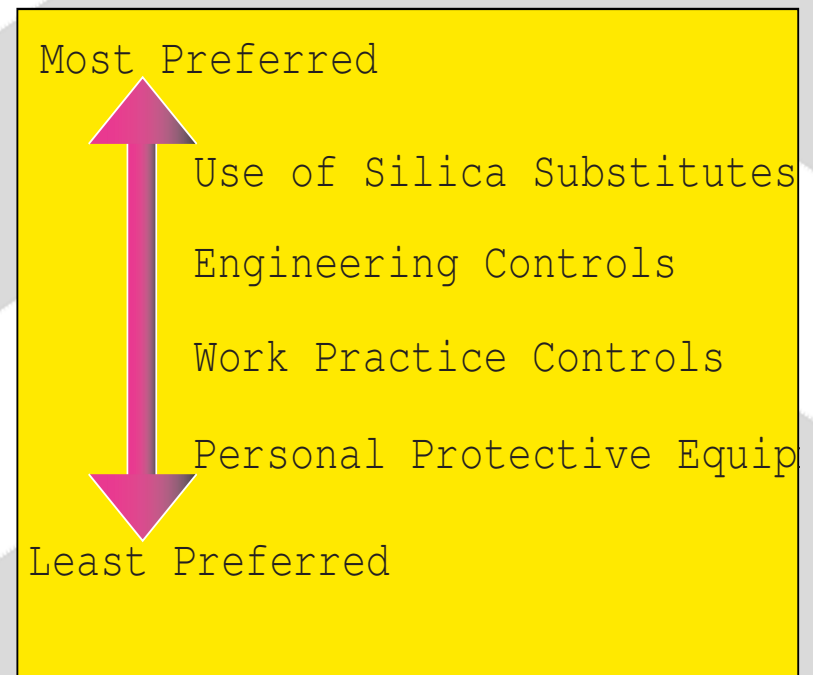
## b) Definitions

- **Competent Person** – “an individual who is capable of identifying existing and foreseeable RCS hazards **and** who has authorization to take prompt corrective measures to eliminate or minimize them”
- **Objective data** – “information, such as industry-wide surveys or calculations...the data must reflect workplace conditions closely resembling or w/higher exposure”



## c) Specified Exposure Control Methods

- OSHA established Table 1 (18 Tasks)
- Table 1 based on “**Hierarchy of Controls**” to force employers to use Engineering and Work Practice controls



## c) Specified Exposure Control Methods (Table 1)

If following Table 1, some requirements eliminated

Requirement	Must the Employer Follow this Requirement?	
	If Fully and Properly Implementing Table 1	If Following Alternative Exposure Controls
PEL	No	Yes
Exposure Assessment	No	Yes, when exposures are reasonably expected to be above the action level.
Methods of Compliance	No	Yes
Respiratory Protection	Yes, if respirator use is required by Table 1	Yes, if respirator use is required to reduce exposures to the PEL
Housekeeping	Yes	Yes
Written Exposure Control Plan	Yes	Yes
Medical surveillance	Yes, for employees who must wear a respirator under the silica standard for 30 or more days a year.	
Communication of Hazards	Yes	Yes
Recordkeeping	Yes, for any employees who are getting medical examinations	Yes, for exposure assessments and for any employees who are getting medical examinations

# Table 1 - Task 1 Stationary Masonry Saw

**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
(i) Stationary masonry saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None



**Without water control**




**With water control**

# Table 1 - Stationary Masonry Saw (and any Task where water is used)

- **“Full and proper implementation”** of water controls requires the employer ensure:
  1. Control was commercially developed specifically for the type of tool in use
  2. An adequate supply of water for dust suppression is used
  3. The spray nozzle is working properly to apply water at point of dust generation
  4. The spray nozzle is not clogged or damaged
  5. All hoses and connections are intact
- **If cutting indoors** (“structure w/roof and 3 walls”) additional ventilation needed



# Table 1 - Task 2 Handheld Power Saw

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)	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> <li>▪ When used outdoors.</li> <li>▪ When used indoors or in an enclosed area.</li> </ul>	None <b>APF 10</b>	 <small>(Half mask required)</small> <b>APF 10</b> <b>APF 10</b>



**Without water control**



**With water control**

**APF 10** = Half Mask/Filtering Facepiece Required

# Table 1 - Task 3 Handheld Power Saw (for cutting fiber-cement board)

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
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: <ul style="list-style-type: none"> <li>• Use saw equipped with commercially available dust collection system.</li> <li>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</li> <li>• Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</li> </ul>	None	None



**Without LEV**



**With LEV**

## Table 1 - Handheld Power Saw (for cutting fiber-cement board and Tasks using collection system)

“**Full and proper implementation**” of dust collection system requires employer ensure:

1. Control is commercially available dust collection system with filter having  $\geq 99\%$  efficiency;
2. Shroud or cowling is intact and installed according to manufacturer’s instructions;
3. Hose connecting tool to the vacuum is intact and without kinks or tight bends;
4. Filter(s) on the vacuum are cleaned or changed in accordance with manufacturer’s instructions to prevent clogging; and
5. The dust collection bags are emptied to avoid overfilling.





