Understanding and Implementing the New Construction Silica Standard

Chris Trahan, CPWR Deputy Director
David O’Connor, Director, Office of Chemical Hazards- Nonmetals, OSHA Directorate of Standards and Guidance
Eileen Betit, CPWR Research to Practice Director
Today’s Discussion

1. Snapshot of CPWR’s Research Program

2. Overview of the Construction Silica Final Rule

3. Using the Silica-Safe online tool to help implement the new standard

4. Questions and Answers
CPWR – The Center for Construction Research and Training is a not-for-profit focusing on construction safety and health since 1990.

3 Major Construction Safety and Health Program Areas

- Research
- Training
- Medical Screenings
CPWR Program Areas: Designed for Synergy

Dissemination/Promotion of Results

Medical Screening Program
DOE

National Construction Center Research Programs
NIOSH

Training Evaluation Instructor Feedback

Training Programs
DOL / OSHA, NIEHS

Health Data

Training Resources and Research Findings Incorporated Into Training Programs
RESEARCH

Understanding the Hazards, Developing Evidence-Based Solutions & Putting Research into Practice
## 2014 - 2019 CPWR Internal Projects

<table>
<thead>
<tr>
<th>CPWR Investigator</th>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pete Stafford</strong></td>
<td>Administrative Core</td>
</tr>
<tr>
<td><strong>Executive Director</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Linda Goldenhar</strong></td>
<td>Enhancing Safety Climate through Leadership</td>
</tr>
<tr>
<td><strong>Director, Evaluation and Research</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Babak Memarian</strong></td>
<td>Construction Solutions</td>
</tr>
<tr>
<td><strong>Director of Exposure Control</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Technologies Research</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sue Dong</strong></td>
<td>Disparities Surveillance Research</td>
</tr>
<tr>
<td><strong>Data Center Director</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Eileen Betit</strong></td>
<td>r2p Coordination Project</td>
</tr>
<tr>
<td><strong>Director, Research to Practice (r2p)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Eileen Betit</strong></td>
<td>Prevention Partnerships in r2p</td>
</tr>
<tr>
<td><strong>Director, Research to Practice (r2p)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Clayton Sinyai</strong></td>
<td>Communications Plan</td>
</tr>
<tr>
<td><strong>Communications Manager</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bruce Lippy</strong></td>
<td>Nanomaterials in Construction: Tracking Product</td>
</tr>
<tr>
<td><strong>Director, Safety Research</strong></td>
<td>Diffusion and Measuring Exposures</td>
</tr>
<tr>
<td><strong>Sue Dong</strong></td>
<td>Data Tracking and Support Services</td>
</tr>
<tr>
<td><strong>Data Center Director</strong></td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Investigator</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>University of California, San Francisco</td>
<td>David Rempel, MD, MPH, CPE</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>Diane Bush, MPH</td>
</tr>
<tr>
<td>Northeastern University</td>
<td>Jack Dennerlein, PhD</td>
</tr>
<tr>
<td>Eastern Washington University</td>
<td>Dan Anton, PT, PhD, ATC</td>
</tr>
<tr>
<td>Washington University, St. Louis</td>
<td>Ann Marie Dale, PhD, OTR/L, CEA</td>
</tr>
<tr>
<td>University of Massachusetts, Lowell</td>
<td>Dhimiter Bello, ScD</td>
</tr>
</tbody>
</table>
OSHA’s Final Rule on Occupational Exposure to Respirable Crystalline Silica

David O’Connor
Understanding & Implementing the New Construction Silica Standard
May 19, 2016
Final Rule Published on March 25, 2016
Reasons for the Rule

• Previous permissible exposure limits (PELs) are formulas that many find hard to understand
• Construction/shipyard PELs are obsolete particle count limits
• General industry formula PEL is about equal to 100 µg/m³; construction/shipyard formulas are about 250 µg/m³
Most Important Reason for the Rule

- Previous PELs do not adequately protect workers
- Exposure to respirable crystalline silica has been linked to:
  - Silicosis
  - Lung cancer
  - Chronic obstructive pulmonary disease
  - Kidney disease
- Extensive epidemiologic evidence that lung cancer and silicosis occur at exposure levels below 100 µg/m³
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

OSHA®
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
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
Construction Standard

(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
Construction – Scope

• All occupational exposures to respirable crystalline silica are covered, unless employee exposure will remain below 25 µg/m³ as an 8-hr TWA under any foreseeable conditions.
Construction – 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
### Example of a Table 1 Entry

