

Review of 1926.1153: OSHA's Silica Standard for Construction



Brief History on Silica Standard

- US DOL first highlighted hazards of respirable crystalline silica in the 1930's
- First silica standard set in 1971 when OSHA was created
- Standard did not adequately protect workers from disease
- Rule first proposed in September 2013
- Over 2000 comments- amounting to 34,000 pages of material

Scope

- Applies to all exposures to respirable crystalline silica (RCS) except where employee exposure will stay below the OSHA Action Level (25 ug/m³; 8-hour time-weighted average exposure) under any foreseeable condition.

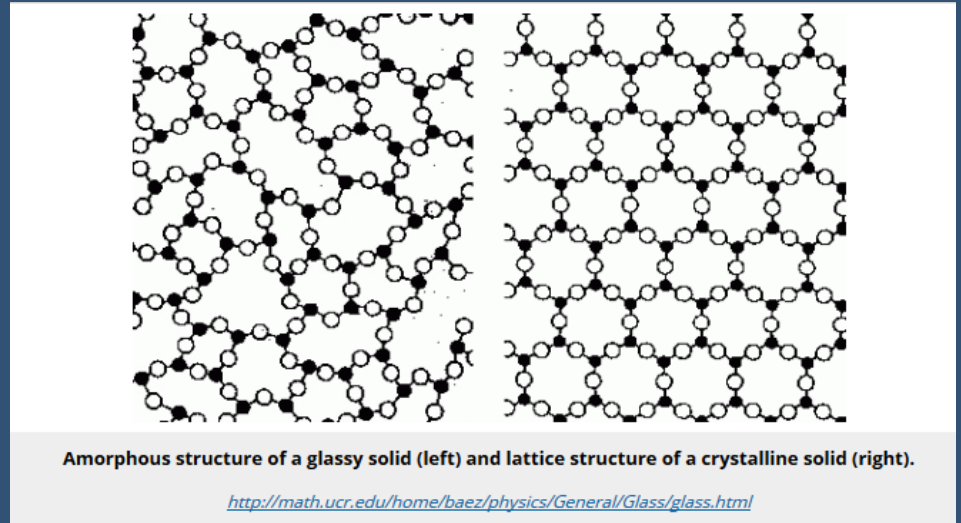
Exemption Examples: limited mixing concrete for post holes; pouring concrete footers, slab foundation and foundation walls; removing concrete formwork → reasonably expected to be < 25 ug/m³

Commonly Involved Materials:

- Sand
- Concrete
- Mortar
- Block (CMU)
- Terrazzo
- Stone/Rock (granite, quartz, etc.)
- Thinset, grout, stucco, color hardners
- Some joint compounds

Types of Silica

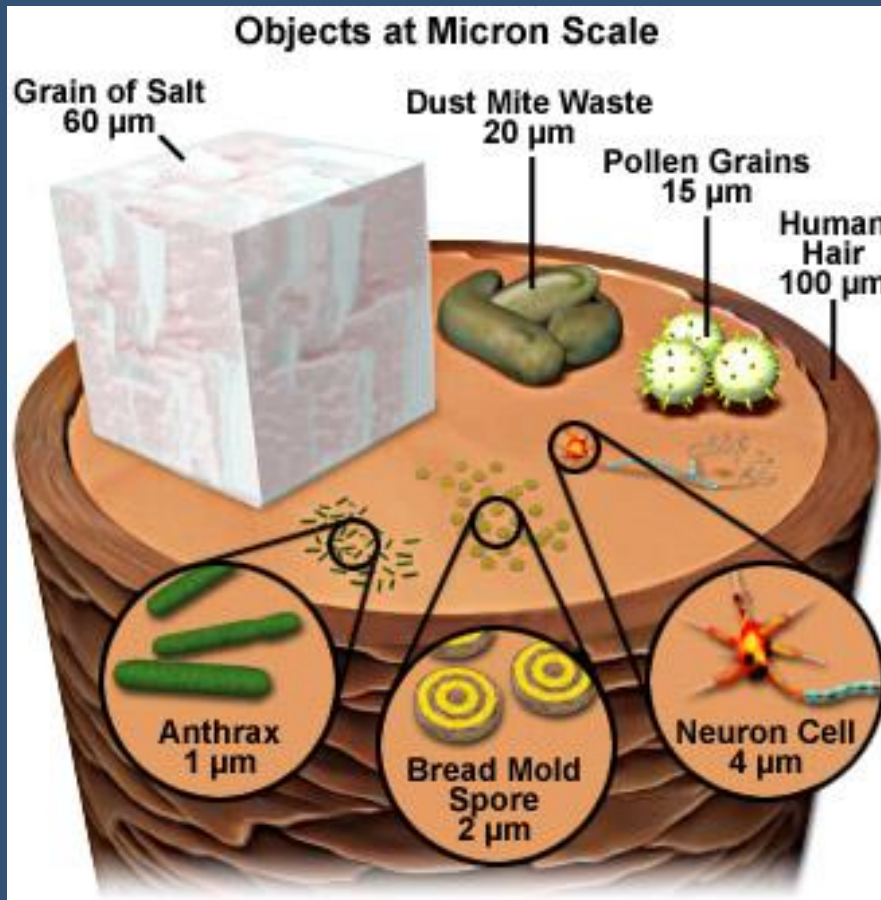
- Crystalline silica
 - SiO_2
 - "Free silica"
 - 3 most common forms:
 - quartz, tridymite, and cristobalite
 - Regulated