**Without LEV**



**With LEV**



# Table 1 - Task 4 Walk Behind Saw

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
(iv) Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> <li>When used outdoors.</li> <li>When used indoors or in an enclosed area.</li> </ul>	 <p>(Half mask required)</p> <p>None APF 10</p>	 <p>(Half mask required)</p> <p>None APF 10</p>



**Without water control**



**With water control**

# Table 1 - Task 5 Drivable Saw

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
(v) Drivable saws	<p>For tasks performed outdoors only:</p> <ul style="list-style-type: none"> <li>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</li> <li>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</li> </ul>	None	None



**Without water control**



**With water control**

# Table 1 - Task 6 Rig-Mounted Core Saws or Drills

**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
(vi) Rig-mounted core saws or drills	<ul style="list-style-type: none"> <li>Use tool equipped with integrated water delivery system that supplies water to cutting surface.</li> <li>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</li> </ul>	None	None



**With water control**





# Table 1 - Task 7 Handheld and Stand-Mounted Drills

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
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<ul style="list-style-type: none"> <li>Use drill equipped with commercially available shroud or cowling with dust collection system.</li> <li>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</li> <li>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</li> <li>Use a HEPA-filtered vacuum when cleaning holes.</li> </ul>	None	None



**With LEV**

# Table 1 - Task 8 Dowel Drilling Rigs

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
(viii) Dowel drilling rigs for concrete	<ul style="list-style-type: none"> <li>Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</li> <li>Use a HEPA-filtered vacuum when cleaning holes.</li> </ul>	<p>APF 10</p>   <p>(Half mask required)</p>	<p>APF 10</p>   <p>(Half mask required)</p>



**Without LEV**







**With LEV**

# Table 1 - Task 9 Vehicle-Mounted Drilling Rigs

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
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
	OR	None	None
	Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None



# Table 1 - Task 10 - Jackhammers and Handheld Powered Chipping Tools

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
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. <ul style="list-style-type: none"> <li>When used outdoors.</li> <li>When used indoors or in an enclosed area.</li> </ul> <p style="text-align: center;">OR</p> Use tool equipped with commercially available shroud and dust collection system. <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <ul style="list-style-type: none"> <li>When used outdoors.</li> <li>When used indoors or in an enclosed area.</li> </ul>	None APF 10	APF 10 APF 10
	  (Half mask required)	  (Half mask required)	None APF 10







**Without water control**



**With water control**

# Table 1 - Task 11 Handheld Grinders for Mortar Removal (i.e., Tuckpointing)

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
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	<p>Use grinder 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>	<p>APF 10</p>   <p>(Half mask required)</p>	<p><b>APF 25</b></p>  



Without LEV



With LEV



# Table 1 - Task 11 Handheld Grinders for Mortar Removal (i.e., Tuckpointing)

- CPWR Research Project
- Tuckpointing - Bosch 1775E grinder w/DustControl 2900c vacuum and Dust Director shroud (Price ~\$1,700)

Without LEV



With LEV

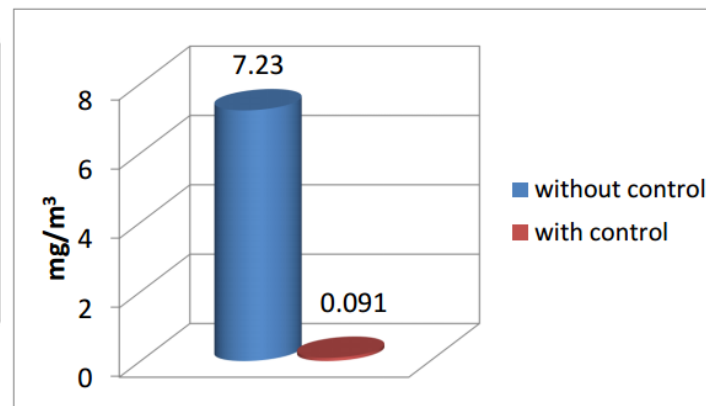


Table 2. Respirable Silica Exposures While Grinding Mortar<sup>A</sup>

	Mean, mg/m <sup>3</sup> (range)	Std. Dev.	Percent Reduction	Hazard Ratio <sup>B</sup>
<b>Bosch with Dust Director Shroud and DustControl 2900c Vacuum</b>	0.091 (<0.069 - 0.137)	0.027	98.7	1.81
<b>Bosch with no Control</b>	7.23 (4.57 - 9.90)	1.94	NA	145

<sup>A</sup> n = 5 samples with the use of the LEV system and n = 7 samples without the use of the LEV system

