



May 1, 2019  
2:00 to 3:00

# Silica, So what has OSHA been finding?

*Dale Glacken,  
Compliance Assistance Specialist  
Harrisburg Area Office*

**Remember: If it's silica,  
it's not just dust.**



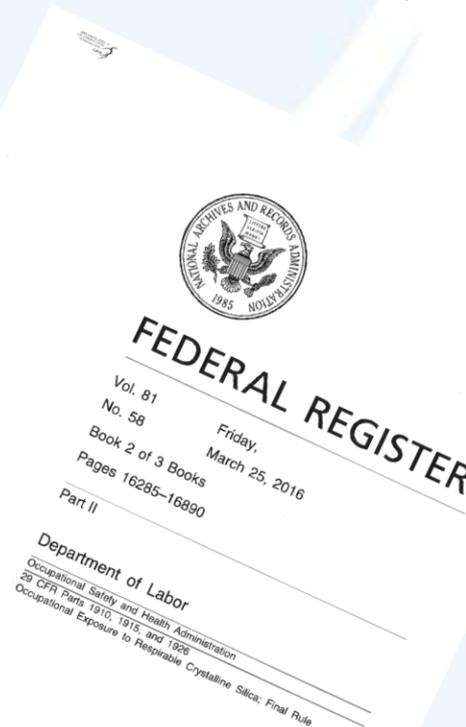
## CAS Material Developed & Distributed

This information has been developed by an OSHA Compliance Assistance Specialist and is intended to assist employers, workers, and others as they strive to improve workplace health and safety. While we attempt to thoroughly address specific topics **[or hazards]**, it is not possible to include discussion of everything necessary to ensure a healthy and safe working environment in a presentation of this nature. Thus, this information must be understood as a tool for addressing workplace hazards, rather than an exhaustive statement of an employer's legal obligations, which are defined by statute, regulations, and standards. Likewise, to the extent that this information references practices or procedures that may enhance health or safety, but which are not required by a statute, regulation, or standard, it cannot, and does not, create additional legal obligations. Finally, over time, OSHA may modify rules and interpretations in light of new technology, information, or circumstances; to keep apprised of such developments, or to review information on a wide range of occupational safety and health topics, you can visit OSHA's website at [www.osha.gov](http://www.osha.gov).

# OSHA Update:

1. Review where we are at/what has been found
2. The standard in response to the findings
3. Other areas of concern
4. Provide up to date resources.
5. Revisit the recipe
6. Q&A

# Final Rule Published on March 25, 2016



<b>Const Standard</b>		<b>Total Vio(s)</b>	<b>Ser Vio(s)</b>	<b>Othr Vio(s)</b>	<b>Init. Penalty</b>
1926.1153(d)(2)	Exposure Assessment	162	135	27	\$167,301
1926.1153(c)(1)	Fully implement Table 1, unless	159	140	19	\$559,038
1926.1153(g)(1)	Written Exposure Control Plan	129	108	21	\$235,407
1926.1153(i)(1)	Hazard Communication includes silica, labels, SDS and training on health hazards	58	52	6	\$74,132
1926.1153(i)(2)	Employees demonstrate knowledge and understanding of: training	46	39	7	\$70,444
1926.1153(g)(4)	Designate a Competent person, inspections	21	19	2	\$8,316
1926.1153(e)(2)	Written Respiratory Program	20	17	3	\$33,247

<b>Const Standard</b>		<b>Total Vio(s)</b>	<b>Ser Vio(s)</b>	<b>Othr Vio(s)</b>	<b>Init. Penalty</b>
1926.1153(d)(1)	Exposure in excess of 50 ug/m3	15	15	0	\$23,653
1926.1153(e)(1)	Respiratory Protection	15	15	0	\$10,163
1926.1153(h)(1)	Medical Surveillance available at no cost	10	8	2	\$18,477
1926.1153(f)(1)	Not allow dry sweeping or brushing,,, not feasible	7	6	1	\$19,310
1926.1153(d)(3)	Methods of Control (Eng/WP)	5	4	1	\$10,975
1926.1153(c)(2)	Controls for Table 1	4	1	3	\$2,217
1926.1153(h)(2)	Initial medical examination made available within 30 days	4	4	0	\$12,195
1926.1153(g)(3)	Exposure Control Plan readily available for examination to: EE, Rep, DOL	3	2	1	\$2,772
1926.1153(f)(2)	Not allow compressed	2	2	0	\$0

<u>GI Standard</u>	<u>Standard</u>	<u>Total Vio(s)</u>	<u>Ser Vio(s)</u>	<u>Init. Penalty</u>
<u>1910.1053(c)</u>	<u>Exposure above 50 mg/m3</u>	<u>7</u>	<u>7</u>	<u>\$43,831</u>
<u>1910.1053(d)(1)</u>	<u>Exposure assessment above</u>	<u>14</u>	<u>9</u>	<u>\$47,478</u>
<u>1910.1053(d)(3)</u>	<u>Employer shall perform</u>	<u>7</u>	<u>2</u>	<u>\$6,467</u>
	<u>Scheduled Monitoring Option</u>			
<u>1910.1053(d)(4)</u>	<u>Reassessment of Exposures</u>	<u>1</u>	<u>0</u>	<u>\$0</u>
	<u>when a change in</u>			
<u>1910.1053(d)(6)</u>	<u>Employee notification of</u>	<u>2</u>	<u>2</u>	<u>\$0</u>
	<u>assessment results</u>			
<u>1910.1053(e)(1)</u>	<u>Establishment of regulated</u>	<u>5</u>	<u>5</u>	<u>\$13,444</u>
	<u>areas</u>			
<u>1910.1053(e)(2)</u>	<u>Demarcation of regulated areas</u>	<u>4</u>	<u>2</u>	<u>\$0</u>
<u>1910.1053(f)</u>	<u>Methods of compliance,</u>	<u>1</u>	<u>1</u>	<u>\$0</u>
	<u>Engineering and Work Practices</u>			
	<u>to reduce</u>			
<u>1910.1053(f)(1)</u>	<u>Methods of compliance,</u>	<u>7</u>	<u>7</u>	<u>\$4,268</u>
	<u>Engineering and Work Practices</u>			
	<u>to reduce</u>			
<u>1910.1053(f)(2)</u>	<u>Written Exposure Control Plans,</u>	<u>12</u>	<u>7</u>	<u>\$8,146</u>
	<u>establish</u>			
<u>1910.1053(g)(1)</u>	<u>General Respiratory Protection</u>	<u>2</u>	<u>2</u>	<u>\$3,880</u>
	<u>Program Efforts</u>			