- Amorphous silica
 - Glass; "free-flowing or anti-caking" additive for paints, powders
 - Non-regulated



“Regular Dust” vs “Respirable Dust”



Respirable dust: <10 microns

100 times smaller
than ordinary beach
sand

Lung Disease

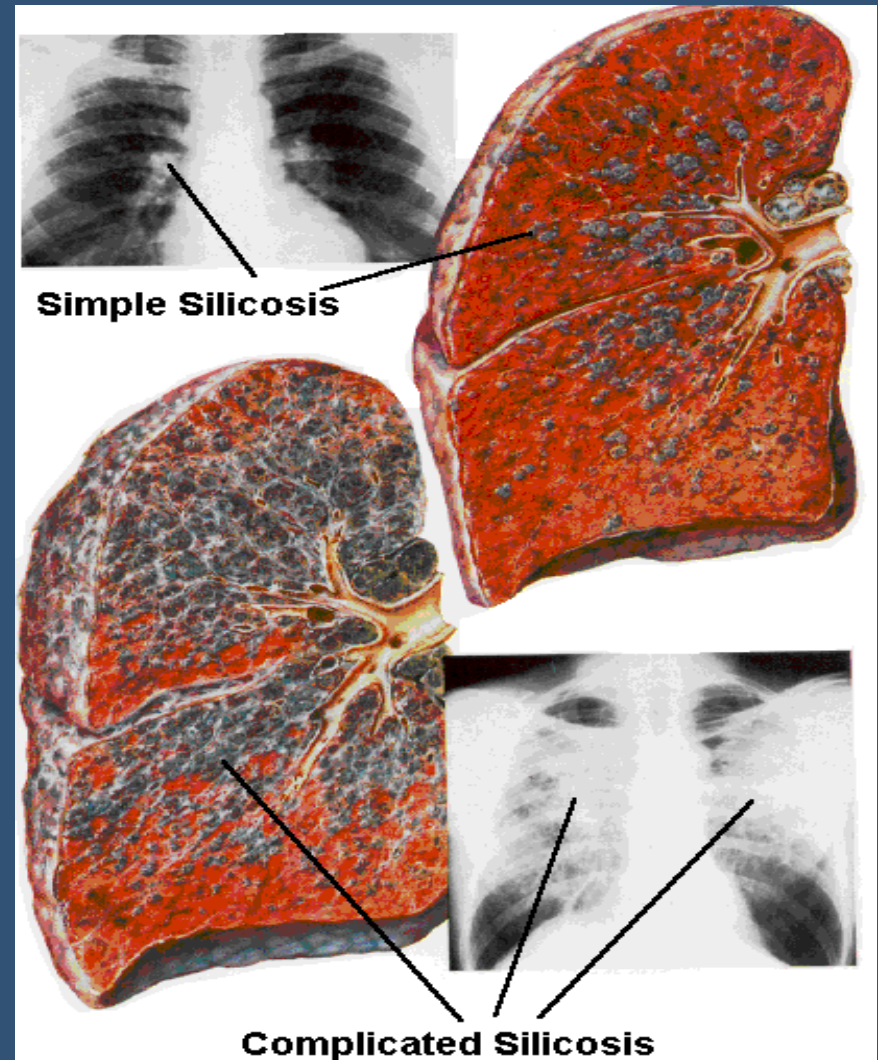
- Silicosis:

- Incurable lung disease that can lead to disability and death
- Nodular pulmonary fibrosis (lung scarring)