<sup>B</sup> Hazard Ratio = measured exposure/NIOSH REL of 0.05 mg/m<sup>3</sup>



# Table 1 - Task 12 Handheld Grinders for Uses Other than Mortar Removal

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
(xii) Handheld grinders for uses other than mortar removal	<p>For tasks performed outdoors only:</p> <p>Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p style="text-align: center;"><b>OR</b></p> <p>Use grinder 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"> <li>When used outdoors.</li> <li>When used indoors or in an enclosed area.</li> </ul>	None	None
		None	None



**Without LEV**



**With LEV**

# Table 1 - Task 13 Walk Behind Milling Machines

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
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.  Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
	OR  Use machine equipped with dust collection system recommended by the manufacturer.  Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.  Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.  When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None	None



**Without LEV**



**With LEV**

# Table 1 - Task 14 Small Drivable Milling Machines (<1/2 lane)



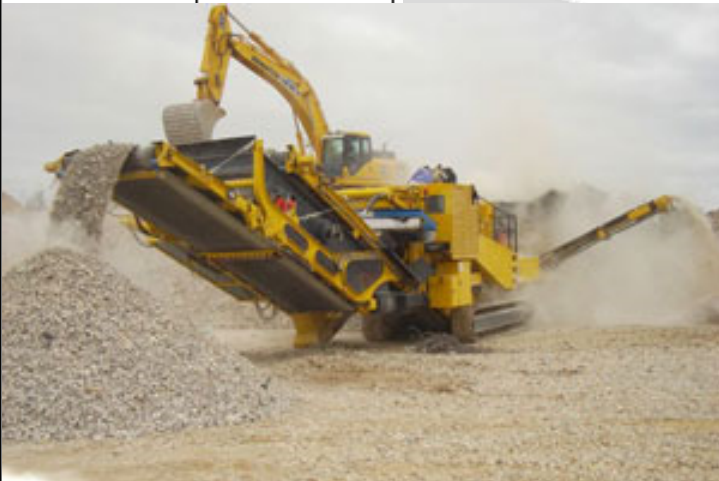
TABLE 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant.  Operate and maintain machine to minimize dust emissions.	None	None

# Table 1 - Task 15 Large Drivable Milling Machines (>1/2 lane)

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
(xv) Large drivable milling machines (half-lane and larger)	<p>For cuts of any depth on asphalt only:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None
	<p>For cuts of four inches in depth or less on any substrate:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p> <p style="text-align: center;">OR</p> <p>Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None

# Table 1 - Task 16 Crushing Machines

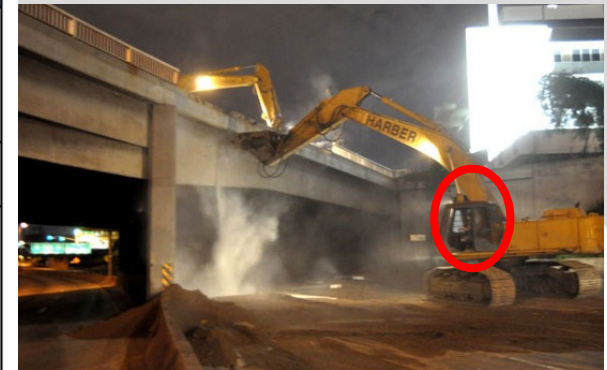
TABLE 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica			
Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
(xvi) Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).</p> <p>Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	None	None



# Table 1 - Task 17 Abrading or Fracturing Silica-Containing Materials

**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
(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	Operate equipment from within an enclosed cab.	None	None
	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None



**NOTE:** When the operator exits the enclosed cab and is no longer actively performing the task, the operator is considered to have stopped the task. However, if other abrading, fracturing, or demolition work is performed by other heavy equipment and utility vehicles in the area while an operator is outside the cab, that operator is considered to be an employee “engaged in the task” and must be protected by the application of water and/or dust suppressants.

# Table 1 - Task 18 Grading and Excavating Silica-Containing Materials

**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
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

**Must use water and/or dust suppressants as necessary to minimize dust emissions when:**

- equipment is not equipped with enclosed, pressurized cabs, or
- employees other than the operator are engaged in the task.