<u>GI Standard</u>	<u>Standard</u>	<u>Total Vio(s)</u>	<u>Ser Vio(s)</u>	<u>Init. Penalty</u>
<u>1910.1053(g)(2)</u>	<u>General Respiratory Protection Program</u>	<u>3</u>	<u>3</u>	<u>\$14,836</u>
<u>1910.1053(h)(1)</u>	<u>Housekeeping, not allow dry sweeping, unless</u>	<u>1</u>	<u>1</u>	<u>\$2,273</u>
<u>1910.1053(i)(1)</u>	<u>Medical Surveillance available within 30 days of initial assignment</u>	<u>5</u>	<u>5</u>	<u>\$15,673</u>
<u>1910.1053(i)(2)</u>	<u>Initial examination available within 30 after initial assignment.</u>	<u>1</u>	<u>1</u>	<u>\$0</u>
<u>1910.1053(j)(1)</u>	<u>Hazard Communication includes silica, labels, SDS and training on health hazards</u>	<u>8</u>	<u>7</u>	<u>\$18,123</u>
<u>1910.1053(j)(2)</u>	<u>HCS, signs at entrances to regulated areas.</u>	<u>3</u>	<u>2</u>	<u>\$0</u>
<u>1910.1053(j)(3)</u>	<u>Employee notification and training, demonstrate knowledge and understanding</u>	<u>8</u>	<u>3</u>	<u>\$353</u>
<u>1910.1053(k)(1)</u>	<u>Records of air monitoring data</u>	<u>2</u>	<u>0</u>	<u>\$0</u>

# Most Important Reason for the Rule

- ❖ Current PELs do not adequately protect workers
- ❖ Extensive epidemiologic evidence that lung cancer and silicosis occur at exposure levels below  $100 \mu\text{g}/\text{m}^3$

# Exposure and Health Risks

Exposure to respirable crystalline silica has been linked to:

- ❖ Silicosis;
- ❖ Lung cancer;
- ❖ Chronic Obstructive Pulmonary Disease (COPD); and
- ❖ Kidney disease
- ❖ Immune system effects



Healthy Lung



Silicotic Lung

# What are the hazards of crystalline silica?

- Fatalities and disabling illnesses
- Classified as a human lung carcinogen.
- An inhalation hazard. The respirable silica dust enters the lungs and causes the formation of scar tissue, thus reducing the lungs' ability to take in oxygen.
- There is no cure for silicosis.
- Silicosis affects lung function, it makes one more susceptible to lung infections like **tuberculosis**.
- In addition, smoking causes lung damage and adds to the damage caused by breathing silica dust.

# What are the Symptoms of Silicosis?

## What are the symptoms of silicosis?

- Silicosis is classified into three types:  
chronic/classic, accelerated, and acute.

### **Chronic/classic silicosis,**

- The most common, occurs after 15–20 years of moderate to low exposures to respirable crystalline silica.
- Symptoms associated with chronic silicosis may or may not be obvious; therefore, workers need to have a chest x-ray to determine if there is lung damage.
- As the disease progresses, the worker may experience shortness of breath upon exercising and have clinical signs of poor oxygen/carbon dioxide exchange.
- In the later stages, the worker may experience fatigue, extreme shortness of breath, chest pain, or respiratory failure.

# What are the Symptoms of Silicosis?

## **Accelerated silicosis**

- Can occur after 5–10 years of high exposures to respirable crystalline silica.
- Symptoms include severe shortness of breath, weakness, and weight loss.
- The onset of symptoms takes longer than in acute silicosis.

## **Acute silicosis**

- Occurs after a few months or as long as 2 years following exposures to extremely high concentrations of respirable crystalline silica.
- Symptoms of acute silicosis include severe disabling shortness of breath, weakness, and weight loss, which often leads to death.

# What Are the Symptoms of Lung Cancer?

In its early stages, [lung cancer](#) normally has no symptoms. When symptoms start to appear, they are usually caused by blocked breathing passages or the spread of [cancer](#) further into the [lung](#), surrounding structures, other parts of the body.

[Lung cancer symptoms](#) may include:

- Chronic, hacking, raspy [coughing](#), sometimes with [blood](#)-streaked mucus
- Recurring respiratory infections, including [bronchitis](#) or [pneumonia](#)
- Increasing shortness of breath, [wheezing](#), persistent [chest pain](#)
- Hoarseness
- Swelling of the neck and face
- Pain and [weakness](#) in the [shoulder](#), arm, or hand
- [Fatigue](#), weakness, loss of [weight](#) and appetite, intermittent fever, severe [headaches](#), and body pain
- Difficulty swallowing

# Chronic Obstructive Pulmonary Disease (COPD)

- COPD describes chronic airflow limitation that is usually irreversible.
- COPD includes four interrelated disease processes: chronic bronchitis, emphysema, (asthma), and peripheral airways disease.
- Cigarette smoking is a major cause of COPD, but community air pollution and occupational exposure to dust, particularly among smokers, also contribute to COPD.

# Chronic Obstructive Pulmonary Disease (COPD)

## Symptoms:

- You have a [cough](#) that won't go away.
- You often [cough](#) up [mucus](#).
- You are often short of breath, especially when you [exercise](#).
- You may feel tightness in your chest.

***NIOSH HAZARD REVIEW***

**Health Effects of Occupational  
Exposure to Respirable  
Crystalline Silica**

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health

April 2002



<http://www.cdc.gov/niosh/docs/2002-129/pdfs/2002-129.pdf>

## Silica Exposure

Silica is a common substance found in sand, rock, and building materials such as concrete and brick. Cutting, grinding, or drilling these materials releases dangerous crystalline silica dust into the air. This video shows how breathing in silica dust can cause permanent damage to the lungs.



Download MP4

Also available in: ਪੰਜਾਬੀ, 한국어, 中文(繁體), 中文(简体), Tiếng Việt, Español

Publication Date: Jul 2010

File type: MP4 (51 MB)

Asset type: Video

Order: DVD157

Share a link

Available from the WorkSafeBC Store

<https://www.worksafebc.com/en/resources/health-safety/videos/silica-exposure?lang=en>

# Health Benefits

OSHA estimates that once the effects of the rule are fully realized, it will prevent:

- ❖ More than 600 deaths per year
  - Lung cancer: 124
  - Silicosis and other non-cancer lung diseases: 325
  - End-stage kidney disease: 193
- ❖ More than 900 new silicosis cases per year

# Scope of Coverage

- ❖ Three forms of silica: quartz, cristobalite and tridymite
- ❖ Exposures from chipping, cutting, sawing, drilling, grinding, sanding, and crushing of concrete, brick, block, rock, and stone products (such as in construction operations)
- ❖ Exposures from using sand products (such as glass manufacturing, foundries, and sand blasting)



# Industries and Operations with Exposures

- Construction
- Glass manufacturing
- Pottery products
- Structural clay products
- Concrete products
- Foundries
- Dental laboratories
- Paintings and coatings
- Jewelry production
- Refractory products
- Asphalt products
- Landscaping
- Ready-mix concrete
- Cut stone and stone products
- Abrasive blasting in:
  - Maritime work
  - Construction
  - General industry
- Refractory furnace installation and repair
- Railroads
- Hydraulic fracturing for gas and oil

# Workers and Industries Affected

- ❖ 2.3 million workers:
  - Construction: 2 million
  - GI/Maritime: 300,000
- ❖ 676,000 establishments
  - Construction: 600,000
  - GI/Maritime: 76,000

