CRYSTALLINE SILICA DUST

EXPOSURE CONTROL PLAN

OSHA (29 CFR 1910.1053)
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1. Introduction

It is the policy of Union College to take precautions to eliminate potential hazards in the workspace. The Silica Dust Exposure Control Plan identifies hazards associated with silica dust and outlines the mitigation controls to ensure employees who work with or around silica are not exposed to hazardous levels of silica dust; and provides procedures for common silica related duties to minimize exposure in accordance with the OSHA Air Contaminants Standard (29 CFR 1910.1000)

Crystatline silica is a basic component of soil, sand, granite and many other minerals. Quartz is the most comment form of crystalline silica. All materials containing silica can produce respirable silica particles when chipping, cutting, drilling or grinding occurs. Silica exposure occurs through inhalation of silica containing particles that may be generated from many construction and general industry methods. The most severe exposures generally occur during abrasive blasting with sand to remove paint and rust from bridges, tanks, concrete structures and other surfaces. Other activities that might result in severe silica exposure include jack hammering, rock/well drilling, concrete mixing, concrete drilling, brick and concrete cutting/sawing and tunneling operations. Exposure to excessive silica dust over long periods of time can result in silicosis, an occupational lung disease.

This silica dust exposure control plan applies to Union College employees who are expected to be exposed to silica dust through the methods outlined above; or through other means, which are determined by Union College Environmental Health & Safety Department (EHS) or their supervisor. A copy of this plan is located in the EHS department located in Silliman Hall, the EHS section of the Union College website and a hard copy will be furnished within 24 hours upon request.

2. Responsibilities

a. Environmental Health & Safety Department
   i. Provides program oversight and consultation to Union College employees regarding potential risks, exposure prevention and training relating to silica dust exposures.
   ii. Conducts building material assessments/monitoring upon request.

b. Facilities Services
   i. Each department with responsibilities for maintaining buildings or working in buildings with potential exposure to silica should:
1. Ensure that the applicable components of the Silica Dust Exposure Control Plan are available to and reviewed by all affected employees.

2. Provide applicable training to employees expected to work in or with building materials where there is a potential risk for silica exposure.

c. Supervisors
   i. Must ensure that personnel with responsibilities to work in areas where there is a risk of exposure to silica dust are properly trained on the applicable components of the Silica Dust Exposure Control Plan.
   ii. Must provide appropriate Personal Protective Equipment (PPE).

3. Definitions
   
   Action Level – A concentration of airborne respirable crystalline silica of 25 µg/m³, calculated as an 8 hour Time Weighted Average (TWA).

   Authorized Person – An employee who has received proper training and exposure monitoring to safely work with silica containing materials.

   Crystalline Silica – Naturally occurring component in earth soils, sand, granite and many other minerals resulting in many building materials containing silica.

   Exposure Assessment – Monitor air quality to determine if an employee has had silica dust exposure at or above the permissible exposure level (PEL).

   HEPA – High Efficiency Particulate Air. A filtering system capable of trapping and retaining at least 99.97% of all particles of 0.3 microns in diameter or larger.

   Permissible Exposure Limit – (PEL) the OSHA limit for silica dust exposure is 50µg/m³, averaged over an 8 hour work day, time weighted average (TWA).

   Silica Containing Material – Any material that has the potential to contain silica at levels that may pose a hazard to employees when the material is manipulated to create airborne particles.

   Silicosis – A lung disease caused by inhalation of silica dust. Silica dust can cause fluid buildup and scar tissue in the lungs that cuts down the ability for the
lungs to fully function. Silicosis is not curable, but can be prevented through the use of protective systems.

4. Material Assessment
   a. Any time there is a potential for silica containing materials to be involved in a project, sources of silica must be assessed prior to disturbing. Union College EHS or an authorized contractor can perform building material assessments to determine silica content in materials. Bulk samples can be taken to categorize site materials for potential silica hazards. These samples will be sent to an accredited lab for analysis.
   b. Crystalline silica occurs naturally in the earth’s crust and is a basic component of sand, concrete, brick, asphalt, granite, some blasting grit and wall spackling materials. Employees can be exposed to silica when conducting activities such as:

<table>
<thead>
<tr>
<th>Abrasive blasting</th>
<th>Chipping or scarifying concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack hammering</td>
<td>Rock crushing</td>
</tr>
<tr>
<td>Concrete crushing</td>
<td>Using coatings containing silica</td>
</tr>
<tr>
<td>Mixing of concrete or grout</td>
<td>Removing coating containing silica</td>
</tr>
<tr>
<td>Concrete drilling</td>
<td>Moving or dumping piles of concrete, rock or sand</td>
</tr>
<tr>
<td>Sawing concrete or bricks</td>
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</tbody>
</table>

   c. If airborne silica is expected to be generated during a project, Union College EHS or an authorized contractor should be contacted to conduct exposure monitoring and ensure all safety precautions are followed to minimize exposure to airborne silica.