Classes of Silicosis

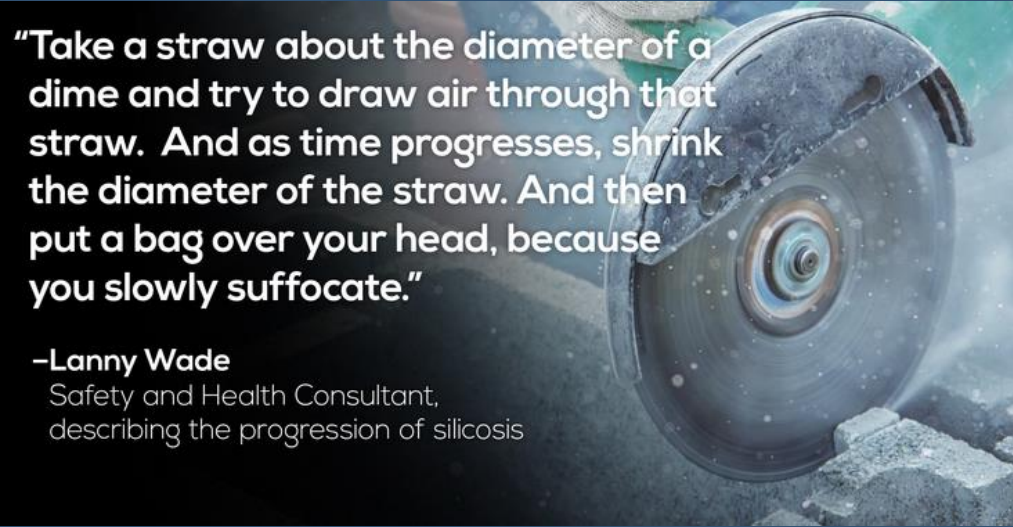
- Acute (weeks-5 years)
 - Accelerated (5-15 years)
 - Chronic (15 years+)
-
- Progression can occur even if exposure removed

Signs & Symptoms: shortness of breath, dry cough, wheezing, weakness



Lung Disease (cont'd)

- Lung Cancer: known human carcinogen
- COPD: i.e. bronchitis and emphysema
- Tuberculosis (TB):
 - An infectious disease
 - Both exposure to silica and silicosis are risk factor for contracting/developing TB
 - Exposure to silica can increase the risk for latent TB to convert to active TB
 - Silica-exposed employees are 3-30 times more likely to develop active pulmonary TB



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

-Lanny Wade

Safety and Health Consultant,
describing the progression of silicosis

Certain populations at increased risk for TB:

- African-American, Hispanics, Asians
- Co-morbid medical conditions
- Incarcerate
- Homeless
- Foreign-born

Additional Health Effects:

Kidney (Renal) Disease

- Slightly soluble in blood, which is how it can migrate in the body from the lung to the kidney's

Immune System Disease

- Autoimmune diseases:
 - Where the body's immune system attacks healthy cells
 - Scleroderma
 - Lupus
 - Rheumatoid arthritis

Permissible Exposure Levels

- Permissible Exposure Level (PEL):
 - 50 ug/m³
- Action Level (AL):
 - 25 ug/m³



RCS dust



You are at risk if the dust you breathe in over a full shift contains more RCS than the amount shown next to the penny

OSHA's Crystalline Silica Standard

29 CFR 1926.1153

- Exposure Determination
 - Use of OSHA's predetermined list of tasks and control strategies (**Table 1**) --- OR ---
 - Completion of exposure assessment (air monitoring/objective data)
- Written Exposure Control Plan
- Designation of Competent Person
- Provision of Medical Surveillance
- Training
- Recordkeeping Requirements

Tasks/Equipment Covered Under Table 1 (not inclusive)

- Stationary Masonry Saws
- Handheld power saws
- Handheld power saws for cutting fiber cement boards
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld & stand-mounted drills (including impact and rotary hammer drills)
- Dowel drilling rig for concrete
- Vehicle-mounted drilling rigs for rock/concrete
- Jackhammers and handheld powered chipping tools
- Handheld grinders (mortar removal)
- Handheld grinders (other uses)
- Walk-behind milling machines and floor grinders

Exposure Determination

- 1) Determine applicability of the standard
 - a) What materials are used?
 - b) What tasks are completed and are they on Table 1?
 - c) Does the task/equipment used always comply with the listed engineering controls and work practice control methods listed on Table 1?
 - Modify task/equipment as necessary to comply with Table 1 (if possible)
 - No air monitoring required if in compliance with listed Table 1 controls
 - If unable to modify (or fully and properly implement) → Go to Step 2

- 2) Identify any tasks performed that are NOT included on Table 1
 - Determine exposure levels using 1 of 2 options
 - Perform representative air monitoring (following scheduled monitoring approach)
 - Use existing representative objective data or combine with air monitoring data

Option A: Table 1 Compliance

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.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10
	OR		
	Use tool equipped with commercially available shroud and dust collection system.		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	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.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10

Table 1 is Non-Negotiable. Each component must be fully and properly completed in order to be in compliance.