# Silica



Look at 3 rules:

- ❖ Silica standard
- ❖ Respiratory Protection standard
- ❖ Hazard Communication standard

# Respirable Crystalline Silica Rule

- ❖ Two standards:
  - One for general industry and maritime
  - One for construction
- ❖ Similar to other OSHA health standards and ASTM consensus standards

# General Industry/Maritime Standard: §1910.1053 Respirable crystalline silica

- a) Scope
- b) Definitions
- c) Permissible exposure limit (PEL)
- d) Exposure assessment
- e) Regulated areas
- f) Methods of compliance
  - 1) Engineering and work practice controls
  - 2) Written exposure control plan
- g) Respiratory protection
- h) Housekeeping
- i) Medical surveillance
- j) Communication of silica hazards
- k) Recordkeeping
- l) Dates

# Construction:

## §1926.1153 Respirable crystalline silica.

- a) Scope
- b) Definitions
- c) **Specified exposure control methods**  
**OR**
- d) **Alternative exposure control methods**
  - 1) **PEL**
  - 2) **Exposure Assessment**
  - 3) **Methods of Compliance**
- e) Respiratory protection
- f) Housekeeping
- g) Written exposure control plan
- h) Medical surveillance
- i) Communication of silica hazards
- j) Recordkeeping
- k) Dates

# Silica Recipe



- ❖ Complete an inventory of silica operations
- ❖ Perform an assessment of each
- ❖ Establish controls (engineering and work procedures)
- ❖ PPE (respiratory protection)
- ❖ Housekeeping
- ❖ Create a written exposure control plan
- ❖ Communicate/Train the workers, include the work plan
- ❖ Medical surveillance
- ❖ Recordkeeping
- ❖ Review

## - Scope

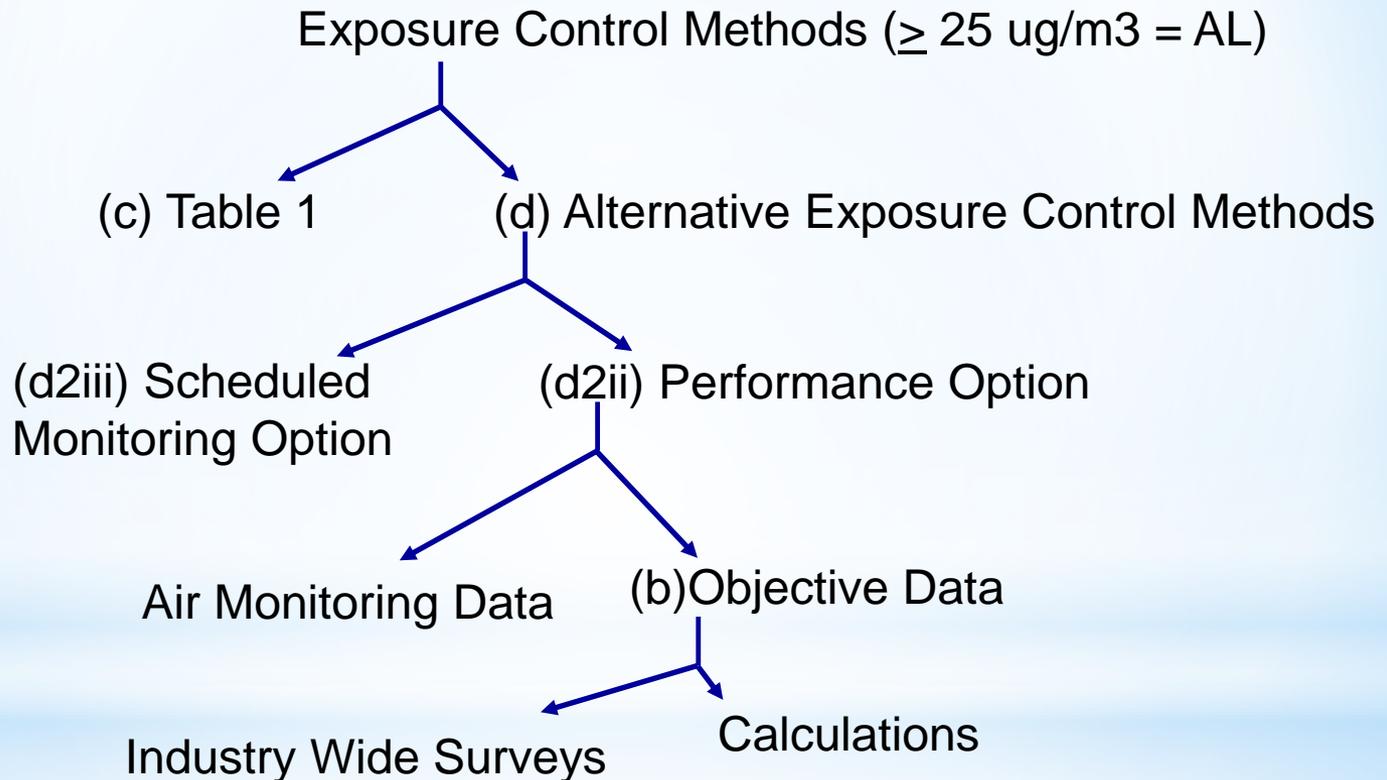
- ❖ All occupational exposures to respirable crystalline silica are covered, unless employee exposure will remain below  $25 \mu\text{g}/\text{m}^3$  as an 8-hr TWA under any foreseeable conditions.

# Permissible Exposure Limit (PEL)

- ❖ PEL = 50  $\mu\text{g}/\text{m}^3$  as an 8-Hour TWA
- ❖ Action Level = 25  $\mu\text{g}/\text{m}^3$  as an 8-Hour TWA

# Silica Decision Tree

## (Construction)



# Construction - (c) Specified Exposure Control Methods

- ❖ Table 1 in the construction standard matches 18 tasks with effective dust control methods and, in some cases, respirator requirements.
- ❖ Employers that fully and properly implement controls on Table 1 do not have to:
  - Comply with the PEL
  - Conduct exposure assessments for employees engaged in those tasks

# Construction - Example of Table 1

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
Hand-held power saw (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 manufacturers' instruction to minimize dust</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

# Example of Table 1 Entry

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
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

# Example of Table 1 Entry

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
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
	<p>OR</p> <p>Operate from within an enclosed cab and use water for dust suppression on drill bit.</p>	None	None

# Example of Table 1 Entry

**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>	APF 10	APF 25

# TABLE 1 – ASSIGNED PROTECTION FACTORS<sup>5</sup>

Respirator Type <sup>1, 2</sup>	Quarter Mask	Half Mask	Full Face	Helmet/Hood	Loose-Fitting
Air Purifying	5	310	50	-----	-----
PAPR	----- --	50	1,000	<sup>4</sup> 25/1,000	25
SAR					
▪ Demand	-----	10	50	-----	-----
▪ Continuous Flow	--	50	1,000	<sup>4</sup> 25/1,000	--
▪ Pressure Demand/other (+) pressure	----- -- ----- --	50	1,000	-----	25 ----- --
SCBA					
▪ Demand	-----	10	50	50	-----
▪ Pressure Demand/other (+) pressure	-- ----- --	----- --	10,000	10,000	----- ----- ----

