Silica Awareness Training
Training Objectives

At the conclusion of this training program, participants shall be able to identify:

- The health hazards associated with exposure to Silica
- Tasks in the workplace that could result in exposure to Silica
- Specific measures implemented, or you can do, to protect you from exposure to Silica
- The contents of the OSHA Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153)
- The identity of your designated Competent Person(s)
- The purpose and a description of your company’s Medical Surveillance Program
Where is Silica Found?

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

Manufactured products:
• Concrete products
• Bricks and blocks
• Abrasive blasting materials
What is Respirable Silica?

- Respirable crystalline silica (or any respirable dust) is barely visible to the naked eye as it is smaller than human hair!
- Takes a while to settle out of the air
- Can be trapped in lungs and cause health problems over long exposure periods
Construction Tasks Leading to Silica Exposures

Some operations/tasks with silica exposure include:

• Stone, brick, and concrete block cutting, blasting, chipping, grinding, and sawing
• Cement/concrete mixing or cutting
• Jackhammer operations
• Milling and crushing operations
• Demolition activities
• Others?? – Request input from students
Health Hazards - 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 (7-25 yrs.)**

Silicosis is a single disease w/single cause:
Breathing crystalline silica dust
Health Hazards - 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
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” with cigarette smoking similar to asbestos exposure

**Also linked with:**
- Tuberculosis, emphysema, and pneumonia
- Stomach and other cancers
- Chronic renal disease
OSHA Silica Standard

Similar in format to Lead and Hexavalent Chromium standards...

a) Scope/Application
b) Definitions
c) Specified Exposure Control Methods (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 – Must comply with this standard by June 23, 2017
a) Scope/Application

The standard applies to...

- “...all occupational exposures to respirable crystalline silica in construction work...”

- Std. does NOT apply if worker exposure < Action Level (AL) “under any foreseeable conditions”

- AL = 25 µg/m³ as 8-hour Time-Weighted Average (TWA)
  - Laborer tuckpointing?
  - Laborer saw-cutting concrete?
  - Equipment Operator?
  - Superintendent?
  - Others? Ask students for others
b) Definitions

Many definitions, but one important one is...

- **Competent Person** – “an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards and who has authorization to take prompt corrective measures to eliminate or minimize them”
c) Specified Exposure Control Methods

• OSHA established Table 1 (18 pieces of Equipment or Tasks)

• Table 1 based on “Hierarchy of Controls” to use Engineering and Work Practice controls first when feasible
Table 1 Task 1
Stationary Masonry Saw

<table>
<thead>
<tr>
<th>Equipment/Test</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
</table>
| (i) Stationary masonry saws | 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. | Without water control: None  
With water control: None |
# Table 1 Task 2

## Handheld Power Saw

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
</table>
| (ii) Handheld power saws (any blade diameter) | Use saw equipped with integrated water delivery system that continuously feeds water to the blade.  
Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.  
- When used outdoors.  
- When used indoors or in an enclosed area. | ≤ 4 hours/shift: None  
> 4 hours/shift:  
  - APF 10  
  - APF 10 |

= Half Mask/Filtering Facepiece Required

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**Without water control**

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**With water control**
Table 1 Task 3 Handheld Power Saw (for cutting fiber-cement board)

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iii) Handheld power saw for cutting fiber-cement</td>
<td>For tasks performed outdoors only:</td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>board (with blade diameter of 8 inches or less)</td>
<td>- Use saw equipped with commercially available dust collection system.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>- Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</td>
<td></td>
</tr>
</tbody>
</table>

Without LEV

With LEV
Table 1 Task 4
Walk Behind Saw

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>(iv) Walk-behind 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. - When used outdoors. - When used indoors or in an enclosed area.</td>
<td>None</td>
</tr>
</tbody>
</table>

Without water control

With water control

(A half mask required)

(A half mask required)
Table 1 Task 5 Drivable Saw

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For tasks performed outdoors only:</td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>(v) Drivable saws</td>
<td>- Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>- Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td></td>
</tr>
</tbody>
</table>

Without water control

With water control
Table 1 Task 6
Rig-Mounted Core Saws or Drills

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
</table>
| (vi) Rig-mounted core saws or drills | - Use tool equipped with integrated water delivery system that supplies water to cutting surface.  
                                     | - Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.           | ≤ 4 hours/shift: None         |
|                                 |                                                                                                                  | > 4 hours/shift: None         |

With water control
### Table 1 Task 7
Handheld and Stand-Mounted Drills

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)</td>
<td>• Use drill equipped with commercially available shroud or cowling with dust collection system.</td>
<td>≤ 4 hours/shift: None</td>
</tr>
<tr>
<td></td>
<td>• Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>&gt; 4 hours/shift: None</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use a HEPA-filtered vacuum when cleaning holes.</td>
<td></td>
</tr>
</tbody>
</table>

With LEV
Table 1 Task 8
Dowel Drilling Rigs

<table>
<thead>
<tr>
<th>Equipment/Tasks</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(viii) Dowel drilling rigs for concrete</td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td>For tasks performed outdoors only:</td>
<td>APF 10</td>
</tr>
<tr>
<td>• 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.</td>
<td>(Half mask required)</td>
</tr>
<tr>
<td>• Use a HEPA-filtered vacuum when cleaning holes.</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 Task 9
Vehicle-Mounted Drilling Rigs

