



Oregon State University
Environmental Health
and Safety

SILICA EXPOSURE CONTROL PLAN



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Purpose

The purpose of this document is to establish and implement a written exposure control plan that identifies tasks involving silica exposure and methods used to protect employees.

University departments and operating units are required to implement the components of the plan needed to ensure compliance with the Occupational Safety and Health Administration (OSHA) and Oregon OSHA standards applicable to respirable crystalline silica, including 29 CFR 1910.1053 (General Industry Standard), 29 CFR 1926.1153 (Construction Industry Standard), and OARs 437.002.1053-1065.

Scope

This program covers University employees who work with silica, establishes the minimum requirements for working with silica, and applies to employees who are exposed over the action level.

Responsibilities

Environmental Health & Safety

Environmental Health & Safety (EHS) provides program oversight and consultation to Oregon State University work groups regarding potential risks, exposure prevention, monitoring, and training relating to silica dust exposures.

Conduct building/material assessments for silica containing materials and perform employee silica hazard assessments/monitoring upon request.

Regularly assess silica work sites on campus and provide review of site specific written exposure control plans upon request.

Oregon State University Departments

Each department with responsibilities for maintaining buildings or working in buildings with potential exposure to silica should:

- Ensure the applicable components of the Silica Exposure Control Program are available to all affected employees.
- Ensure employees who are expected to work in, or with, building materials where there is a potential risk for silica exposure receive proper training.
- Annually review their site specific written exposure control plans.

Supervisors

Supervisors who oversee personnel with responsibilities to work in areas where there is a risk of exposure to silica dust, must ensure their employees are properly trained on



the applicable contents of the Silica Exposure Control Program and that they are provided appropriate personal protective equipment (PPE) when conducting such work.

Authorized Person

Employees working in areas where there is an identified risk of silica dust exposure above the action limit must be properly trained on all applicable elements of the Silica Exposure Control Program; and be provided and utilize the appropriate PPE for the task being performed.

Contractors

Contractors shall comply with all Oregon State University [Safety Policies and Procedures](#) in accordance with the Silica Exposure Control Program.

Definitions

The following definitions are provided to allow for a better understanding of the Silica Exposure Control Program.

Action Level: a concentration of airborne respirable crystalline silica of $25 \mu\text{g}/\text{m}^3$, calculated as an 8-hour time weighted average (TWA).

Competent Person: 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.

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

Exposure Assessment: The initial determination to find if any employee may be exposed to lead at or above the permissible exposure level. Until the assessment is completed, employees shall take all precautions necessary to maintain exposures below the PEL.

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

Permissible Exposure Limit: (PEL) the OSHA limit for silica dust exposure. It is set at $50 \mu\text{g}/\text{m}^3$, averaged over an 8-hour workday, as a TWA.

Silica containing material: Any material, which has the potential to contain silica at levels, which 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. The disease is not curable, but can be prevented through the use of protective systems.

Plan Requirements

Initial Exposure Assessment

Exposure monitoring will be conducted when any employee is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level.

Employee exposure monitoring is not required if the task is listed in 29 CFR 1926.1153(c)(1) and the engineering controls, work practices, and PPE are used as listed (See Table 1).

Exposure monitoring is also not required if EHS has either objective or historic data that shows employees will not be exposed above limits for the task being performed. If a department purchases tools not listed in the SECM that incorporate dust controls, notify EHS so we can obtain their objective data on the effectiveness of the dust controls.

If a task needs to be performed that is not outlined in Table 1 of this program, please contact EHS for assistance.

Periodic Exposure Assessment

If the most recent results are at or above the action level but are below the permissible exposure limit (PEL), monitoring will be repeated every 6 months.

If the most recent results are at or above the PEL, monitoring will be repeated within 3 months.

Periodic exposure monitoring may be discontinued if results from two consecutive sampling periods taken at least 7 days apart show that employee exposure is below the action level.

Monitoring will be conducted whenever a change in the 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.

Employee Notification

Employee(s) will be notified in writing of the results of the assessment within 15 workdays or the results will be posted in an appropriate location accessible to all affected employees.

If the result is above the PEL, the notification will include the means that are being taken to reduce the exposure to below the PEL.

Regulated and Restricted Areas

A **regulated area** will be established where work exposures at a fixed location are known to be at or above the PEL on a consistent basis.

A **regulated area** must be separated from other areas in a way that will minimize the number of employees exposed. The following sign will be posted at each entrance to the regulated area:

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

Only employees who have work to perform are allowed to enter a regulated area. All employees entering the regulated area must wear a respirator, regardless of the amount of time spent in the area. Air from a regulated area shall not be recirculated by the building ventilation system unless it is first cleaned by HEPA filtration.

