Crystalline Silica Program

Occupational Health, Safety and Injury Prevention
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1.0 INTRODUCTION

1.1 The purpose of the Crystalline Silica Program is to protect Cornell University employees from health hazards associated with occupational exposures to respirable dust that contains crystalline silica.

1.2 The Occupational Safety and Health Administration (OSHA) implemented CFR 1926.1153 (Construction Industry) and CFR 1910.1053 (General Industry) that addresses assessing and controlling occupational exposures to respirable crystalline silica.

1.3 Crystalline Silica has significant health hazards associated with overexposure in occupational settings.

1.3.1 Crystalline Silica is known to be a human carcinogen by the International Agency on Cancer Research.

1.3.2 Crystalline Silica is most commonly associated with causing Silicosis.
   a. Silicosis can be seriously disabling and/or fatal.
   b. There is no cure for Silicosis.
   c. Silicosis affects lung function and can make someone more susceptible to other lung infections such as tuberculosis.
   d. Additionally, smoking causes damage to the lungs as well and has an additive effect to the damage cause by breathing silica dust.

2.0 OBJECTIVES

2.1 Cornell University Environmental Health and Safety (EHS) has developed the Crystalline Silica Program for all employees who have potential for to have an occupational exposure to respirable crystalline silica.

2.2 The Crystalline Silica Program establishes procedures to follow for compliance with OSHA silica regulations.

3.0 SCOPE

3.1 This program applies to all Cornell University locations except the Cornell Weill Medical College.

4.0 ROLES AND RESPONSIBILITIES

4.1 Environmental Health and Safety (EHS)

4.1.1 Annually reviews program

4.1.2 Develops and reviews Silica Training.

4.1.3 Coordinates with Cornell Health Occupational Medicine for medical surveillance.

4.1.4 Conducts quantitative and qualitative assessments of employee exposure to respirable crystalline silica.

4.1.5 Provides notification within 5 days of completing an exposure assessment to affected employees of the results from personal air monitoring.
4.1.6 Makes engineering, administrative and personal protective equipment recommendations based on expert knowledge and sampling results.

4.1.7 Recommends and/or requires corrective measures to eliminate or reduce the employee exposure to respirable crystalline silica.

4.1.8 Remains educated on updates to OSHA silica standards, any other changes enacted, and new information as it becomes available.

4.1.9 Serves as competent person.

4.1.10 Conducts periodic site inspections and identifies respirable crystalline silica hazards.

4.2 Department/Unit

4.2.1 Works with EHS to schedule required exposure monitoring.

4.2.2 Informs EHS when processes, equipment, or other variables have changed that may affect exposure to respirable crystalline silica.

4.2.3 Enforces personal protective equipment (PPE) and work practice requirements.

4.2.4 Develops procedures for restricting access from other employees and the public, to work environments where production of silica dust is probable based on work tasks performed.

4.2.5 Develops procedures for housekeeping that complies Section 6.0: Housekeeping.

4.3 Employee

4.3.1 Participates in exposure monitoring when quantitative measurements are required.

4.3.2 Assists the EHS staff with questions related to the tasks performed during the assessment.

4.3.3 Adheres to work practices outlined in Appendix A: Specified Exposure Control Methods and Cornell standard operating procedure (SOP).

4.3.4 Restricts access to the work area that silica dust is produced to minimize the number of persons exposed to respirable crystalline silica dust.

4.4 Cornell Health Occupational Medicine

4.4.1 Provides medical surveillance to employees who have been identified for respirable crystalline dust exposures.

4.5 External Contractors Completing Work at Cornell University Properties

4.5.1 Contractors who are completing work that creates respirable crystalline silica dust will include silica control plans as part of their site-specific plan.
5.0 PROCEDURES

5.1 When a task will be completed that is listed in Appendix A: Specified Exposure Control Measures, the employee will fully and properly implement the control methods that are listed according to the task and duration of time.

5.1.1 If the task and duration requires the use of respiratory protection, the employee completing the task must be enrolled in the EHS Respiratory Protection Program, have been medically cleared, and fit tested for the type of respirator that is required.

5.2 If the task to be completed is NOT listed in Appendix A: Specified Exposure Control Measures, or where engineering, work practices, and respiratory protection are not utilized, the department is required to contact EHS, before the task is to be performed.

5.3 For tasks not listed in Appendix A: Specified Exposure Control Measures, EHS will complete an assessment to assess any hazards to the employee

5.3.1 An assessment consists of the evaluation a job task for identification of hazards that the employee may be exposed to during the course of completing the task.

5.3.2 If required, EHS will conduct personal air monitoring in accordance with Appendix B: Flow Chart for Occupational Exposure Monitoring.

5.3.3 All results of personal air sampling will be made available to the employee within five business days of receipt of lab analysis results.

5.3.4 All results will be held on file by EHS for the course of the employee’s time with Cornell University, and 30 years beyond their separation from the University.

5.3.5 As a result of air sampling and monitoring, EHS will make recommendations and/or requirements for the task sampled and will add the specific task and its requirements to Appendix B: Specified Exposure Control Measures, for future reference.