# NOTES TO TABLE 1 – ASSIGNED PROTECTION FACTORS<sup>5</sup>

- <sup>1</sup>May use respirators assigned for higher concentrations in lower concentrations or when required use is independent of concentration.
- <sup>2</sup>These APF's are only effective when employer has a continuing, effective respirator program per 1910.134.
- <sup>3</sup>This APF category includes filtering facepieces and elastomeric facepieces.
- <sup>4</sup>Must have manufacturer test evidence to support an APF of 1,000 or else these respirators receive an APF of 25.
- <sup>5</sup>These APFs do not apply to escape-only respirators. Escape respirators must conform to 1910.134(d)(2)(ii) or OSHA's substance specific standards, if used with those substances.
- {1910.134(d)(3)(i)(A)}

# Construction - List of Table 1 Entries

- Stationary masonry saws
- Handheld power saws
- Handheld power saws for fiber cement board
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld and stand-mounted drills
- Dowel drilling rigs for concrete
- Vehicle-mounted drilling rigs for rock and concrete
- Jackhammers and handheld powered chipping tools
- Handheld grinders for mortar removal (tuckpointing)
- Handheld grinders for other than mortar removal
- Walk-behind milling machines and floor grinders
- Small drivable milling machines
- Large drivable milling machines
- Crushing machines
- Heavy equipment and utility vehicles to abrade or fracture silica materials
- Heavy equipment and utility vehicles for grading and excavating

# Fully and Properly Implementing Controls Specified on Table 1

- ❖ Presence of controls is not sufficient.
- ❖ Employers are required to ensure that:
  - Controls are present and maintained
  - Employees understand the proper use of those controls and use them accordingly

# Employees Engaged in Table 1 Tasks

- ❖ Employees are “engaged in the task” when operating the listed equipment, assisting with the task, or have some responsibility for the completion of the task
- ❖ Employees are not “engaged in the task” if they are only in the vicinity of a task

# Respiratory Protection Requirements on Table 1

- ❖ Respirators required where exposures above the PEL are likely to persist despite full and proper implementation of the specified engineering and work practice controls
- ❖ Where respirators required, must be used by all employees engaged in the task for entire duration of the task
- ❖ Provisions specify how to determine when respirators are required for an employee engaged in more than one task

# (d) Alternative Exposure Control Methods - Exposure Assessment

Employers must:

- Determine exposures

**Why perform an Exposure Assessment?**



# Exposure Assessment

- ❖ Required if exposures are or may reasonably be expected to be at or above action level of  $25 \mu\text{g}/\text{m}^3$
- ❖ Exposures assessments can be done following:
  - The performance option
  - The scheduled monitoring option

# Performance Option

- ❖ Exposures assessed using any combination of air monitoring data or objective data sufficient to accurately characterize employee exposure to respirable crystalline silica

# Objective Data

- ❖ Includes air monitoring data from industry-wide surveys or calculations based on the composition of a substance.
- ❖ It demonstrates employee exposure associated with a particular product or material or a specific process, task, or activity.
- ❖ Must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

# Examples of Using Objective Data to Conduct Exposure Assessments under the Performance Option

1. **Industry-wide surveys** of typical tasks or operations, which include well-documented procedures for measuring exposures and methods for controlling dust, could be used by employers to characterize employee exposures where employees perform tasks consistent with those described in the survey.
2. Employers can use **direct-reading instruments** to measure real-time levels of respirable dust in the air. If the employer has information on the percentage of respirable crystalline silica in that dust (for example, from the analysis of a bulk sample or information from a safety data sheet), he or she can then calculate the level of respirable crystalline silica in air.
3. **Historical data**, which are monitoring results collected at any time before the effective date of the standard, could be used to assess employee exposures if the employer can show that the **data were collected during work operations and conditions that are consistent with the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.**

# Scheduled Monitoring Option

- ❖ Prescribes a schedule for performing initial and periodic personal monitoring
- ❖ If monitoring indicates:
  - Initial below the AL: no additional monitoring
  - Most recent at or above the AL: repeat within 6 months
  - Most recent above the PEL: repeat within 3 months
  - Reassessment: When two consecutive non-initial results, taken 7 or more days apart, are below the AL, monitoring can be discontinued
  - Reassess if circumstances change

# Appendix A - Methods of Sample Analysis

- ❖ Employers must ensure that samples are analyzed by a laboratory that follows the procedures in Appendix A
- ❖ Appendix A specifies methods of sample analysis
  - Allows for use of OSHA, NIOSH, or MSHA methods
  - Analysis must be conducted by accredited laboratories that follow specified quality control procedures

# Sampling Options

- ❖ Perform yourself and send for analysis:
  - ❖ Own equipment
  - ❖ Rent equipment
- ❖ Consultant
- ❖ Insurance carrier
- ❖ PA Consultation

# Methods of Compliance - Hierarchy of Controls

- ❖ Employers can use any **engineering or work practice controls** to limit exposures to the PEL
- ❖ Respirators permitted where PEL cannot be achieved with engineering and work practice controls