Tasks performed in accordance with Table 1 and where respirators are required for the task and the task will not be performed regularly in the same area or location shall be performed in a **temporary restricted area**. A temporary restricted area shall be designated by signs, barriers, or other effective means that will assure unauthorized persons do not enter. Where these tasks are performed near areas occupied by the general public, dust barriers shall be installed as needed to prevent dust migrating into those areas. If a building ventilation system provides air to the area where restricted work is being performed, the air returns from that system shall be blanked or closed while that work is in progress.

Where tasks are performed indoors or in an enclosed area, exhaust shall be provided as needed to minimize the accumulation of visible airborne dust. If this exhaust is vented inside the building, or outside in an area where the public may be exposed, the exhaust system must incorporate HEPA filtration. For tasks performed using wet methods, water shall be applied at a rate that is sufficient to minimize the release of visible dust.

Engineering and Work Practice Controls

For any work task or work location where the exposure to respirable silica is above permissible limits, engineering controls or work practice controls will be implemented to lower the exposure as much as possible. When engineering and work practice controls cannot lower the exposure to below permissible limits (or when specified by Table 1), respirators shall be used in accordance with this Plan and [Oregon State University's Respiratory Protection Program](#).

Housekeeping

Dry sweeping or dry brushing of dust containing silica is **prohibited**. Instead, use a HEPA filtered vacuum cleaner, followed by wet mopping or wet sweeping as necessary.

Do not use compressed air to clean an employee's clothes that have become soiled with dust containing respirable crystalline silica. Rather, use a HEPA filtered vacuum to remove dust before laundering. Coveralls can be used to minimize the transfer of dust to other areas. Vacuum the coveralls with a HEPA filtered vacuum before removing and launder or dispose of them as appropriate. Disposable apparel and vacuum filters can be disposed in normal trash.

Written Exposure Control Plan

When departmental tasks with potential exposure to silica containing materials are limited to those identified in Table 1 and are performed in accordance with the outlined controls then this Plan will serve as the Written Exposure Control Plan. When departmental tasks with potential exposure to silica containing materials are performed that are not identified within this Plan, the department must develop a Departmental specific written exposure control plan (or standard operating procedure) that describes departmental implementation of this Plan and appropriate controls.

For fixed worksites where exposures above the action level occur on a routine basis, a work site specific written exposure control plan must be developed. Please contact EHS for assistance with writing your plan. The plan must be reviewed at least annually.

A template written exposure control plan is provided in Appendix A.

Respiratory Protection

Respiratory protection is required during certain activities identified in Table 1 of this plan. It may also be required if other tasks are identified where employee exposures exceed the PEL and work practice or engineering controls are not feasible or effective enough to reduce exposures. All respirator use will comply with the OSHA Respirator Standard and [Oregon State University's Respiratory Protection Program](#).

Medical Surveillance

Medical surveillance will be required for any employee who meets any of the following criteria:

- Exposure to respirable crystalline silica above the permissible exposure limit.
- Exposure to respirable crystalline silica at/above the action level for 30 or more days per year.
- Required to wear a respirator for 30 or more days a year (per Table 1).
- Work with crystalline silica and develop signs/symptoms of excessive exposure to respirable crystalline silica.

Medical surveillance will comply with all the requirements of 1910.1053 and 1926.1153.

Training

Training is required annually and when starting a job where silica-containing materials will be impacted and may result in exposures above the action limit or where tasks in Table 1 are performed. Training may be obtained by utilizing OSU's online Bridge training system.

This training will cover the following topics:

- Health hazards associated with respirable crystalline silica,
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica,
- Specific measures the employer has implemented to protect employees from exposure, including engineering and work practice controls as well as respiratory protection.
- Information about the purpose of the medical surveillance program.

Hazard Communication

Crystalline silica shall be included on the list of hazardous substances for areas working with it. Silica containing products must also have safety data sheets available.

Recordkeeping

Environmental Health & Safety will keep records of employee exposure testing. Medical Surveillance records will be kept by Occupational Medicine.

Review and Audits

Regularly assess silica work sites on campus and provide review of site specific written exposure control plans upon request.

Departments shall annually review their site specific written exposure control plans.