5.3.6 Recommendations for employee occupational exposures will follow the protection hierarchy. The established hierarchy order is Engineering Controls, Administrative Controls, and Personal Protective Equipment (PPE).
   a. Engineering controls for mitigation of silica dust include the use of water or a vacuum system to limit dust exposure.
   b. Administrative controls include the use of task rotations or task time limits to reduce the employee’s time working with or around silica dust. Additional training given to the employees about the hazard and control methods is also considered an administrative control.
   c. PPE is used when engineering and administrative controls are not feasible or do not lower the exposure to an acceptable level.
6.0 HOUSEKEEPING

6.1 Follows housekeeping procedures established by their department:
   a. Will not use dry sweeping or dry brushing where there is a potential to expose themselves or others to silica dust.
   b. Will not use compressed air to clean clothing or surfaces unless used with a ventilation system that effectively captures the dust cloud.

7.0 MEDICAL SURVEILLANCE

7.1 EHS will notify employee who will be required to be enrolled in medical surveillance.

7.2 EHS will notify Cornell Health Occupational Medicine of persons who are required have medical surveillance.

7.3 Medical surveillance is provided at no cost to the employee.

7.4 All medical testing related to medical surveillance will be conducted by Cornell Health Occupational Medicine, another physician, or other licensed health care professional (PLHCP) recognized by Cornell University, at a reasonable time and place for the employee.

   7.4.1 The provider will be required to supply the employee with test results within 30 days of the examination.

   7.4.2 The provider will be required to supply EHS with a written medical opinion within 30 days of the examination.

7.5 Medical testing may include:

   7.5.1 Comprehensive history of medical and work history, with an emphasis on the past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents that affect the respiratory system; any history of respiratory system dysfunctions, including signs and symptoms of respiratory disease.

   7.5.2 Physical Examination with a special emphasis on the respiratory system.
      a. Initial and every three years

   7.5.3 Tuberculosis testing
      a. Initial and annual testing
      b. Additional testing if a positive or undetermined results are indicated

   7.5.4 Pulmonary Function Testing
      a. Initial and every three years

   7.5.5 Chest X-Ray
      a. Initial and every three years

   7.5.6 Based upon initial exam results, the employee maybe referred to a specialist for further examination.
8.0 TRAINING

8.1 EHS will develop Silica training.

8.2 The training will address the following requirements:

8.2.1 Health hazards associated with exposure to respirable crystalline silica dust.
8.2.2 Specific tasks in the workplace that could result in exposure to respirable crystalline silica.
8.2.3 Control measures that are used to protect employees from exposure to respirable crystalline silica.
8.2.4 The identity of the competent person responsible for inspections of job sites, materials, and equipment.
8.2.5 The purpose and description of the medical surveillance program for employees working with respirable crystalline silica.

8.3 Employees identified to have a risk of exposure to respirable crystalline silica will be required to complete silica training. Training may be completed through an online or classroom course.

<table>
<thead>
<tr>
<th>Training Course</th>
<th>Created/Last Update</th>
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<tbody>
<tr>
<td>Silica Training</td>
<td>Initial Document</td>
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9.0 RECORDS AND DOCUMENT CONTROL

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<td>Time of employment plus 30 years</td>
<td>EHS Medgate Database</td>
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<tr>
<td>Crystalline Silica Program HS11_IH_PRG_Silica</td>
<td>Permanent</td>
<td>EHS</td>
</tr>
</tbody>
</table>
10.0 DEFINITIONS

10.1 Administrative Controls (or Work Practices)- are changes in work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations.

10.2 Assigned Protection Factor (APF) - is the workplace level of respiratory protection that a respirator is expected to provide to employees.

10.3 Time Weighted Average (TWA) - an average exposure over a specified period, usually a nominal eight hours.

10.4 Action Level- is an airborne concentration of 25 μg/m3 calculated as an 8-hour TWA for respirable crystalline silica. Exposures at or above the action level trigger requirements for exposure assessment.

10.5 Carcinogen- a substance capable of causing cancer in living tissue.

10.6 Competent Person- is an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability necessary to implement the written exposure control plan required under the standard.

10.7 Dust Collection System- is use of a shroud or cowling around the tool bit or cutting zone that works with a vacuum to collect silica dust as it is produced during cutting operations.

10.8 Engineering Controls- to eliminate or reduce exposure to a chemical or physical hazard through the use or substitution of engineered machinery or equipment.

10.9 Fully and properly implemented- means that controls are in place, are properly operated and maintained, and employees understand how to use them.

10.10Half-Face Elastomeric Respirator- is a tight-fitting, air-purifying respirator with replaceable filters (for particulates), cartridges, or canisters (for gases and vapors). In either case, these are attached to a rubber or silicone face piece that covers the nose and mouth. This type of respirator needs to be fit tested and can be used instead of a filtering face piece respirator.

10.11Permissible Exposure Limit (PEL)- is a legal limit in the US for exposure of an employee to a chemical substance or physical agent.