# Engineering Controls

Grinding stone  
without engineering controls



Polishing stone using water to  
control the dust

# Engineering Controls

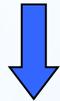
Grinding without engineering controls



Grinding using a vacuum dust collector

# Engineering Controls (cont.)

Jackhammer use without engineering controls



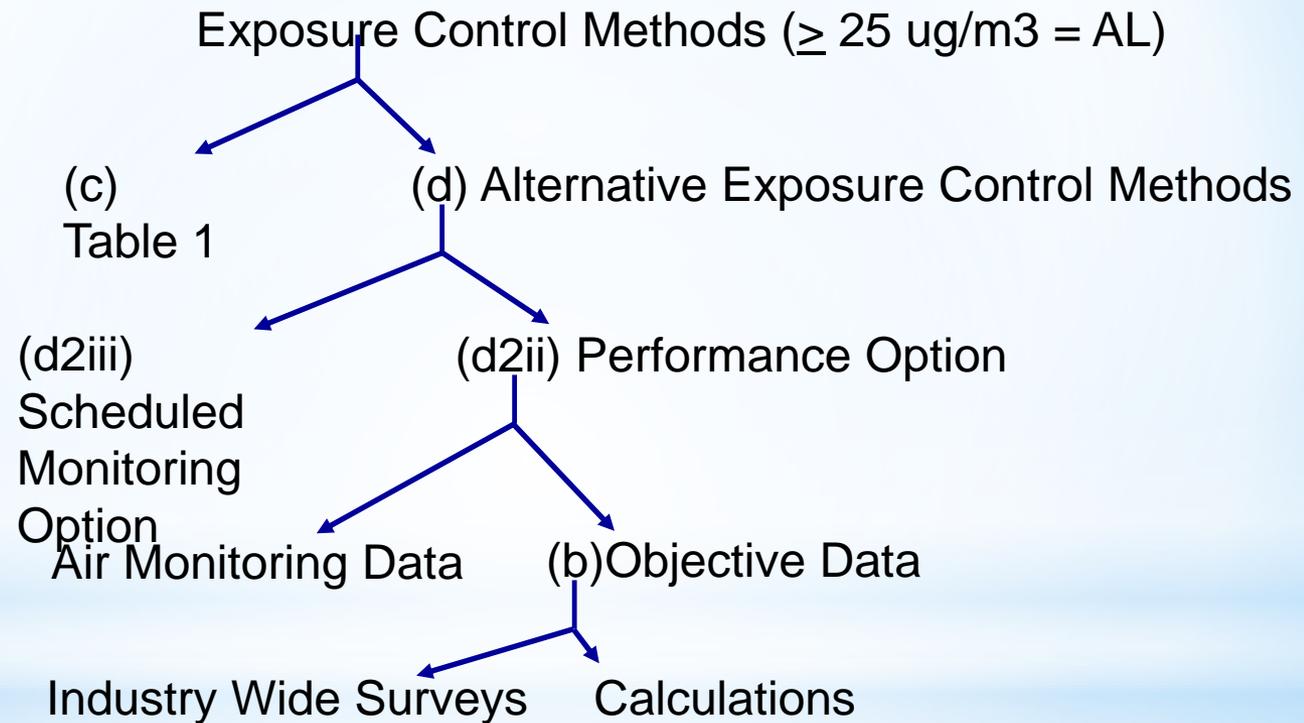
Jackhammer use with water spray to control dust

# Work Practice Controls

- ❖ Work Practices, how the work is done.
- ❖ Inspecting and maintaining controls to prevent or fix malfunctions that would result in increased exposures;
- ❖ Making sure that nozzles spray water at the point of dust generation for wet method controls;
- ❖ Making sure that hoses are not kinked on a tool used with a dust collector;
- ❖ Wetting down silica dust before sweeping it up; and
- ❖ Scheduling work so that tasks that involve high exposures are performed when no other employees are in the area.
- ❖ Goal: Reduce exposures to the lowest possible level.

# Silica Decision Tree

## (Construction)



# Controls

Best if controlled at the source.

- Wet cutting: Other considerations: freezing temperature, electrical safety
- Vacuum Dust Collection (VDC) (not as effective as wet cutting)
- Local exhaust ventilation
- Ventilation Booths
- Isolation
- Fans (not good by themselves, but supplement other control methods.
- Establish work rules and training to share expectations.

# Construction - Written Exposure Control Plan

- ❖ The plan must describe:
  - Tasks involving exposure to respirable crystalline silica
  - Engineering controls, work practices, and respiratory protection for each task
  - Housekeeping measures used to limit exposure
  - **Construction: Procedures used to restrict access, when necessary to limit exposures**
  - Conduct an annual review of the plan at least once a year and update as necessary.

## Sample Written Exposure Control Plan

**Company:**  
John Doe Renovators

**Person Completing the Plan, Title:**  
John Doe, Owner

**Description of Task:**  
Demolishing concrete and tile floors inside homes or public buildings using a jackhammer.

### Control Description

#### Controls:

- Use jackhammer equipped with the appropriate, commercially available shroud and a vacuum dust collection system with the flow rate recommended by the jackhammer manufacturer, a filter that is at least 99 percent efficient, and a filter cleaning mechanism.
- Use a portable fan to exhaust air and prevent the buildup of dust.

#### Work practices:

- Check shrouds and hoses to make sure they are not damaged before starting work.
- Make sure the hoses do not become kinked or bent while working.
- Use switch on vacuum to activate filter cleaning at the frequency recommended by the manufacturer.
- Replace vacuum bags as needed to prevent overfilling.
- Use the jackhammer and vacuum controls according to manufacturer's instructions for reducing the release of visible dust.
- If visible dust increases, check controls and adjust as needed.

#### Respiratory protection:

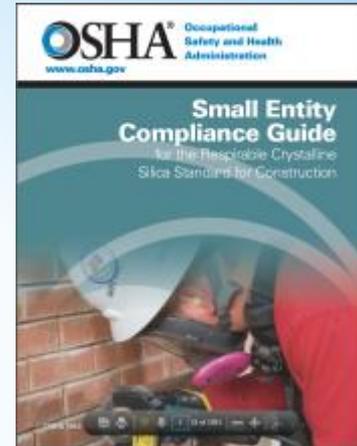
- Use respirator with APF of 10 the entire time the task is being performed.
- See the written respiratory protection program for information on selection, training and fit testing requirements, in addition to proper use instructions for respirators (for example, being clean shaven when using a respirator that seals against the face).

#### Housekeeping:

- Dust containing silica on work surfaces and equipment must be cleaned up using wet methods or a HEPA-filtered vacuum.
- Do not use compressed air or dry sweeping for removing dust and debris containing silica from work surfaces.
- Dispose of used vacuum bags in a container and keep the container sealed.

#### Procedures Used to Restrict Access to Work Areas:

Schedule the work so that only employees who are engaged in the task (the jackhammer operator and employees helping the operator) are in the area.





Employee exposure can reasonably be anticipated to **remain below 25  $\mu\text{g}/\text{m}^3$  as an 8-hour TWA** when performing certain tasks that involve only minimal exposure to respirable crystalline silica. Such tasks include:

- ❖ Mixing concrete for post holes;
- ❖ Pouring concrete footers, slab foundation, and foundation walls; and
- ❖ Removing concrete formwork.

When these tasks are **performed in isolation from tasks** that generate significant exposures to respirable crystalline silica, the standard does not apply.

These examples are not exclusive, and there may be other tasks that involve exposure under 25  $\mu\text{g}/\text{m}^3$  as an 8-hour TWA under any foreseeable conditions.

Some employees in the construction sector perform tasks involving **occasional, brief exposures** to respirable crystalline silica that are **incidental to their primary work**. These workers include **carpenters, plumbers, and electricians** who occasionally drill holes in concrete or masonry or perform other tasks that involve exposure to respirable crystalline silica.

Where employees perform tasks that involve exposure to respirable crystalline silica for a very short period of time, exposures for many tasks will be below  $25 \mu\text{g}/\text{m}^3$  as an 8-hour TWA. For example, for hole drillers using hand-held drills, if **the duration of exposure is 15 minutes or less, the 8-hour TWA** exposure can reasonably be anticipated to remain under the  $25 \mu\text{g}/\text{m}^3$  threshold (assuming no exposure for the remainder of the shift), and the standard would not apply.



# Construction - Competent Person

- ❖ Construction employers must designate a competent person to implement the written exposure control plan
- ❖ *Competent person* is an individual capable of identifying existing and foreseeable respirable crystalline silica hazards, who has authorization to take prompt corrective measures
- ❖ Makes frequent and regular inspection of job sites, materials, and equipment
- ❖ Has the knowledge and ability to implement the written exposure control plan.