5. Exposure Monitoring
   a. Scheduled Monitoring Option
      i. Initial Exposure Monitoring
         1. Union College will develop an exposure monitoring plan for employees that can be expected to come in contact, while working, with silica containing materials.
         2. Conduct initial exposure monitoring to quantitatively evaluate the exposure to airborne silica.
         3. Exposure monitoring should be conducted on any employee exposed to airborne silica dust, as levels may vary based on job duty within a project. There may be an employee performing concrete cutting and another employee supervising the work being performed.
4. If initial monitoring indicates exposures are below the action level Union College will discontinue monitoring for those employees.

ii. Periodic Exposure Monitoring:
   1. Whenever silica exposure levels are greater than or equal to 50µg/m³, the permissible exposure level (PEL), periodic exposure monitoring is required within 6 months.
   2. If the exposure levels are above the PEL, the next periodic monitoring will occur within 3 months.
   3. Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below 25µg/m³, the action level, Union College will repeat the monitoring 6 months after the most recent monitoring, until 2 consecutive measurements taken at least 7 days apart are below the action level. At which time Union College will discontinue monitoring of this represented area.

iii. Reassessment of exposures
   1. Union College will reassess exposures whenever a change exists that could reasonably result in new or additional exposures at or above the action level.

6. Methods of Sample Analysis
   a. All samples taken in accordance with 1910.1053(d) will be evaluated by a laboratory that analyzes air samples for respirable crystalline silica in accordance with 1910.1053 App A.

7. Notification of Assessment Results
   a. Within 15 days of receiving assessment results, Union College will individually notify each affected employee or post the results in an appropriate location accessible to all affected employees.
   If the assessment indicates the exposure level for the employee(s) is above the PEL, Union College will provide a written corrective action plan that identifies measures to reduce employee exposure to or below the PEL.

8. Exposure Control
   a. Pre-Project planning
      i. During pre-project planning it should be determined if there are any silica containing materials that may be impacted by the project. Any silica
containing materials must be identified and appropriate methods of exposure control must be planned prior to the project commencing.

b. Administrative/Engineering Controls
   i. When silica exposures have been documented or are expected to be above the PEL, appropriate engineering or administrative controls will be implemented, where feasible. Some controls could be:
      1. Containment
      2. Use of already mixed products, i.e. grout
      3. Local exhaust ventilation
      4. General ventilation
      5. Water
      6. Distance
      7. Vacuum with HEPA filter
      8. Good housekeeping, worker rotation

ii. Personal Protective Equipment (PPE)
   1. In addition to administrative and engineering controls, employees may be required to wear PPE. The level of protection will depend on the task being conducted and the tools being utilized.

   Recommended PPE:
   - Respirator
   - Tyvek suit, or other disposable clothing
   - Leather gloves
   - Safety glasses or goggles, Face shield
   - Boot or shoe covers

9. Housekeeping

   a. Dust and other silica containing debris must be removed from the work area as soon as possible. All surfaces must be maintained free from accumulations of dust, minimizing potential silica exposure.

   b. An acceptable method of silica dust removal is the use of a HEPA vacuum or wet methods, such as mopping.

   c. Unacceptable methods are: dry sweeping, standard or shop vacuums, and compressed air.

   d. Use recommended PPE during cleanup of silica containing material debris.

   e. PPE should be removed upon work completion and disposed of after each use.
f. Employees must wash hands, and if available, shower prior to leaving work.
g. Ensure contaminated PPE, including footwear is not worn outside the work area.

10. Medical Surveillance
a. Medical surveillance is available at no cost to employees who will be
occupationally exposed to respirable crystalline silica at or above the action level,
25 µg/m³, for 30 or more days per year.
b. The initial baseline examination and chest x-ray will be performed by Ellis
Works. Results will be provide within 30 days to the affected employee and their
supervisor.
c. Periodic examinations will occur every 3 years, or sooner, if recommended by
Ellis Works.

11. Training
a. Employees covered by this regulation will receive training on:
   i. The respirable crystalline silica regulation
   ii. The health hazards of crystalline silica exposure
   iii. Work place tasks that could result in the exposure to respirable crystalline
        exposure
   iv. Measures used to protect employees from exposure to respirable
       crystalline silica i.e., engineering controls, workplace practices, respirators
   v. The purpose and description of the medical surveillance program

12. Recordkeeping
    The Environmental, Health & Safety will:
    a. Maintain an accurate record of all exposure measurements taken to assess
       employee exposure to respirable crystalline silica. The record will include:
       i. Date sample measurement was taken.
       ii. The task being monitored.
       iii. Sampling and analytical methods used.
       iv. Number, durations and results or samples.
       v. Name of the laboratory performing the analysis.
       vi. PPE used.
       vii. Name, SSN, and job classification of the employees that were monitored.
b. Maintain a record of all objective data used to comply with this regulation.
   i. The crystalline silica containing material.
   ii. The source of the material.
   iii. Testing protocol used.
iv. A description of the task or activity on which the objective data was based.
v. And any other relevant data.
c. Maintain an accurate record of each employee covered under the medical surveillance program, to include:
   i. Employee name and SSN,
   ii. Copy of Physician or Other Licensed Health Care Provider’s (PLHCP) written medical opinion.
   iii. Copy of information provided to PLHCP.
All medical records will be maintained in accordance with 29 CFR 1910.1020

13. Signage
   a. Signs will be posted at all entrances to the regulated work area. The following information will be on the signs:
      i. Danger
      ii. Respirable Crystalline Silica
      iii. May Cause Cancer
      iv. Causes Damage to Lungs
      v. Wear Respiratory Protection
      vi. Authorized Personnel Only
§1926.1153 Respirable crystalline silica.