# Table 1 – Tasks 17 and 18

**If working from/in enclosed booth or cab, it must be...**

1. Free as practical of settled dust
2. Doors seals/closing mechanisms work
3. Gaskets and seals in good condition
4. Under positive pressure via delivered air
5. Intake air filtered and heated/AC



## d) Alternative Exposure Controls Methods

- “For tasks **not** listed in Table 1...” or if Table 1 cannot be met
- Exposure Assessment (i.e., employee monitoring) required where employees may “reasonably be expected to be exposed above the AL”
- New PEL (as an 8-hour TWA) applies



## d) New 8-Hour PEL

- **FORMER** OSHA PELs:

- *Approx. 0.10 mg/m<sup>3</sup> for general industry*
- *Approx. 0.25 mg/m<sup>3</sup> for construction and maritime*
- *Derived from a formula*
- *Adopted in 1971*

- **NEW** OSHA PEL: 0.05 mg/m<sup>3</sup> (or 50 µg/m<sup>3</sup>)

- *One limit for all industries and all forms of crystalline silica*
- *50% reduction of the general industry PEL*
- *80% reduction for construction and shipyards*

Distribution of 8-hr TWA PBZ Respirable Quartz Exposures of At-Risk Workers by Task - Construction Industry

Number of FTE At-Risk Workers (and percent of total) in Given Range

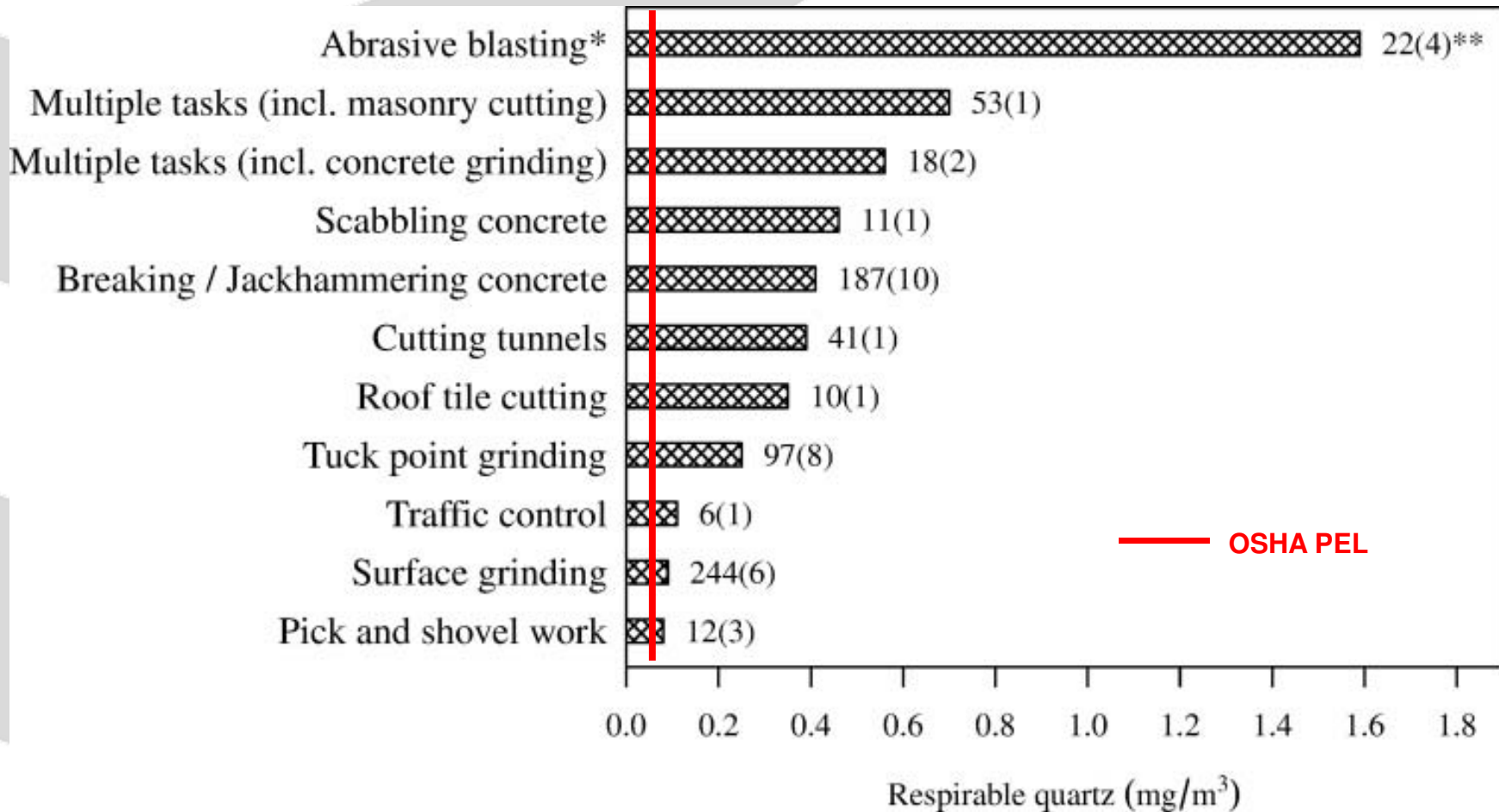
Task	<=25	>25	>50 to	>100 to	>250 to	>1000	Total Number	
	(µg/m³)	to <=50 (µg/m³)	<=100 (µg/m³)	<=250 (µg/m³)	<=1000 (µg/m³)	(µg/m³)		
Drywall Finishing	29,617 86.7%	2,278 6.7%	2,278 6.7%	0 0.0%	0 0.0%	0 0.0%	34,174 100.0%	7%
Earth Drilling	15,834 40.0%	3,958 10.0%	6,597 16.7%	7,917 20.0%	3,958 10.0%	1,319 3.3%	39,585 100.0%	50%
Grinding and Tuckpointing	1,997 4.7%	856 2.0%	4,564 10.8%	7,416 17.6%	15,118 35.8%	12,266 29.1%	42,217 100.0%	93%
Heavy Equipment Operator	196,011 79.2%	10,316 4.2%	20,633 8.3%	20,633 8.3%	0 0.0%	0 0.0%	247,593 100.0%	17%
Hole Drilling	3,613 22.2%	3,613 22.2%	7,226 44.4%	0 0.0%	1,806 11.1%	0 0.0%	16,258 100.0%	55%
Impact Drilling	3,941 13.0%	2,425 8.0%	5,153 17.0%	7,881 26.0%	8,791 29.0%	2,122 7.0%	30,312 100.0%	79%
Portable Masonry Saws	15,100 41.9%	3,897 10.8%	2,923 8.1%	8,768 24.3%	3,897 10.8%	1,461 4.1%	36,046 100.0%	47%
Stationary Masonry Saws	7,356 40.8%	1,471 8.2%	1,103 6.1%	5,517 30.6%	1,471 8.2%	1,103 6.1%	18,023 100.0%	52%
Milling	18,277 66.7%	0 0.0%	4,569 16.7%	0 0.0%	4,569 16.7%	0 0.0%	27,415 100.0%	34%
Rock Crushing	0 0.0%	0 0.0%	0 0.0%	105 20.0%	210 40.0%	210 40.0%	524 100.0%	100%
Underground Work	843 63.3%	222 16.7%	133 10.0%	89 6.7%	44 3.3%	0 0.0%	1,331 100.0%	20%
All Tasks	292,592 59.3%	29,037 5.9%	55,181 11.2%	58,327 11.8%	39,867 8.1%	18,482 3.7%	493,487 100.0%	35%