# Respiratory Protection

- ❖ Must comply with 29 CFR 1910.134
- ❖ Respirators required for exposures above the PEL:
  - While installing or implementing controls or work practices
  - For tasks where controls or work practices are not feasible
  - When feasible controls cannot reduce exposures to the PEL
  - While in a regulated area (General Industry/Maritime)

# Housekeeping

- ❖ When it can contribute to exposure, employers must not allow:
  - Dry sweeping or brushing
  - Use of compressed air for cleaning surfaces or clothing, unless it is used with ventilation to capture the dust
- ❖ Those methods can be used if no other methods like HEPA vacuums, wet sweeping, or use of ventilation with compressed air are feasible

# Construction - Housekeeping Practices

## [paragraph (f)]

- ❖ The paragraph prohibits dry sweeping and dry brushing where such activities could contribute to employee exposures to respirable crystalline silica, *unless* wet sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible (*i.e.*, the other cleaning methods would not be effective, would cause damage, or would create a hazard in the workplace). The employer bears the burden of showing that the alternative methods are not feasible.
- ❖ Using sweeping compounds (*e.g.*, non-grit, oil- or waxed-based) is an acceptable dust suppression housekeeping method.
- ❖ The use of compressed air for cleaning is allowed where the compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air, or where no alternative method is feasible.
- ❖ The employer's exposure control plan must include the description of the housekeeping measures.

# General Industry/Maritime - Medical Surveillance

- ❖ Employers must offer medical examinations to workers:
  - Who will be **exposed above the action level for 30 or more days a year**
- ❖ Employers must offer examinations every three years to workers who continue to be exposed above the trigger
- ❖ Exam includes medical and work history, physical exam, chest X-ray, and pulmonary function test (TB test on initial exam only)

# Construction - Medical Surveillance

- ❖ Employers must offer medical examinations to workers:
  - Who will be **required to wear a respirator under the standard** for 30 or more days a year.
- ❖ Employers must offer examinations every three years to workers who continue to be exposed above the trigger
- ❖ Exam includes medical and work history, physical exam, chest X-ray, and pulmonary function test (TB test on initial exam only)

# Medical Opinion

- ❖ Worker receives report with detailed medical findings
- ❖ Employer receives an opinion that only describes limitations on respirator use, and if the worker gives written consent, recommendations on:
  - Limitations on exposure to respirable crystalline silica, and/or
  - Examination by a specialist

# Under the Hazard Communication Standard Employers must (general):

- ❖ Inform employees about the **general requirements** of HCS, as well as where and how they can view the written hazard communication program, lists of hazardous chemicals, and SDSs.
- ❖ Train employees on **how the presence or release of hazardous chemicals in the work area is detected**; in the case of respirable crystalline silica, this could include methods the employer uses to measure exposures, such as air sampling or objective data. If employers are using Table 1, they can train employees to recognize that an increase in visible dust is a sign that a control may not be working properly.
- ❖ Train employees on the **details of the workplace-specific hazard communication program** developed by the employer, such as container labels, the workplace labeling system, SDSs (including the order in which the information is presented), and how employees can get and use hazard information.

# Training Topics

Employees can demonstrate knowledge and understanding of at least:

1. Health hazards associated with respirable crystalline silica exposure: cancer, lung effects, immune system effects, and kidney
2. Specific workplace tasks that could expose employees to respirable crystalline silica.
3. Specific measures the employer is implementing to protect employees. Specific for each task that each employee performs.
  - a. The full and proper use of the controls on those tools; and
  - b. Signs that controls may not be functioning properly.

# Training Topics

- c. Housekeeping method
- 4. OSHA Standard,
- 5. Medical surveillance.
- 6. Construction: Identify the Competent Person

# General Industry/Maritime - Employee Notification

- ❖ 1910.1053(d)(6)(i)
- ❖ Within 15 working days after completing an exposure assessment in accordance with paragraph (d) of this section, the employer shall individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

# Construction - Employee Notification

- ❖ **1926.1153(d)(2)(vi)(A)**
- ❖ Within five working days after completing an exposure assessment in accordance with paragraph (d)(2) of this section, the employer shall individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

# Recordkeeping

- ❖ Must maintain records per 29 CFR 1910.1020 for:
  - ❖ Air monitoring data
  - ❖ Objective data
  - ❖ Medical records and availability

# General Industry/Maritime - Compliance Dates

- ❖ Employers must comply with all requirements of the standard by June 23, 2018, except :
  - ❖ Employers must comply with the action level trigger for medical surveillance by June 23, 2020. (The PEL is the trigger from June 23, 2018 through June 23, 2020.)
  - ❖ Hydraulic fracturing operations in the oil and gas industry must implement engineering controls to limit exposures to the new PEL by June 23, 2021.

# Construction - Compliance Dates

- ❖ Employers must comply with all required methods by June 23,

and all required methods of analysis required by June

**DELAY**  
Until Sept 23, 2017

# Silica



Look at 3 rules:

- Silica standard
- Respiratory Protection standard
- Hazard Communication standard

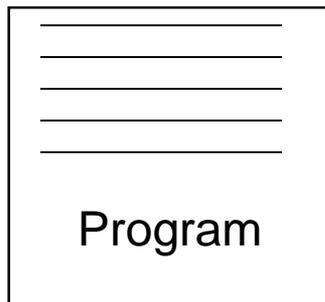
**The silica standard has 3 parts: Don't  
for get OSHA's  
Respiratory Protection Standard  
29 CFR 1910.134  
and 1926.103  
As it relates to silica/particulates**



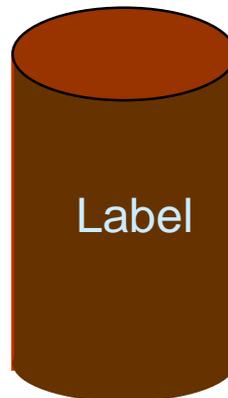
# Purpose of OSHA's Hazard Communication (HCS-2012) Standard

To ensure that employers and employees know about work hazards and how to protect themselves so that the incidence of illnesses and injuries due to hazardous chemicals is reduced.