10.12Personal Protective Equipment (PPE)- refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.

10.13Physician or other licensed health care professional (PLHCP)- is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to
independently provide or be delegated the responsibility to provide some or all of the particular healthcare services required by this standard.

10.14Silica- a hard, unreactive, colorless compound that occurs as the mineral quartz and as a principal constituent of sandstone and other rocks.

10.15Silicosis- lung fibrosis cause by the inhalation of dust containing silica.

10.16Specialist- means an American Board Certified Specialist in Pulmonary Disease or an American Board Certified Specialist in Occupational Medicine.

10.17Water Delivery System- is an integrated system that continuously delivers water to the saw blade

11.0 REFERENCES

11.0 Occupational Health and Safety Administration (OSHA) Silica:  
https://www.osha.gov/dsg/topics/silicacrystalline/

11.1 Cornell University EHS Respiratory Protection Program:  
https://sp.ehs.cornell.edu/osh/occupational-health/respiratory-protection/Pages/default.aspx

11.2 Cornell Health Occupational Medicine:  
https://health.cornell.edu/services/occupational-medicine

12.0 DOCUMENT HISTORY

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## APPENDIX A: Specified Exposure Control Methods

<table>
<thead>
<tr>
<th>Equipment/Task</th>
<th>Engineering and Work Practice Control</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>(i) 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>
<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. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
<td>− When used outdoors. None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>− When used indoors or in an enclosed area. APF 10</td>
</tr>
<tr>
<td>(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)</td>
<td>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 airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</td>
<td>None</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.</td>
<td>When used outdoors. None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When used indoors or in an enclosed area. APF 10</td>
</tr>
<tr>
<td>(v) Drivable saws</td>
<td>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.</td>
<td>None</td>
</tr>
<tr>
<td>(vi) Rig-mounted core saws or drills</td>
<td>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.</td>
<td>None</td>
</tr>
<tr>
<td>Equipment/Task</td>
<td>Engineering and Work Practice Control</td>
<td>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><em>(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)</em></td>
<td>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 airflow 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.</td>
<td>≤ 4 hours /shift: None  &gt; 4 hours /shift: None</td>
</tr>
<tr>
<td><em>(viii) Dowel drilling rigs for concrete</em></td>
<td>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.</td>
<td>≤ 4 hours /shift: APF 10  &gt; 4 hours /shift: APF 10</td>
</tr>
<tr>
<td><em>(ix) Vehicle-mounted drilling rigs for rock and concrete</em></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>
<tr>
<td><em>(x) Jackhammers and handheld powered chipping tools</em></td>
<td>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 airflow 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</td>
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<tr>
<td>Equipment/Task</td>
<td>Engineering and Work Practice Control</td>
<td>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</td>
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<td>------------------------------------------------------------------------------</td>
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<tr>
<td>(xi) Handheld grinders for mortar removal (i.e., tuck-pointing)</td>
<td>Use grinder equipped with commercially available shroud and dust collection system.</td>
<td>≤ 4 hours /shift: APF 10 &lt; 4 hours /shift: APF 25</td>
</tr>
<tr>
<td></td>
<td>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</td>
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<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>(xii) Handheld grinders for uses other than mortar removal</td>
<td>For tasks performed outdoors only:</td>
<td>≤ 4 hours /shift: None &lt; 4 hours /shift: None</td>
</tr>
<tr>
<td></td>
<td>Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.</td>
<td></td>
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<tr>
<td></td>
<td>Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions.</td>
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<tr>
<td></td>
<td>OR</td>
<td></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.</td>
<td>≤ 4 hours /shift: None &lt; 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></td>
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<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use machine equipped with dust collection system recommended by the manufacturer</td>
<td>≤ 4 hours /shift: None &lt; 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></td>
</tr>
<tr>
<td></td>
<td>Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes</td>
<td></td>
</tr>
<tr>
<td>Equipment/Task</td>
<td>Engineering and Work Practice Control</td>
<td>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</td>
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<tr>
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</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. Operate and maintain machine to minimize dust emissions</td>
<td>None</td>
</tr>
<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. 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>
</tr>
<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>
<td>None</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>Equipment/Task</td>
<td>Engineering and Work Practice Control</td>
<td>Required Respiratory Protection and Minimum Assigned Protection Factor (APF)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(xviii) <strong>Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica containing materials</strong></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: None ≥ 4 hours/shift: None</td>
</tr>
</tbody>
</table>
APPENDIX B: Flow Chart for Occupational Exposure Monitoring

1. If results are below Action Level, monitoring will be repeated within 6 months.
2. If results are above Action Level, mitigation must be completed.
3. Monitoring is discontinued if both are below Action Level.
4. Monitoring is discontinued if one is above Action Level.
5. If results are above the PEL and Action Level, employee is below action level (15μg/m³).
6. If results are above the PEL and Action Level, employee is above action level (25μg/m³).
7. Employee is below action level (25μg/m³).
8. Employee is above action level (25μg/m³).
9. Monitoring is discontinued.