**Construction  
Tasks with  
Silica  
Exposures**

Source: ERG, 2008.

**OSHA PEL**

# Exposures by Task vs. PEL



# e) Respiratory Protection

## Respirator use...

- When following Table 1
- If not following Table 1, when worker monitoring indicates need
- Consistent w/1910.134
  - Written Respiratory Protection Program
  - Fit-testing
  - Medical Evaluation
  - Training



### Air-purifying respirators

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



Half mask Filtering Facepiece  
Dust mask  
APF=10  
*Needs to be fit tested*



Half mask Elastomeric Respirator  
APF=10  
*Needs to be fit tested*



Full Facepiece Elastomeric Respirator  
APF=50  
*Needs to be fit tested*

## f) Housekeeping

- Dry sweeping NOT permitted...unless no other options
  - **NOTE: OSHA now permits sweeping compounds as an acceptable option**
- Use of compressed air NOT permitted unless...
  - ✓ Used w/LEV
  - ✓ No other method available



# g) Written Exposure Control Plan

## Exposure Control Plan (ECP) includes...

- Descriptions of tasks w/exposure and controls used
- Description of housekeeping used
- Procedures for restricting access
- Provisions for **Competent Person** to “make frequent and regular inspections...”.
- Reviewed annually

**H**OLDER  
1

Respirable Crystalline Silica Control Procedures, 29 CFR 1926.1153  
HOLDER CONSTRUCTION COMPANY

CONTENTS	PAGE
SCOPE	1
PURPOSE	2
RESPONSIBILITY	2
DEFINITIONS	3
GUIDELINES	4
GENERAL INFORMATION	4
HEALTH HAZARDS	5
EXPOSURE ROUTE	6
MATERIAL / PRODUCT REVIEW	6
EXPOSURE LIMITS	6
EXPOSURE ASSESSMENT	6
RESPIRATORY PROTECTION	8
HOUSEKEEPING	9
METHODS OF COMPLIANCE	9
MEDICAL SURVEILLANCE	10
COMMUNICATION & TRAINING	12
RECORDKEEPING	13
TABLE 1 (SPECIFIED EXPOSURE CONTROL METHODS)	14
APPENDICES	
1 - Respirable Crystalline Silica requirement flowchart	20
1A - Requirement when using Table 1	21
1B - Objective data or air sampling results are less than Action Level (AL)	22
1C - Air sample results are at or above AL and less than PEL	23
1D - Air sample results are at or above PEL for less than 30 days/year	25
1E - Air sample results are at or above PEL for more than 30 days/year	26
2 - Written medical report for employee	28
3 - Written medical opinion for employee	29
4 - Authorization for crystalline silica opinion to employer	30
5 - RCS Exposure Control Plan template	31

**SCOPE**

The scope of this program shall apply to any Holder employee who may be exposed to respirable crystalline silica, except where employee exposure will remain below 25 micrograms per cubic meter of air as an 8-hour time-weighted average (TWA) under any foreseeable conditions. Guidelines and requirements contained within this program shall be closely followed and monitored to ensure that our employees are protected from respirable crystalline silica hazards.





