



## **Silica Exposure Control Program**

### **I. INTRODUCTION**

This program is intended to provide consistent standards for silica exposure control within University of Oregon (UO) owned and occupied facilities, consistent with OSHA 1910.1053 - Respirable Crystalline Silica. The primary objective is to prevent injuries to employees, students, the public and other members of the University community.

Silica can become airborne anytime employees impact various silica containing materials. Silica can be found in concrete, cement, bricks, mortars, clays, abrasive blasting agents, and others. Mechanical demolition, wet or dry cutting or drilling, grinding, blasting, or otherwise generating dust from a silica containing material can generate an exposure.

### **II. SCOPE**

This program applies to all UO employees and contractors working on UO properties, as well as all UO owned or occupied facilities. The intent of this program is to establish minimum requirements for employees working with silica, work processes, monitoring requirements, and personal protective equipment.

### **III. RESPONSIBILITIES**

#### A. Department

Departments are responsible for:

1. Ensuring training is made available for employees that are authorized to work with silica and silica containing materials.
2. Financial costs associated with exposure assessments, exposure monitoring, required annual medical evaluations, and clean up.

#### B. Environmental Health and Safety

Environmental Health and Safety (EHS) Department is responsible for:

1. Writing, reviewing and updating this program.
2. Collaborating with departments and supervisors to promote compliance with the silica rule and this program.
3. Conducting silica preliminary hazard assessments and exposure assessments during work.
4. Oversight of training materials and providers.
5. Providing annual awareness training for potentially exposed employees.

6. Oversight of required program records.

#### C. Supervisors

Supervisors who oversee personnel that may be exposed to silica are responsible for:

1. Identification and prompt reporting of activities that may result in silica exposures.
2. Collaboration with EHS to conduct preliminary hazard assessments and develop written work processes for exposure control during work
3. Actively promoting compliance with the silica rule and this program

#### D. Employees

All UO employees that impact silica containing materials and may be exposed are responsible for:

1. Reporting concerns regarding potential exposures to your supervisor *prior* to completing work, and communicating issues with established procedures identified *during* work.
2. Working in collaboration with EHS on exposure assessments and work process development
3. Following established safe work processes while conducting work that may impact silica

#### E. Contractors

All contractors that work on University projects are responsible for management of their own Silica Exposure Control Plan with their personnel and sub-contractors, and must maintain a written Silica Exposure Control Program compliant with 29 CFR 1910.1053 - Respirable Crystalline Silica. Contractors must ensure that their staff and sub-contractors are all trained according to the standard. Contractors must provide copies of their written program upon request of EHS.

### IV. EXPOSURE ASSESSMENT

Silica exposures will be managed through *identification* of tasks that may result in an exposure and *exposure monitoring* to verify that exposures have been adequately controlled.

#### A. Identification

Identification of tasks that may generate a silica exposure is conducted prior to beginning work. Identification of potential silica hazards shall follow the process below:

1. Refer to *Table 1: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica (Table 1)* (Appendix B) This table

provides general requirements for Personal Protective Equipment (PPE) and Engineering Controls on a task by task basis.

- a. Work should be conducted with the indicated engineering controls and personal protective equipment to minimize exposure.
2. The Engineering Controls and PPE indicated per task on Table 1 must be followed for all applicable work. *Exception on requirement to follow Table 1: When an exposure assessment definitively shows the Action Level is not exceeded by the work.*
3. Consult EHS if work does not fit any of the categories indicated on Table 1. EHS will assist with determination of engineering controls and personal protective equipment for the task.

## B. Exposure Monitoring

Exposure monitoring will be conducted when the proposed task does not match any of the Equipment / Task categories listed on Table 1 and employees may be reasonably expected to be exposed at or above the Action Level (AL). Exposure monitoring may also be completed if the decision is made to alleviate the Engineering Controls and PPE required by Table 1 for a given task. Exposure monitoring will be managed by EHS. Exposure assessments will be conducted according to the following process:

1. Prepare a written procedure, completed by the Employee and/or, Supervisor, and submit EHS. Required elements include:
  - a. Billing index and Contact information
  - b. A simple description of the task
  - c. A list of tools that will be used
  - d. Site preparation / engineering controls to be used
  - e. A step by step process for completion of the task from start to finish, including set up and clean up
2. EHS will conduct exposure monitoring while representative employees perform work.
3. EHS will provide a written report to include the following information:
  - a. Date of measurement of each sample taken
  - b. Task monitored, including any deviations
  - c. Sampling and analytical methods used
  - d. Number, duration, and results of samples taken
  - e. Identity of the laboratory that performed the analysis
  - f. PPE used by employees participating in the assessment
  - g. Name and job classification of employees participating in the assessment
  - h. Based on the analytical data, the report must indicate that:
    - The Action Level (AL) was not exceeded during completion of the task

- The AL was exceeded but the Permissible Exposure Level (PEL) was not exceeded during completion of the task
  - The PEL was exceeded during completion of the task
- i. If the PEL is exceeded, the report must detail immediate steps being taken to reduce exposures
4. Exposure monitoring will be repeated according to the following schedule:

<b>Initial Monitoring Result</b>	<b>Action Needed</b>
AL not exceeded	Monitoring can be discontinued
At or Above AL but below PEL	Repeat monitoring in 6 months
Above PEL	Repeat monitoring in 3 months
<b>Most Recent Result (not initial)</b>	<b>Action Needed</b>
AL not exceeded	Repeat monitoring w/in 6 months until 2 consecutive measurements (taken 7 or more days apart) are below the AL. Then discontinue monitoring.

5. Exposure will be reassessed whenever a change in production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when the employer has reason to believe that new or additional exposures at or above the action level have occurred.
6. The employee and their supervisor will be notified within 15 working days after completing an exposure assessment. This notification will extend to include all other potentially affected employees through direct notification or through posting the results in an appropriate location accessible to all affected employees.

## **V. WORK PRACTICES**

Work practices employed during work that may impact silica shall be done using the engineering controls and PPE as indicated on Table 1, unless exposure assessment monitoring shows that the AL has not been exceeded. The following additional controls must be employed if monitoring shows exposures exceeding the PEL.

### **A. Regulated work area**

A regulated work area must be separated from adjacent areas in a manner that will clearly communicate the hazard within the regulated work area. The minimum elements of a regulated work area are indicated below:

1. The work area shall be demarcated from the rest of the workplace by use of signs, barrier tape, plastic sheets, etc. to minimize the number of employees exposed to respirable crystalline silica within the regulated area.

2. Signage posted at each entrance to the work area. Regulated work area signs must bear the following legend

DANGER  
RESPIRABLE CRYSTALLINE SILICA  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
WEAR RESPIRATORY PROTECTION IN  
THIS AREA  
AUTHORIZED PERSONNEL ONLY

B. Engineering & work practice Controls

Engineering and work practice controls will be used to reduce and prevent employee exposure to respirable crystalline above the PEL. Wherever engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall supplement them with the use of respiratory protection that complies with the requirements of 29 CFR 1910.1053(g) and the University of Oregon Respiratory Protection Program.

**VI. RESPIRATORY PROTECTION**

Respiratory protection, when required, will be provided and managed according to the University of Oregon Respiratory Protection Program. The program covers mandatory, and voluntary, uses of respirators provided to university students, faculty, and staff.

**VII. HOUSEKEEPING**

The following work practices shall not be allowed:

- A. Dry sweeping or dry brushing of respirable crystalline silica materials. *Exception: whenever wet sweeping, HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.*
- B. Use of compressed air to clean clothing or surfaces.

**VIII. MEDICAL SURVEILLANCE**

Medical surveillance shall be made available at no cost to the employee, and at a reasonable time and place, for employees occupationally exposed to respirable crystalline silica at or above the action level for 30 or more days per year.

C. Initial examination.

An initial (baseline) medical examination shall be conducted by a Physician or an Occupational medicine provider contracted by the UO (Provider) within 30 days after initial assignment, unless the employee has received a medical examination

that meets the requirements of this section within the last three years. The examination shall consist of:

1. A medical and work history, with emphasis on: Past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system; any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing); history of tuberculosis; and smoking status and history;
2. A physical examination with special emphasis on the respiratory system;
3. A chest X-ray (a single posteroanterior radiographic projection or radiograph of the chest at full inspiration recorded on either film (no less than 14 x 17 inches and no more than 16 x 17 inches) or digital radiography systems), interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader;
4. A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV<sub>1</sub>) and FEV<sub>1</sub>/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH approved spirometry course;
5. Testing for latent tuberculosis infection; and
6. Any other tests deemed appropriate by the Provider.