(c) Specified exposure control methods. (1) For each employee engaged in a task identified on Table 1, the employer shall fully and properly implement the engineering controls, work practices, and respiratory protection specified for the task on Table 1, unless the employer assesses and limits the exposure of the employee to respirable crystalline silica in accordance with paragraph (d) of this section.

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>(i) Stationary masonry saws</td>
<td>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</td>
<td>None</td>
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<tr>
<td></td>
<td>Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>None</td>
</tr>
<tr>
<td>(ii) Handheld power saws (any blade diameter)</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>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>
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</table>
| (iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) | For tasks performed outdoors only:  
Use saw equipped with commercially available 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. | ≤ 4 hours /shift | > 4 hours /shift |
|                    |                                             | None | None |
| (iv) Walk-behind 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.  
− When used outdoors.  
− When used indoors or in an enclosed area. | ≤ 4 hours /shift | > 4 hours /shift |
|                    |                                             | None | APF 10 |
| (v) Drivable saws | For tasks performed outdoors only:  
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. | ≤ 4 hours /shift | > 4 hours /shift |
<p>|                    |                                             | None | None |</p>
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</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. | None | None |
| (vii) Handheld and stand-mounted drills (including impact and rotary hammer drills) | Use drill equipped with commercially available shroud or cowling with 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.  
Use a HEPA-filtered vacuum when cleaning holes. | None | None |
| (viii) Dowel drilling rigs for concrete | For tasks performed outdoors only:  
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.  
Use a HEPA-filtered vacuum when cleaning holes. | APF 10 | APF 10 |
| (ix) Vehicle-mounted drilling rigs for rock and concrete | Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.  
OR  
Operate from within an enclosed cab and use water for dust suppression on drill bit. | None | None |
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</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: None  
> 4 hours /shift: APF 10 |
| (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. | APF 10  
APF 25 |
<table>
<thead>
<tr>
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</table>
| (xii) Handheld grinders for uses other than mortar removal | 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-cleaning mechanism.  
– When used outdoors.  
– When used indoors or in an enclosed area. | ≤ 4 hours /shift | > 4 hours /shift |
<p>|                  |                                               | None                                               | None |
|                  |                                               | None                                               | APF 10 |</p>
<table>
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<tr>
<td></td>
<td></td>
<td>≤ 4 hours /shift</td>
</tr>
<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>None</td>
</tr>
<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>
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</tr>
</tbody>
</table>
| (xv) Large drivable milling machines  
(half-lane and larger) | 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.  
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. | ≤ 4 hours /shift | > 4 hours /shift |
| (xvi) Crushing machines | 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. | None | None |
<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤ 4 hours /shift</td>
</tr>
<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. 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>None</td>
</tr>
<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>None</td>
</tr>
</tbody>
</table>

(2) When implementing the control measures specified in Table 1, each employer shall:
   (i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
   (ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
   (iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
      (A) Is maintained as free as practicable from settled dust;
      (B) Has door seals and closing mechanisms that work properly;
      (C) Has gaskets and seals that are in good condition and working properly;
      (D) Is under positive pressure maintained through continuous delivery of fresh air;
      (E) Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 μm range (e.g., MERV-16 or better); and
      (F) Has heating and cooling capabilities.

(3) Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.
Major Types of Respirators

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

- **Half mask/Dust mask**
  - APF = 10
  - Needs to be fit tested

- **Half mask (Elastomeric)**
  - APF = 10
  - Needs to be fit tested

- **Full facepiece (Elastomeric)**
  - APF = 50
  - Needs to be fit tested

- **Loose-Fitting Powered Air-Purifying Respirator (PAPR)**
  - APF = 25

- **Hood Powered Air-Purifying Respirator (PAPR)**
  - APF = 25
Atmosphere-supplying respirators, which provide clean air from an uncontaminated source.

Full Facepiece Supplied-Air Respirator (SAR) with an auxiliary Escape Bottle
APF=1,000
APF = 10,000 (if used in “escape” mode)
Needs to be fit tested

Full Facepiece Self-Contained Breathing Apparatus (SCBA)
Pressure demand mode is APF=10,000
Needs to be fit tested

Full Facepiece Abrasive Blasting Continuous Flow
APF=1,000
Needs to be fit tested