

Silica Exposure Control Plan

Date Created: June 2018

Date Revised: April 2022

Reviewed By: EHS Staff

INTRODUCTION

Silica is a general name for a compound formed from the elements silicon and oxygen into the molecular form crystalline silica (SiO_2). The three main forms of silica are alpha quartz, cristobalite, and tridymite. The polymer most abundant and most hazardous to human health is alpha quartz, commonly referred to as crystalline silica. The health hazards of silica come from breathing in fine dust particles. If crystalline silica becomes airborne through industrial activities, exposure to crystalline silica dust (specifically exposure to the size fraction that is considered to be respirable) can lead to a disease called silicosis. The fine particles are deposited in the lungs, causing thickening and scarring of the lung tissue. The scar tissue restricts the lungs' ability to extract oxygen from the air. The symptoms of the diseases may not appear for many years. Respirable silica dust is very small and is not visible to the human eye. Due to the recognized negative health effects of prolonged exposure to silica, the use, disturbance, and management of silica debris is regulated by the Oregon Occupational Safety and Health Administration (OR-OSHA) Silica Standard: OAR 437, Div. 2, Subdivision Z – Silica Respirable crystalline silica in general industry and construction activities.

Portland State University is dedicated to ensuring that all reasonable precautions are taken to protect our employees and campus community from the adverse health effects associated with exposure to silica.

PURPOSE

The purpose of the Silica Exposure Control Plan (SECP) is to provide a template for work practices to minimize the potential exposure to silica-containing materials during demolition, maintenance, and renovation activities. This program outlines steps to ensure that employees who work with and around silica-containing materials are not exposed to hazardous levels of silica, provide procedures that will limit exposures during work activities, and outline steps of monitoring and controls to document worker exposures to respirable silica.

This SECP is intended as a summary of the OR-OSHA Silica Standard for occupational exposures to respirable silica. A complete copy of this document will be provided by EHS by request, or linked at <https://osha.oregon.gov/OSHArules/div2/div2Z-437-002-1053-1065-silica.pdf>, and should be consulted for additional information.

RESPONSIBILITIES

Environmental Health and Safety (EHS) – EHS is responsible for providing technical guidance to employees concerning silica hazard evaluation and control, and the implementation of the Silica Exposure Control Plan, including:

- Providing program oversight and consultation regarding potential risks, exposure prevention, and training relating to potential crystalline silica dust exposures.
- Implementing a respirable silica exposure monitoring program, or otherwise ensuring representative exposure monitoring results are available. The purpose of the program will ensure that (over time) PSU has quantifiable silica exposure data available for all regularly occurring and reasonably foreseeable work activities.
- Ensuring that all employees (i.e. Managers, Supervisors and Workers) have access to the necessary education and training related to this policy, as well as project/task specific SECPs. These trainings will involve silica awareness for staff members as well as “competent person” training for staff tasked with implementation of the aspects of this SECP.
- Maintaining applicable records (i.e. exposure sampling, inspections, respirator fit tests, training records, etc.) in accordance with PSUs record retention procedures/practices.

- Oversee medical surveillance program and respiratory protection program.
- Assist with the selection of appropriate personal protective equipment and/or task specific engineering controls.

Construction and Maintenance Supervisors – Departmental managers and supervisors are responsible for ensuring that all workers are properly trained prior to working with silica-containing materials and that work is performed in accordance with the SECP and task specific written exposure control plans, including:

- Identify a competent person for work potentially impacting silica-containing materials.
- Ensure that all new employees complete Silica Awareness training prior to performing tasks which may impact silica-containing materials.
- Schedule employees for respirator training and fit testing annually, as needed.
- Ensure that the SECP is available to all affected employees and that all work impacting silica-containing materials are performed in accordance with this plan.

Project Managers - Project managers shall coordinate with contractors employed to work on PSU projects to verify that they have a silica control plan in compliance with the silica standard, including:

- Obtaining and provide to EHS silica exposure control plans for contractors who will be performing silica-related tasks on campus.
- Conducting regular jobsite inspections to ensure that all work impacting silica-containing materials are performed in accordance with the contractor's submitted plan.
- Completing silica training, as assigned by EHS.

Competent Persons – Competent persons are those who receive training in silica control strategies and in developing task specific written exposure control plans. Each department employing workers affected by the SECP must identify at least one competent person who is responsible for:

- Identifying potential respirable crystalline silica hazards in the workplace and developing task specific exposure control plans in an effort to mitigate or lessen hazards.
- Regularly inspecting job sites, materials, and equipment to implement this control plan and the silica standard.
- Ensuring that tasks are performed in accordance with OSHA's Table 1, or procedures outlined during previous exposure monitoring events, or the task specific written exposure control plan.
- Coordinating with EHS to schedule exposure monitoring on new tasks not formerly monitored for exposures, or covered under Table 1, to document worker exposures during new or unique tasks.