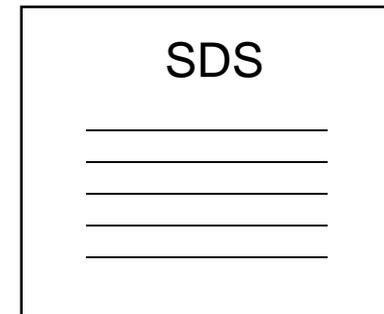
Hazard  
Communication  
Program+  
Chemical List



Container  
Labeling



Safety  
Data Sheet



EMPLOYEE TRAINING

# Guidance and Outreach

- ❖ Silica Rulemaking Webpage:  
[www.osha.gov/silica](http://www.osha.gov/silica)
  - Fact sheets
  - FAQs
  - Video
  - Small Entity Compliance Guide
- ❖ Appendix B - Medical Surveillance Guidelines
- ❖ Coming soon after publication:
  - PowerPoint template
  - Directive



Occupational Safety & Health Administration

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FAQs

For Workers - For Employers - Law & Regulations - Data & Statistics - Enforcement - Training & Education - News & Publications - En Español

HOME / SILICA

## OSHA's Final Rule to Protect Workers from Exposure to Respirable Crystalline Silica



### About the Rule

[Read the Final Rule](#)

[Regulatory Text for Construction Standard, with Table 1\\*](#)

- [Sampling Methods \(Appendix A\)\\*](#)
- [Medical Surveillance \(Appendix B\)\\*](#)

[Regulatory Text for General Industry/Maritime Standard\\*](#)

- [Sampling Methods \(Appendix A\)\\*](#)
- [Medical Surveillance \(Appendix B\)\\*](#)

[Overview of the Rule\\*](#)

[Fact Sheet on Construction\\*](#)

[Fact Sheet on General Industry/Maritime\\*](#)

[Frequently Asked Questions\\*](#)

### Stay Informed

Register for [Silica Rule Updates by Email](#)

Submit a [Question by Email](#)

### Video



### Rule requires engineering controls to keep workers from breathing silica dust

The Occupational Safety and Health Administration (OSHA) has issued a final rule to curb lung cancer, silicosis, chronic obstructive pulmonary disease and kidney disease in America's workers by limiting their exposure to respirable crystalline silica. The rule is comprised of two standards, one for Construction and one for General Industry and Maritime.

OSHA estimates that the rule will save over 600 lives and prevent more than 900 new cases of silicosis each year, once its effects are fully realized. The Final Rule is projected to provide net benefits of about \$7.7 billion, annually.

About 2.3 million workers are exposed to respirable crystalline silica in their workplaces, including 2 million construction workers who drill, cut, crush, or grind operations such as brick masonry. OSHA has been protecting workers from silica dust with water sprays, vacuum systems, and other engineering controls.

<http://www.osha.gov/silica/index.html>

# Resources

- Standard
- Small Entity Compliance Guide
- FAQs
- Directive



**Occupational  
Safety and Health  
Administration**

[www.osha.gov](http://www.osha.gov)

# Small Entity Compliance Guide

for the Respirable Crystalline  
Silica Standard for Construction



OSHA 3902-1



<https://www.osha.gov/Publications/OSHA3902.pdf>

# Controlling Silica Dust in Construction

## Fact Sheets for Table 1 Tasks

- Handheld Power Saws Fact Sheet
- Handheld Grinders for Tasks Other Than Mortar Removal Fact Sheet
- Handheld Power Saws Used to Cut Fiber-Cement Board
- Jackhammers or Handheld Powered Chipping Tools Fact Sheet
- Handheld and Stand-Mounted Drills Fact Sheet
- Stationary Masonry Saws Fact Sheet
- Handheld Grinders for Mortar Removal (Tuckpointing) Fact Sheet
- Walk-Behind Saws Fact Sheet
- Drivable Saws Fact Sheet
- Rig-Mounted Core Saws or Drills Fact Sheet
- Dowel Drilling Rigs for Concrete Fact Sheet
- Vehicle-Mounted Drilling Rigs for Rock and Concrete Fact Sheet
- Walk-Behind Milling Machines and Floor Grinders Fact Sheet
- Small Drivable Milling Machines (Less than Half Lane) Fact Sheet
- Large Drivable Milling Machines (Half Lane and Larger) Fact Sheet
- Crushing Machines Fact Sheet
- Heavy Equipment and Utility Vehicles Used During Demolition Activities Fact Sheet
- Heavy Equipment and Utility Vehicles Used for Grading and Excavating Tasks Fact Sheet

## **Controlling Silica Dust in Construction Videos for Table 1 Tasks**

- Stationary Masonry Saws
- Handheld Power Saws
- Handheld and Stand-Mounted Drills
- Jackhammers or Handheld Powered Chipping Tools
- Handheld Grinders for Mortar Removal (Tuckpointing)
- Handheld Grinders for Uses Other than Mortar Removal

<https://www.osha.gov/dsg/topics/silicacrystalline/construction.html#tableOneTasks>

# New Silica Information

- o [FAQs for the Construction Industry](#)
- o [Controlling Silica Dust in Construction – Videos for Table 1 Tasks](#)
- o [Video: Protecting Workers from Silica Hazards in the Workplace](#)

# Silica, Crystalline



- Home
- Health Effects
- Construction
- General Industry and Maritime
- Sampling and Analysis
- FAQs

## Overview

Crystalline silic  
concrete, and  
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Respirable cry  
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## Highlights

- Small Entity Compliance Guides
  - Construction
  - General Industry and Maritime
- **New** FAQs for the Construction Industry
- **New** Controlling Silica Dust in Construction – Videos for Table 1 Tasks
- Table 1 Task Fact Sheets for Construction
- **New** Video: Protecting Workers from Silica Hazards in the Workplace
- **New** Sample Training Powerpoint for Construction
- Interim Enforcement Guidance for the Respirable Crystalline Silica In General Industry/Maritime Standard
- Interim Enforcement for the Respirable Crystalline Silica in Construction Standard
- Silica Rule Updates
- Submit a question



- Home
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# Work Safely with Silica

A ONE-STOP SOURCE OF INFORMATION ON  
HOW TO PREVENT A SILICA HAZARD AND PROTECT WORKERS



About • Know the Hazard • Regulations & Requirements • What's New • Create a Plan

Search

GO

## Know the Hazard

**Workers** may be exposed to dangerous levels of silica dust when cutting, drilling, grinding, or otherwise disturbing materials that contain silica. These materials and tasks are common on construction jobs. Breathing that dust can lead to serious, often fatal illnesses. This section contains information that workers – and contractors – need to know to [recognize the hazard](#), understand the risk factors, and work safely with silica.

## Control the Dust

There are ways **contractors** can reduce the dust and reduce the hazard. This easy to use planning tool takes you step-by-step through conducting a **job hazard analysis for silica**, selecting appropriate controls, and creating a job-specific plan to eliminate or reduce silica hazards. You can save as a pdf, print and/or email your plan.

CREATE-A-PLAN



## Training & Other Resources

Find silica-related handouts, fact sheets, videos, toolbox talks and other resources for workers and contractors.



## What's Working

Contractors, workers, manufacturers, and researchers are on the lookout for the best ways to control silica dust. Learn what is happening in the field and share what you are doing.



## Ask a Question

Get answers to commonly asked questions about silica and ask one of your own.

<http://www.silica-safe.org/>

# Work Safely with Silica

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Home About Know the Hazard Regulations & Requirements What's New Create-A-Plan

Search

## Create-A-Plan to Control the Dust

You do not need to register to use the planning tool, however, registering will allow you to **confidentially** save, retrieve, edit, rename or delete saved plans. Only you have access to your saved plans.