Pay attention to:

- Location (indoors or enclosed area, outdoors)
- AND's & OR's
- Respiratory protection

Option A: Table 1 (Continued)

- Follow specified control measures
 - Pay attention to duration of time task is performed
 - Pay attention to indoors/enclosed areas and exhausted dust
 - Pay attention to water flow rates
 - Cabs/Booths (gaskets, seals, positive pressure, filtration, conditioned air)

-OR-

- Assess and limit the exposure of employee using the “Alternative Exposure Control Methods”

Option B: Evaluation by objective data

- Air monitoring data from industry-wide surveys, or
- Calculations based on the composition of a substance (found in SDS)
- The data must reflect workplace conditions
- May be able to use this to show there is no potential for exposures $>AL$

Written Exposure Control Plan

- Descriptions of:
 - Tasks creating exposure
 - Specific Engineering controls/work practices/respiratory protection used to limit exposure
 - Housekeeping measures
 - Procedures to restrict access to work areas (when necessary) – including exposures generated by other employers

- Reviewed annually



Competent Person Inspections



- OSHA expects “routine observations” of dust-generating tasks to be made by the CP
- If increases in visible dust occur, the competent person’s assigned role is to take prompt, corrective action.
 - Capable of identifying existing and foreseeable silica hazards in workplace AND who has authorization to take corrective measures
 - Make frequent and regular inspection of jobsites, materials, and equipment to implement the written ECP

Control Options

- Substitution
- Water Suppression
- Capture, Contain and Exhaust the Dust
- Respiratory Protection
- Minimizing the number of employees exposed



Task 16: Crushing Machine

Respiratory Protection and the Silica Standard

29 CFR 1910.134

Elements of a Respiratory Protection Program

-per 1910.134-

A Program is **REQUIRED**:

1) When respirators are necessary due to air contaminant overexposure

2) When respirators are required by the employer

3) If another OSHA Standard requires respirator use – i.e. the silica standard

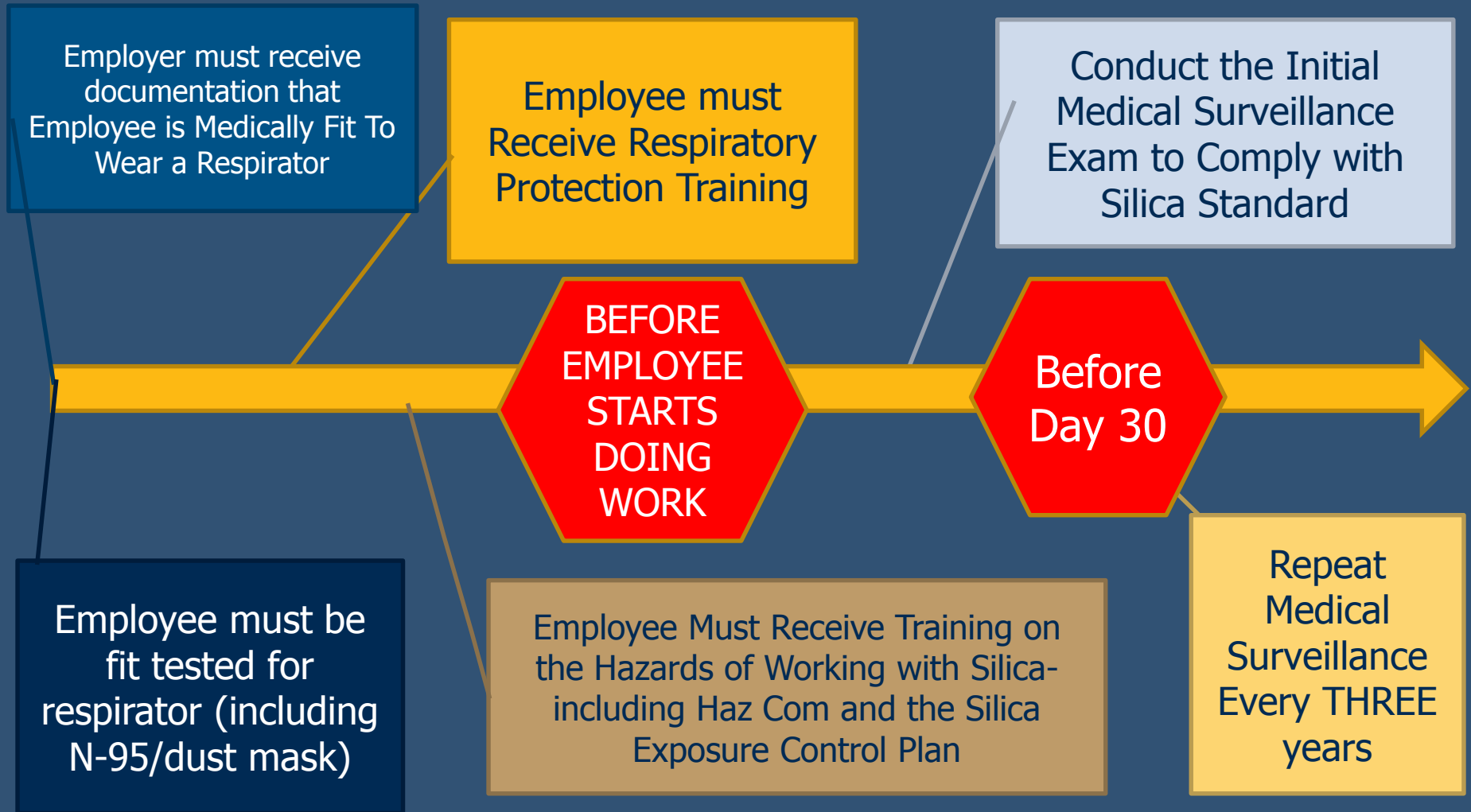
Must **update program** as necessary to reflect changes in workplace conditions that affect respirator use