<table>
<thead>
<tr>
<th>Equipment / Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum APF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary masonry saws</td>
<td>Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>None</td>
</tr>
</tbody>
</table>

- **Engineering and Work Practice Control Methods**: Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.  
- **Required Respiratory Protection and Minimum APF**: None for ≤ 4 hr/shift and None for > 4 hr/shift.
## Example of a Table 1 Entry

<table>
<thead>
<tr>
<th>Equipment / Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum APF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</td>
<td>≤ 4 hr/shift None</td>
</tr>
<tr>
<td>Handheld power saws (any blade diameter)</td>
<td>Operate and maintain tool in accordance with manufacturers’ instruction to minimize dust</td>
<td>&gt; 4 hr/shift APF 10</td>
</tr>
<tr>
<td></td>
<td>- When used outdoors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- When used indoors or in an enclosed area</td>
<td></td>
</tr>
</tbody>
</table>
### 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
Alternative Exposure Control Methods – Permissible Exposure Limit (PEL)

- PEL = 50 µg/m³ as an 8-hour TWA
- Action Level = 25 µg/m³ as an 8-hour TWA
Alternative Exposure Control Methods – Exposure Assessment

• Required if exposures are or may reasonably be expected to be at or above action level of 25 µg/m³

• 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

• 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
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
  • 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.
Alternative Exposure Control Methods – 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

Cutting block without engineering controls

Cutting block using water to control the dust
Engineering Controls (cont.)

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
Respiratory Protection

• Must comply with 29 CFR 1910.134
• Respirators required where specified by Table 1, or 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
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 – 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
  • Procedures used to restrict access, when necessary to limit exposures
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
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, any work restrictions, and recommendations concerning any further evaluation or treatment.

• 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.
Communication of Hazards

• Employers required to comply with hazard communication standard (HCS) (29 CFR 1910.1200)
• Address: Cancer, lung effects, immune system effects, and kidney effects as part of HCS
• Train workers on health hazards, tasks resulting in exposure, workplace protections, the identity of the competent person, and the medical surveillance program
Recordkeeping

• Must maintain records per 29 CFR 1910.1020 for:
  • Air monitoring data
  • Objective data
  • Medical records
Construction – Compliance Dates

• Employers must comply with all requirements (except methods of sample analysis) by June 23, 2017

• Compliance with methods of sample analysis required by June 23, 2018
Guidance and Outreach

• Silica Rulemaking Webpage: www.osha.gov/silica
• Fact sheets
• FAQs
• Video
• Appendix B – Medical Surveillance Guidelines
• Coming soon – Small Entity Compliance Guides
www.silica-safe.org

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

1) About
Regulations & Requirements
What’s New

(2) Know the Hazard

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.

Copyright © 2012 CPWR — The Center for Construction Research and Training. All rights reserved.
Photo Credits / Privacy Policy / Disclaimer / Contact Us
Site by: Telbox

47
3. Training & Other Resources

What’s Working

Ask a Question
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.
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.

- Asphalt
- Brick
- Cement
- Concrete
- Concrete Block
- Drywall
- Fiber Cement products
- Grout
- Gunite/Shotcrete
- Mortar
- Paints containing silica
- Plaster
- Refractory Mortar/Castables
- Refractory Units
- Rock
- Roof Tile (concrete)
- Sand
- Soil (fill dirt and top soil)
- Stone (including: granite, limestone, quartzite, sandstone, shale, slate, cultural, etc.)
- Stucco/EIFS
- Terrazzo
- Tile (clay and ceramic)
- Material Other

To find out if a material contains silica:

Option 1 - Check the label: OSHA's silica standard requires employers to include silica in their program to comply with the hazard communication standard. OSHA's Hazard Communication Standard requires materials containing silica to be labeled.  [Learn more]

Option 2 - Check the Safety Data Sheet  [Learn more]

Option 3 - Review the published data  [Learn more]

Option 4 - Analyze a sample of the material  [Learn more]
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.