Table 1 - 29 CFR 1926.1153(c)(1) Respirable Silica Control Methods

If Doing Construction Task or Equipment Operation		With These Engineering and Work Practice Control Methods	Then the Following Respiratory Protection is Required	
			≤ 4 hours/shift	>4 hours/shift
1	Stationary masonry saws	<ul style="list-style-type: none"> 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
2a	Handheld power saws (any blade diameter) when used outdoors	<ul style="list-style-type: none"> 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	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
2b	Handheld power saws (any blade diameter) when used indoors or in an enclosed area	<ul style="list-style-type: none"> 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. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
3	Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) for tasks performed outdoors only	<ul style="list-style-type: none"> 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. 	None	None
4a	Walk-behind saws when used outdoors	<ul style="list-style-type: none"> 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
4b	Walk-behind saws when used indoors or in an enclosed area	<ul style="list-style-type: none"> 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. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
5	Drivable saws for tasks performed outdoors only	<ul style="list-style-type: none"> 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
6	Rig-mounted core saws or drills	<ul style="list-style-type: none"> Use tool equipped with integrated water delivery system that supplies water to cutting surface. 	None	None



If Doing Construction Task or Equipment Operation		With These Engineering and Work Practice Control Methods	Then the Following Respiratory Protection is Required	
			≤ 4 hours/shift	>4 hours/shift
		<ul style="list-style-type: none"> Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. 		
7	Handheld and stand-mounted drills (including impact and rotary hammer drills)	<ul style="list-style-type: none"> Use drill equipped with commercially available shroud or cowl 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
8	Dowel drilling rigs for concrete for tasks performed outdoors only	<ul style="list-style-type: none"> 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. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
9a	Vehicle-mounted drilling rigs for rock and concrete	<ul style="list-style-type: none"> 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. 	None	None
9b	Vehicle-mounted drilling rigs for rock and concrete	<ul style="list-style-type: none"> Operate from within an enclosed cab and use water for dust suppression on drill bit. 	None	None
10a	Jackhammers and handheld powered chipping tools when used outdoors	<ul style="list-style-type: none"> Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10b	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10c	Jackhammers and handheld powered chipping tools when used outdoors	<ul style="list-style-type: none"> 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. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask



If Doing Construction Task or Equipment Operation		With These Engineering and Work Practice Control Methods	Then the Following Respiratory Protection is Required	
			≤ 4 hours/shift	>4 hours/shift
		<ul style="list-style-type: none"> 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. 		
10d	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	<ul style="list-style-type: none"> 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. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
11	Handheld grinders for mortar removal (i.e., tuckpointing)	<ul style="list-style-type: none"> 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. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	Powered Air-Purifying Respirator (PAPR) with P100 Filters
12a	Handheld grinders for uses other than mortar removal for tasks performed outdoors only	<ul style="list-style-type: none"> 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. 	None	None
12b	Handheld grinders for uses other than mortar removal when used outdoors	<ul style="list-style-type: none"> 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. 	None	None
12c	Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area	<ul style="list-style-type: none"> 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 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask



If Doing Construction Task or Equipment Operation		With These Engineering and Work Practice Control Methods	Then the Following Respiratory Protection is Required	
			≤ 4 hours/shift	>4 hours/shift
		wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
13a	Walk-behind milling machines and floor grinders	<ul style="list-style-type: none"> 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. 	None	None
13b	Walk-behind milling machines and floor grinders	<ul style="list-style-type: none"> 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. 	None	None
14	Small drivable milling machines (less than half-lane)	<ul style="list-style-type: none"> 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. 	None	None
15a	Large drivable milling machines (half-lane and larger) for cuts of any depth on asphalt only	<ul style="list-style-type: none"> 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. 	None	None
15b	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	<ul style="list-style-type: none"> 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. 	None	None
15c	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	<ul style="list-style-type: none"> 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. 	None	None
16	Crushing machines	<ul style="list-style-type: none"> 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). 	None	None



If Doing Construction Task or Equipment Operation		With These Engineering and Work Practice Control Methods	Then the Following Respiratory Protection is Required	
			≤ 4 hours/shift	>4 hours/shift
		<ul style="list-style-type: none"> 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. 		
17a	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	<ul style="list-style-type: none"> Operate equipment from within an enclosed cab. 	None	None
17b	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	<ul style="list-style-type: none"> When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions. 	None	None
18a	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	<ul style="list-style-type: none"> Apply water and/or dust suppressants as necessary to minimize dust emissions. 	None	None
18b	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	<ul style="list-style-type: none"> When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab. 	None	None



Appendix A – Site Specific Exposure Control Plan Template

Site Specific Exposure Control Plan

Department: *Department Name*

Site Supervisor: *Supervisor Name*

Review Date: *Last date reviewed (updated annually)*

Tasks Involving Silica: *Description of work being conducted that might involve silica exposure.*

Control Methods Implemented: *List of engineering and work practices used to limit potential silica exposures to employees.*

Respiratory Protection Used: *Mask model and cartridge type used for employees if applicable.*

Housekeeping Procedures for Cleaning: *Methods used to clean up silica containing dust in workplace.*



Appendix B – Example Silica Danger Sign



RESPIRABLE CRYSTALLINE SILICA

MAY CAUSE CANCER

CAUSES DAMAGE TO LUNGS

WEAR RESPIRATORY PROTECTION IN

THIS AREA

AUTHORIZED PERSONNEL ONLY