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ix) Vehicle-mounted drilling rigs for rock and concrete</td>
<td>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. OR Operate from within an enclosed cab and use water for dust suppression on drill bit.</td>
<td>≤ 4 hours/shift: None &gt; 4 hours/shift: None</td>
</tr>
</tbody>
</table>
Table 1 Task 10 Jackhammers and Handheld Powered Chipping Tools

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
</table>
| (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.  
- When used indoors or in an enclosed area.  
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.  
- When used indoors or in an enclosed area. | ≤ 4 hours/shift | > 4 hours/shift |
| | | None | APF 10 |
| | | None | APF 10 |
| | | APF 10 | APF 10 |

Without water control

With water control
Table 1 Task 11 Handheld Grinders for Mortar Removal (i.e., Tuckpointing)

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
</table>
| (xi) Handheld grinders for mortar removal (i.e., tuckpointing) | - Use grinder 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 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. | |
### Table 1: Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xii) Handheld grinders for uses other than mortar removal</td>
<td>For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. OR Use grinder 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 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-clearing mechanism. When used outdoors. When used indoors or in an enclosed area.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF 10</td>
</tr>
</tbody>
</table>

Without LEV

With LEV

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**Amerisafe**
Consulting & Safety Services

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**CAWP**
Consulting & Safety Services

**MBA**
Consulting & Safety Services
Table 1 Task 13
Walk Behind Milling Machines

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xiii) Walk-behind milling machines and floor grinders</td>
<td>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. 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.</td>
<td>≤ 4 hours/shift</td>
</tr>
</tbody>
</table>
Table 1 Task 14 Small Drivable Milling Machines (<½ lane)

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xiv) Small drivable milling machines (less than half-lane)</td>
<td>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.</td>
<td>None</td>
</tr>
</tbody>
</table>
Table 1 Task 15 Large Drivable Milling Machines (>½ lane)

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
<th>≤ 4 hours/shift</th>
<th>&gt; 4 hours/shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xv) Large drivable milling machines (half-lane and larger)</td>
<td>For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. OR Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Table 1 Task 16
Crushing Machines

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xvi) Crushing machines</td>
<td>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). Operate and maintain machine in accordance with manufacturer’s instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controlled Environment</th>
<th>≤ 4 hours/shift</th>
<th>&gt; 4 hours/shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Table 1 Task 17 Abrading or Fracturing Silica-Containing Materials

<table>
<thead>
<tr>
<th>Equipment/Tasks</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(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</td>
<td>Operate equipment from within an enclosed cab.</td>
<td>≤ 4 hours/shift: None, &gt; 4 hours/shift: None</td>
</tr>
<tr>
<td></td>
<td>When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: When the operator exits the enclosed cab and is no longer actively preforming 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>
<thead>
<tr>
<th>Equipment/Tasks</th>
<th>Engineering and Work Practice Control Methods</th>
<th>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials</td>
<td>Apply water and/or dust suppressants as necessary to minimize dust emissions. OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.</td>
<td>≤ 4 hours/shift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

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.
c) Specified Exposure Control Methods

- When following Table 1...
  - “for tasks performed indoors/enclosed areas, provide a means of exhaust to min. accumulation of visible dust”
  - “for wet methods apply water at flow rates to minimize visible dust”

- If enclosed booth or cab is used...
  - Free as practical of settled dust
  - Doors seals/closing mechanisms work
  - Gaskets and seals in good condition
  - Under positive pressure via delivered air
  - 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 Permissible Exposure Limit (as an 8-hour TWA) applies.
Specific Controls Methods

At this company/project we will use the following control methods

• List all silica controls utilized at the company/project (including pictures if possible)
d) New 8-Hour Permissible Exposure Limit (PEL)

**FORMER**
- OSHA PELs:
  - Approx. 0.10 mg/m$^3$ for general industry
  - Approx. 0.25 mg/m$^3$ for construction and maritime
  - Derived from a formula
  - Adopted in 1971

**NEW**
- OSHA PEL: 0.05 mg/m$^3$ (or 50 μg/m$^3$)
  - One limit for all industries and all forms of crystalline silica
  - 50% reduction of the general industry PEL
  - 80% reduction for construction and shipyards
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
f) Housekeeping

- Dry sweeping NOT permitted...unless no other options
- 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...”. At our company/job the Competent Person is ___. To be added
- Reviewed annually
h) Medical Surveillance

- Required if respirator needed 30+ days/yr.
- Baseline required within 30 days
- Only results provided to employer are whether employee can/cannot wear a respirator
- You will/will not get an exam
i) Communication of Hazards

• Training provided under Company’s Hazard Communication Program (OSHA Hazcom Standard 29 CFR 1910.1200)

• Labels on containers of Crystalline Silica and respective Safety Data Sheets (SDS’s) will be provide. Read them!

This class is your training
i) Communication of Hazards

Hazards of Silica involve this Pictogram
Training Summary

You now are able to identify:

- The health hazards associated with exposure to Silica
- Workplace Tasks that could result in exposure to Silica
- Specific measures your company has implemented to protect you from exposure to Silica, including engineering controls, work practices, and respirators use
- The contents of the OSHA Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153)
- The identity of your designated Competent Person(s)
- The purpose and a description of your company’s Medical Surveillance Program
- Questions???
Training program developed by:

Amerisafe Consulting & Safety Services
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Greensburg, PA 15601
844-295-6709
www.amerisafe-css.com

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