## h) Medical Surveillance

- Required if respirator needed 30+ days/yr.
- Baseline required within 30 days
- Only results provided to employer (without additional authorization) are whether employee can/cannot wear a respirator



# Silica Medical Surveillance Cost Estimate

Physical Examination	\$50 - \$70
Pulmonary Function Test (PFT)	\$35 - \$40
B-Read Chest X-Ray	\$350 - \$370
Tuberculosis Test (TB Test, PPD, Mantoux OR Blood Work)	\$25 - \$30 \$120-150
<p>The following may be administered prior to the above provided that documentation is maintained as part of the medical surveillance file:</p>	
Respiratory Medical Questionnaire	\$14 - \$20
	\$10 - \$20
Respiratory Fit Test	\$60 - \$75
<b>Total Estimated Costs</b>	<b>~\$484 - \$550</b>

# i) Communication of Hazards

- Training provided under Company's Hazard Communication Program
- Each employee can demonstrate knowledge and understanding of at least...
  1. Health hazards of silica;
  2. Specific tasks that could result in exposure;
  3. Specific measures implemented to protect employees;
  4. Contents of the OSHA standard;
  5. Identity of the Competent Person
  6. The purpose and description of the medical surveillance program

<b>Health Hazard</b>  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	<b>Flame</b>  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	<b>Exclamation Mark</b>  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
<b>Gas Cylinder</b>  • Gases Under Pressure	<b>Corrosion</b>  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	<b>Exploding Bomb</b>  • Explosives • Self-Reactives • Organic Peroxides
<b>Flame Over Circle</b>  • Oxidizers	<b>Environment (Non-Mandatory)</b>  • Aquatic Toxicity	<b>Skull and Crossbones</b>  • Acute Toxicity (fatal or toxic)

The background of the slide features several horizontal, wavy bands of a light grey color, creating a layered, wave-like effect. The bands are separated by white space and curve gently across the width of the slide.

# **Overview of OSHA General Industry Standard**

# OSHA's "Respirable Crystalline Silica" Standard

## Similar in format to Construction Standard...

- a) Scope/Application
- b) Definitions
- c) **PEL**
- d) Exposure Assessment
- e) **Regulated Areas**
- f) Methods of Compliance
- g) Respiratory Protection
- h) Housekeeping
- i) Medical Surveillance
- j) Communication of silica hazards to employees
- k) Recordkeeping
- l) Dates



# a) Scope/Application

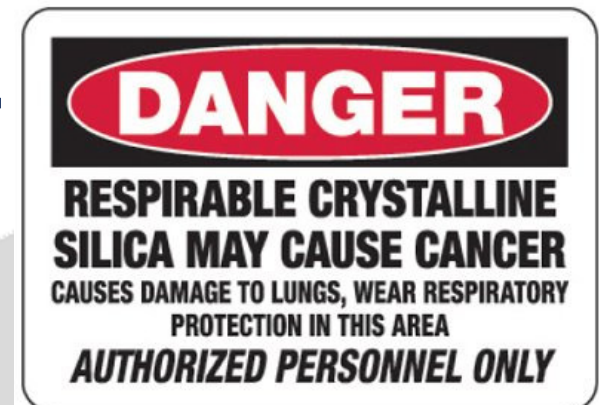
## The standard applies to...

- “...all occupational exposures to respirable crystalline silica except in:
  - construction work,
  - Agricultural work, and
  - processing of sorptive clays (e.g., kitty litter)...”
- Std. does NOT apply if worker exposure < AL ( $25 \mu\text{g}/\text{m}^3$  as 8-hour TWA) “**under any foreseeable conditions**”



## b) Definitions

- **Objective data** – “information, such as industry-wide surveys or calculations...the data must reflect workplace conditions closely resembling or w/higher exposure”
- **Regulated Area** – “an area demarcated by the employer...exposure to RCS can reasonably be expected to exceed PEL”



## c) PEL and d) Exposure Assessment

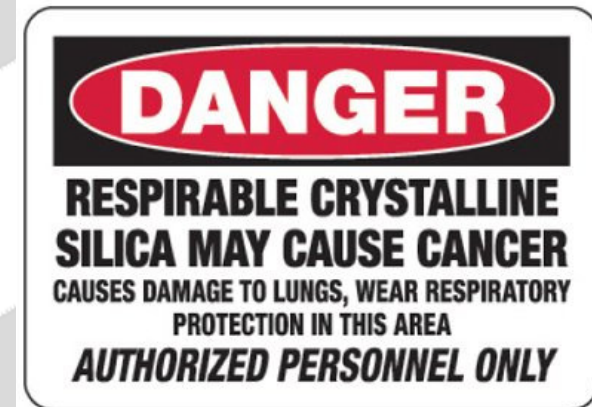
- PEL - No exposures **>50  $\mu\text{g}/\text{m}^3$  as 8-hour TWA**
- Assess each employee “who is or may reasonably be expected to be” exposed to RCS above AL
  - Provisions for re-assessment as a function of concentrations detected