D. Periodic examinations.

Medical examinations that include the procedures described above with the exception of 5. Shall be conducted at least every three years, or more frequently if recommended by the Provider.

**IX. TRAINING**

Each employee covered by this program will be provided with training such that they can demonstrate knowledge and understanding of:

- A. The health hazards associated with exposure to respirable crystalline silica
- B. Specific tasks in the workplace that could result in exposure to respirable crystalline silica
- C. Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used
- D. A summary of the requirements of 29 CFR 1910.1053 - Respirable Crystalline Silica, including, the purpose and a description of the medical surveillance program required by paragraph (i) of this section.

**X. RECORDKEEPING**

Records of the silica program and associated activities will be maintained in accordance with 29 CFR 1910.1020 Access to employee exposure and medical records.

**XI. APPENDICES**

Appendix A – Table 1: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

**XII. DOCUMENTATION**

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## **Silica Exposure Control Program** **Appendix A**

### **I. DEFINITIONS**

*Action level* means a concentration of airborne respirable crystalline silica of 25  $\mu\text{g}/\text{m}^3$ , calculated as an 8-hour TWA

*Assistant Secretary* means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

*Director* means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

*Employee exposure* means the exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.

*High-efficiency particulate air [HEPA] filter* means a filter that is at least 99.97 percent efficient in removing monodispersed particles of 0.3 micrometers in diameter.

*Objective data* means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity. The data 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.

*Permissible exposure limit (PEL)*. The employer shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50  $\mu\text{g}/\text{m}^3$ , calculated as an 8-hour TWA.

*Physician or other licensed health care professional [PLHCP]* means 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 health care services required by paragraph (i) of this section.

*Regulated area* means an area, demarcated by the employer, where an employee's exposure to airborne concentrations of respirable crystalline silica exceeds, or can reasonably be expected to exceed, the PEL.



*Respirable crystalline silica* means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particlesize- selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality- Particle Size Fraction Definitions for Health-Related Sampling.

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

## **II. DOCUMENTATION**

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**Silica Exposure Control Program**  
**Appendix B**

**I. TABLE 1: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica**

Specified exposure control methods

A. For each employee engaged in a task identified on Table 1, the engineering controls, work practices, and respiratory protection specified for the task on Table 1 shall be properly implemented, unless the exposure of the employee to respirable crystalline silica has been assessed and limited.

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
(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.	None	None
(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.	None  APF 10	None  APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
(iii) Handheld power saws for cutting fibercement board (with blade diameter of 8 inches or less)	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with commercially available dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</p>	None	None
(iv) Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>When used outdoors.</p> <p>When used indoors or in an enclosed area.</p>	<p>None</p> <p>APF 10</p>	<p>None</p> <p>APF 10</p>
(v) Drivable saws	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None
(vi) Rig-mounted core saws or drills	<p>Use tool equipped with integrated water delivery system that supplies water to cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowling with dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>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.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	None	None
(viii) Dowel drilling rigs for concrete	<p>For tasks performed outdoors only:</p> <p>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.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	APF 10	APF 10
(ix) Vehicle-mounted drilling rigs for rock and concrete	<p>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.</p> <p>OR</p> <p>Operate from within an enclosed cab and use water for dust suppression on drill bit.</p>	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.  When used outdoors.  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	None  APF 10	None  APF 10
	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



Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
	<p>For cuts of four inches in depth or less on any substrate:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p> <p>OR</p> <p>Use a machine equipped with supplemental water spray designed to suppress dust.</p> <p>Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None
		None	None
(xvi) Crushing machines	<p>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).</p> <p>Operate and maintain machine in accordance with manufacturer’s instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	None	None
(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	<p>Operate equipment from within an enclosed cab.</p> <p>When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</p>	None	None
		None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	≥ 4 hours/shift
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica- containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

B. When implementing the control measures specified in Table 1, each employer shall:

1. For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
2. For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
3. 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.

C. 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.

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