*Returning users login below.*

Email

Password

[Forgot your password?](#)

### Step 1. Will you generate dust containing silica on the job?

The materials listed below contain silica. Select all of the materials you plan to use. As you select a material a list of dust generating tasks will appear. Please select the task(s) that you will perform with the material.

How does the Create-A-Plan tool work?

- |   |  |
|---|--|
| <input type="checkbox"/> Asphalt                  | <input type="checkbox"/> Refractory Mortar/Castables   |
| <input type="checkbox"/> Brick                    | <input type="checkbox"/> Refractory Units  |
| <input type="checkbox"/> Cement                   | <input type="checkbox"/> Rock  |
| <input type="checkbox"/> Concrete                 | <input type="checkbox"/> Roof Tile (concrete)  |
| <input type="checkbox"/> Concrete Block           | <input type="checkbox"/> Sand  |
| <input type="checkbox"/> Drywall                  | <input type="checkbox"/> Soil (fill dirt, top soil, soil w/ fly ash added)   |
| <input type="checkbox"/> Fiber Cement products    | <input type="checkbox"/> Stone (including: granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.) |
| <input type="checkbox"/> Grout                    | <input type="checkbox"/> Stucco/EIFS   |
| <input type="checkbox"/> Gunite/Shotcrete         | <input type="checkbox"/> Terrazzo  |
| <input type="checkbox"/> Mortar                   | <input type="checkbox"/> Tile (clay and ceramic)   |
| <input type="checkbox"/> Paints containing silica | <input type="checkbox"/> Material Other  |
| <input type="checkbox"/> Plaster                  |  |

If you will not be using one of the materials listed above or another silica-containing material,  
**You Don't Need a Silica Control Plan.**  
If you are not sure if a material contains silica, there are several ways you can find out... [learn more.](#)



OSHA is interested in information on the effectiveness of control measures not currently included for tasks and tools listed in Table 1. The Agency is also interested in tasks and tools involving exposure to respirable crystalline silica that are not currently listed in Table 1, along with information on the effectiveness of dust control methods in limiting worker exposure to respirable crystalline silica when performing those operations. OSHA intends to evaluate the available information to determine if revisions to Table 1 may be appropriate.

Home | Unified

[View EO 12866](#)

DOL/OSHA

Title: •Occupat

Abstract:

On March 25, 2011, OSHA issued a new rule for construction, and the rule requires the use of respirators containing Crystalline Silica. The rule also needed. En

OSHA is interes and tools involv limiting worker e Table 1 may be

Agency: Depart

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CFR Citation: 2

Legal Authority

Last Revisio

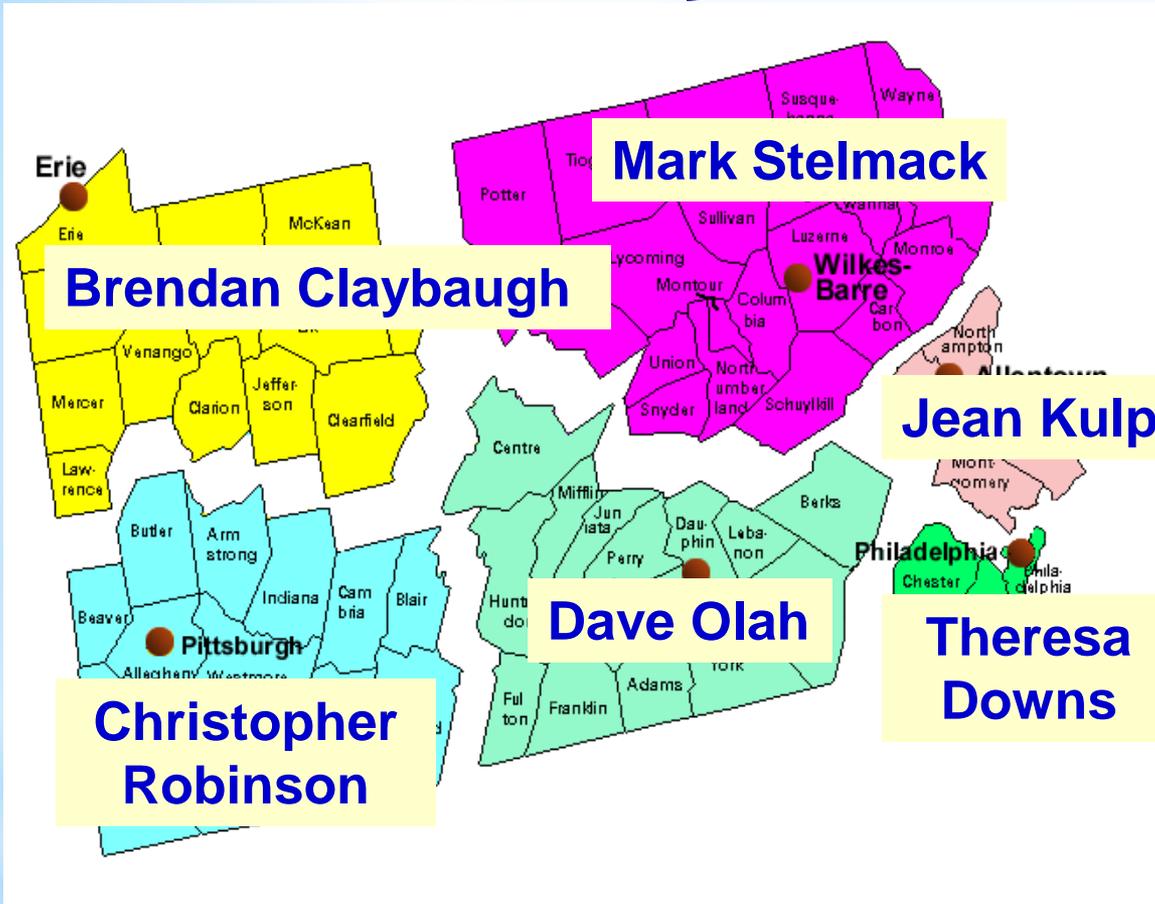


# Silica Recipe



- ❖ Complete an inventory of silica operations
- ❖ Perform an assessment of each
- ❖ Establish controls (engineering and work procedures)
- ❖ PPE (respiratory protection)
- ❖ Housekeeping
- ❖ Create a written exposure control plan
- ❖ Communicate/Train the workers, include the work plan
- ❖ Medical surveillance
- ❖ Recordkeeping
- ❖ Review

# Pennsylvania OSHA Area



## Offices

**Allentown Area Office**

(267) 429-7542

**Erie Area Office**

(814) 874-5150

**Harrisburg Area Office**

(717) 782-3902

**Philadelphia Area Office**

(215) 597-4955

**Pittsburgh Area Office**

(412) 395-4903

**Wilkes-Barre Area Office**

(570) 826-6538

**Main OSHA Number:**

1-800-321-OSHA,

1-800-321-6742

\*Questions?



**OSHA**<sup>®</sup> Occupational  
Safety and Health  
Administration

# Respirable Crystalline Silica in Construction Workplaces



Sample Employee Training Presentation  
Developed by OSHA, 2018