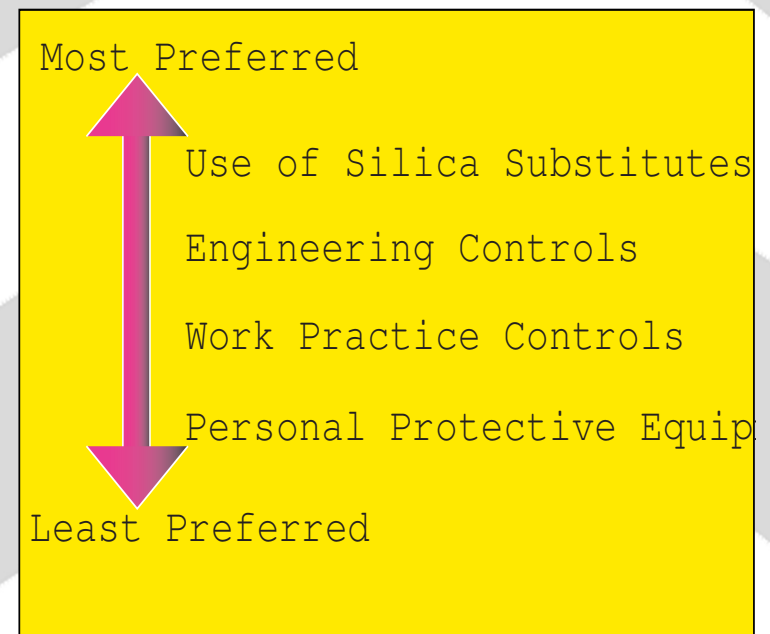
## e) Regulated Areas

- **Establishment** - “an area demarcated by the employer...exposure to RCS can reasonably be expected to exceed PEL”
- **Demarcation** – “in a manner that minimizes the no. of employees exposed”
- **Access** – “limit access...to persons authorized by employer, designated reps. and OSHA”



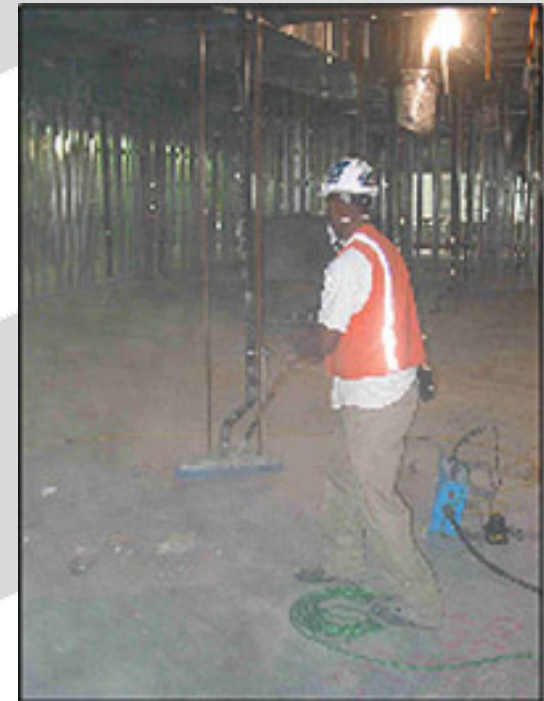
## f) Methods of Compliance

- Based on “**Hierarchy of Controls**” to use feasible Engineering and Work Practice controls
- **Written ECP**
  - Same elements as **Construction ECP** minus provisions for **Competent Person**



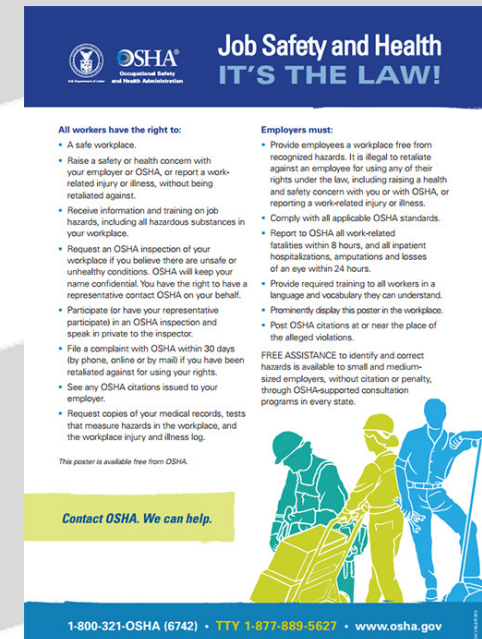
## **g) Respiratory Protection and h) Housekeeping**