- Asphalt
- Brick
- Rock
- Cement
- Concrete
- Concrete Block
- Drywall
- Fiber Cement products
- Grout
- Gunite/Shotcrete
- Mortar
- Paints containing silica
- Plaster
- Refractory Mortar/Castables
- Refractory Units
- Abrasive blasting
- Bushhammering
- Cutting/sawing
- Demolishing/disturbing
- Drilling/coring
- Earthmoving
- Grinding
- Jackhammering
- Milling
- Mixing/pouring
- Other
- Polishing
- Sacking/patching
- Sanding
- Scarifying
- Scraping
- Sweeping/cleaning up
- Test Task
- Abrasive blasting
- Bushhammering
- Cutting/sawing
- Demolishing/disturbing
- Drilling/coring
- Earthmoving
- Grinding
- Jackhammering
- Milling
- Mixing/pouring
- Other
- Roof Tile (concrete)
- Sand
- Soil (fill dirt and top soil)
- Stone (including: granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.)
- Stucco/EIFS
- Terrazzo
- Tile (clay and ceramic)
- Material Other

CONTINUE
Step 2 -- (g)(1)(ii)

More information to help you decide how to control the dust:

Option 1 - OSHA Exposure Control Methods: The exposure control methods and respiratory requirements specified in the OSHA silica standard. [Learn More]

Option 2 - Perform Air Monitoring: Information on how to find an industrial hygienist to conduct air monitoring, questions to ask, and what's involved. [Learn More]

Option 3 - Studies and Data on the Use of Dust Controls: Summaries of research findings, reports, and data. [Learn More]

Option 4 - OSHA’s On-site Consultation Program: [Learn More]

Examples of Equipment and Control Options* for the material and task you selected.

Hand-Held Masonry Saw with Vacuum

1. Bosch 1864 - 12-Inch Abrasive Cut-off Saw w/ Bosch Airsweep™ 14 Gallon Wet/Dry Vacuum with Power Broker™
   - Manufacturer: Bosch - Saw
   - Manufacturer: Bosch - Vacuum
   - Learn More: OSHA - Fact Sheet
   - Learn More: Construction Solutions

2. Hilti DCH 300 Hand held Electric Diamond Cutter w/ VC 40 U HEPA Vacuum
   - See how it works
   - Manufacturer: Hilti - Saw
   - Manufacturer: Hilti - Vacuum
   - Learn More: OSHA - Fact Sheet
   - Learn More: Construction Solutions

3. Husqvarna K 3000 14-Inch Vae Electric Power Cutter
   - See how it works
   - Manufacturer
   - Learn More: OSHA - Fact Sheet

*CPWR does not endorse any specific equipment or product. Many factors influence the effectiveness of a control, including maintenance, user skill, and training, the appropriateness of the equipment/control for the task, and manufacturer instructions/requirements. Respiratory protection may be needed when controls do not bring the silica exposure down to or below OSHA's Permissible Exposure Limit (PEL).
Step 3. Complete your Silica Control Plan

Company
Person Completing the Plan/Title:
Jobsite/Project:
Description of Work:

Please fill in the name and title of the person assigned as the competent person for silica. Required by 29 CFR 1926.1153 (g)(4).

Competent Person (g)(4)

Restricting Access (g)(1)(iv)

Exposure Assessment and Controls

1. Materials: Brick. Task: Cutting/sawing
   Equipment and Control(s): 1) Hand-Held Masonry Saw with Vacuum. 2) Hand-Held Masonry Saw with Vacuum
   Task/Control Description: 1) Masonry cutting by hand.

   Equipment and Control(s): Heavy Equipment with Cab Filtration System
   Task/Control Description: 1) Rock cutting by drill.

   Equipment and Control(s): Jackhammer with Vacuum
   Task/Control Description: 1) Rock cutting by jackhammer.

Please describe the procedures to restrict access to work areas, when necessary, for employees exposed to respirable crystalline silica and their level of exposure, including by other employers or sole proprietors. Required by 29 CFR 1926.1153 (g)(1)(iv)

Click here for an explanation of what a competent person is and why it is important to assign one for silica, and what this means on the job.

Housekeeping (g)(1)(iii)

Medical Surveillance

Please use the space below to describe the training that will be provided to workers engaged in dust producing tasks and those working nearby.

Click here for an explanation of the elements of a worker training program. Materials to help you conduct your training program are available on this site - just click "Training and Other Resources."

Please use the space below to describe the housekeeping measures that will be used on the project to limit employee exposure to respirable crystalline silica. Required by 29 CFR 1926.1153 (g)(1)(iii)

Click here to learn more about recommended housekeeping activities.

Please use the space below to describe medical surveillance that will be provided to workers exposed to silica dust.

Click here to learn more about medical surveillance. Additional materials on the risks, information workers should provide their physicians, and steps to work safely with silica are available on this site - just click “Know the Hazards.”

Please use the space below to describe other things that need to be taken into consideration when controlling dust on this project.

Click here to learn more about possible things to consider.

Other Considerations

CONTINUE
Final Plan

Print/
Email/Download/
Save Your Plan
(g)(2) & (3)
Questions?