1. Selection
2. Medical evaluation
3. Fit testing
4. Use
5. Maintenance and care
6. Breathing air quality and use
7. Training
8. Program evaluation

Respiratory Protection Training

- Conducted annually
- Address:
 - Procedures for selecting appropriate respirators
 - Medical evaluations for respirator users
 - Fit-test procedures for tight fitting respirators
 - Procedures for proper routine and/or emergency use respirators
 - Cleaning, storing, inspecting, repairing, & maintenance
 - Ensure adequate quality, quantity, and flow of breathing air
 - Respiratory hazards to which employees are exposed
 - How to wear, use, and care for their respirators

Employee Will Be Exposed To Silica and **REQUIRED** to wear a respirator



Medical Surveillance Requirements

- Construction:
 - when use of a respirator is required (by the silica standard) for more than 30 days a year

The initial (baseline) exam must be made available within 30 days of initial assignment

UNLESS

the employee has received an equivalent medical exam within the last 3 years

AND THEN

Periodic examinations must be made available at least every 3 years

Training of Employees on Silica Exposure

- **Include silica in Haz Com program**
- **Containers with silica must be labeled and have SDSs**
- **Training must include:**
 - **Health Hazards: cancer, lung effects, immune system effects, and kidney effects associated with exposure to silica**
 - **Tasks where employees might be exposed and Controls in place**
 - **Identity of the competent person(s)**
 - **The contents of the silica standard**
 - **The purpose and a description of the medical surveillance program**
 - **Copies of the silica standard should be available to employees**



Additional Resources (Construction)

www.osha.gov/silica

Regulatory Text: <https://www.osha.gov/silica/SilicaConstructionRegText.pdf>

Fact Sheet: <https://www.osha.gov/Publications/OSHA3681.pdf>

FAQ's: https://www.osha.gov/silica/Silica_FAQs_2016-3-22.pdf

Small Entity Compliance Guide:

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

NIOSH:

<https://www.cdc.gov/niosh/topics/silica/>

Additional Resources (Construction)

- Washington State Department of Labor & Industries "Silica in Construction Training Kit":
- <http://www.lni.wa.gov/SAFETY/TRAININGPREVENTION/TRAININGKITS/SILICAINCONSTRUCTION/DEFAULT.ASP>
- ASTM E2625
- Standard Practice for Controlling Occupational Exposure to Respirable Crystalline Silica for Construction and Demolition Activities (www.astm.org)
- The Center for Construction Research and Training (CPWR):
 - www.silica-safe.org (includes Create-A-Plan)

Additional Resources

- OSHA's Free, confidential, non-enforcement safety and occupational health consultation program:

- <http://4safenv.state.nv.us/>