- **Respiratory Protection... consistent w/1910.134**
- **Housekeeping...**
  - **Dry sweeping NOT permitted...unless no other options**
  - **Use of compressed air NOT permitted unless...**
    - ✓ **Used w/LEV**
    - ✓ **No other method available**



## h) Medical Surveillance

- Required if worker exposed for 30+ days/yr.:
  - $\geq$  PEL (effective June 2018)
  - $\geq$  AL (effective June 2020)
- Baseline required within 30 days
- Only results provided to employer (without additional authorization) are limitations on respirator use **and/or** limitations on exposure to RCS



**OSHA**  
Occupational Safety and Health Administration

**Job Safety and Health  
IT'S THE LAW!**

**All workers have the right to:**

- A safe workplace.
- Raise a safety or health concern with your employer or OSHA, or report a work-related injury or illness, without being retaliated against.
- Receive information and training on job hazards, including all hazardous substances in your workplace.
- Request an OSHA inspection of your workplace if you believe there are unsafe or unhealthy conditions. OSHA will keep your name confidential. You have the right to have a representative contact OSHA on your behalf.
- Participate or have your representative participate in an OSHA inspection and speak in private to the inspector.
- File a complaint with OSHA within 30 days (by phone, online or by mail) if you have been retaliated against for using your rights.
- See any OSHA citations issued to your employer.
- Request copies of your medical records, tests that measure hazards in the workplace, and the workplace injury and illness log.

This poster is available free from OSHA.


**Employers must:**

- Provide employees a workplace free from recognized hazards. It is illegal to retaliate against an employee for using any of their rights under the law, including raising a health and safety concern with you or with OSHA, or reporting a work-related injury or illness.
- Comply with all applicable OSHA standards.
- Report to OSHA all work-related fatalities within 8 hours, and all inpatient hospitalizations, amputations and losses of an eye within 24 hours.
- Provide required training to all workers in a language and vocabulary they can understand.
- Prominently display this poster in the workplace.
- Post OSHA citations at or near the place of the alleged violations.

**FREE ASSISTANCE** to identify and correct hazards is available to small and medium-sized employers, without citation or penalty, through OSHA-supported consultation programs in every state.

**Contact OSHA. We can help.**

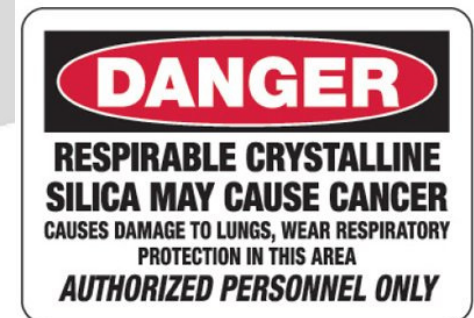
1-800-321-OSHA (6742) • TTY 1-877-889-5627 • www.osha.gov



# j) Communication of Hazards

- Training provided under Company's Hazard Communication Program
- Signs – discussed under e) Regulated Areas
- Each employee can demonstrate knowledge and understanding of at least...
  1. Health hazards of silica;
  2. Specific tasks that could result in exposure;
  3. Specific measures implemented to protect employees;
  4. Contents of the OSHA standard;
  5. The purpose and description of the medical surveillance program

<b>Health Hazard</b>  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	<b>Flame</b>  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	<b>Exclamation Mark</b>  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
<b>Gas Cylinder</b>  • Gases Under Pressure	<b>Corrosion</b>  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	<b>Expanding Bomb</b>  • Explosives • Self-Reactives • Organic Peroxides
<b>Flame Over Circle</b>  • Oxidizers	<b>Environment (Non-Mandatory)</b>  • Aquatic Toxicity	<b>Skull and Crossbones</b>  • Acute Toxicity (fatal or toxic)



# OSHA's Silica Standard

## Applicable Dates

- “**Construction** employers were required to comply by **June 23, 2017**” – **Enforcement effective Sept. 23, 2017**
- “**General Industry** comply w/all except AL trigger for medical surveillance by **June 23, 2018**”



**Job Safety and Health**  
**It's the law!**

**OSHA**  
Occupational Safety and Health Administration  
U.S. Department of Labor

**EMPLOYEES:**

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the OSH Act that apply to your own actions and conduct on the job.

**EMPLOYERS:**

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the OSH Act.

This free poster available from OSHA - The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers without charge or penalty through OSHA-approved consultation programs in each state.

1-800-321-OSHA  
www.osha.gov  
OSHA-1000

# Thank You!

[dkubeldis@americasafegroup.com](mailto:dkubeldis@americasafegroup.com)