Employees - Employees are responsible for following the procedures outlined in the Silica Exposure Control Plan, including:

- Ensuring they are familiar with the contents of this SECP and all work practices described in previous exposure monitoring events or the contents of Table 1, which dictate appropriate or prescribed work practices,
- Being familiar with the hazards of silica dust exposure and how to identify exposure potentials,
- Complete silica training, as assigned by EHS.
- Using the assigned personal protective equipment in an effective and safe manner,
- Reporting to their supervisor, PSU project manager, and/or EHS any unsafe behavior or unregulated silica exposures or releases to non-regulated area.

REGULATORY REQUIREMENTS

Oregon OSHA Table 1

OSHA has published a guidance document (Table 1) which identifies common construction tasks that generate high exposures to respirable crystalline silica and specifies engineering controls, work practices, and respiratory protection for each task. When the engineering controls, work practices, and respiratory protection specified for a task on Table 1 are followed, employers are not required to measure respirable crystalline silica exposures to verify that levels are at or below the airborne limits for workers engaged in that task. Each task listed on Table 1 identifies construction tasks along with specific dust control methods, which must be followed as prescribed in order to use the respiratory protection listed in Table 1. In certain circumstances, respirators are required. If the specific requirements of a Table

1 task are not followed, or vary in any way from those listed, additional employee exposure assessments would be required.

Silica Task Specific Written Exposure Control Plan Template (Attachment 1)

The purpose of the Silica Task Specific Written Exposure Control Plan (hereafter referred to as the exposure control plan) is to identify specific tasks representing a silica exposure concern and to prescribe engineering controls, work practices, and housekeeping methods to control and minimize these exposures. The exposure control plan shall be reviewed prior to the start of a project by a silica competent person and be shared with and made available to all affected workers on the project. A copy of the exposure control plan is attached to this document and also available on EHS's website (<https://www.pdx.edu/environmental-health-safety/silica>). The exposure control plan should be completed in accordance with OSHA's Table 1 control measures for tasks that are listed in Table 1. For tasks not listed in Table 1, but for which exposure monitoring has been completed, the exposure control plan should be completed with the prescribed procedures recommended during and after exposure monitoring. For projects involving tasks not covered by OSHA's Table 1, and for which exposure monitoring information is not yet available, the exposure control plan should be developed with EHS, in conjunction with scheduled exposure monitoring.

Permissible Exposure Limit and Exposure Assessments

The permissible exposure limit (PEL) for crystalline silica is an exposure to airborne concentrations which exceed 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), calculated as a time-weighted average (averaged over an 8-hour work period). The PEL is the concentration established by OSHA to which nearly all workers could be exposed for eight hours a day, five days a week, without adverse health effects. The action level for crystalline silica is an exposure to concentrations which exceed 25 $\mu\text{g}/\text{m}^3$. Action levels are used by OSHA to establish the level which requires increased exposure controls, medical surveillance, or industrial hygiene monitoring. The OSHA Silica Standard and this SECP apply to all activities that produce, or may reasonably be expected to produce exposure levels which exceed the action level or PEL. Employees conducting activities that are not identified in OSHA's Table 1, or that do not comply with established engineering controls (previous sampling or manufacturer's data), shall have these tasks monitored with personal exposure assessment to determine if their exposure exceeds the action level or PEL. If exposures are found to exceed the PEL of 50 $\mu\text{g}/\text{m}^3$, respiratory protection will be required for those activities.

Exposure Monitoring:

Employees must undergo airborne silica exposure assessments if they are utilizing alternative control measures to those identified in OSHA's Table 1, performing tasks lacking historic or manufacturer's exposure data, or conducting activities not represented in Table 1 where they can reasonably be expected to be exposed to respirable crystalline silica above the action level. The purpose of the exposure assessments is to identify where exposures are occurring, help to determine proper and effective control methods, and to prevent exposures above the action level or PEL.

There are two options when it comes to employee exposure monitoring: the performance option and the scheduled monitoring option. For each, the competent person on the project shall ensure the assessment reflects the exposures of each employee on each shift, for each job classification, in each work area.

With the performance option, the employer can use monitoring data and objective data to determine exposure potentials. Objective data would include historical monitoring data, manufacturer's data, data from industry-wide surveys, and direct-reading meters along with concentrations of silica in the impacted medium to calculate exposure potentials. In order to use historical or industry-wide data, the workplace conditions must match the activities previously monitored. They have to be similar processes, types of materials, control strategies, and environmental conditions. The performance option must occur before work begins and must be reassessed whenever there is a change in work conditions.

The scheduled monitoring option identifies when and how often monitoring must be done when not relying on the performance option. In this option, initial monitoring is conducted as soon as work begins, and the results dictate if and when further testing is necessary. If initial results are below the action level, no further testing is required. If results are above the action level but below the PEL, monitoring must be repeated every six months. If initial results are above the PEL, monitoring must be repeated every three months and appropriate engineering controls (ie. personal protective equipment) shall be utilized. Should the workplace conditions change (change in materials, controls, environmental conditions), monitoring will need to be repeated and follow the same schedule. For projects where personal exposure monitoring is performed, employees will be notified of the results, in writing, within 5 business days of receipt of the laboratory results.

Competent Persons:

Competent persons shall be identified to frequently and regularly inspect job sites, materials, and equipment to implement the SECP. This person is someone who has appropriate training to identify existing and foreseeable respirable crystalline silica hazards and is authorized to take prompt corrective action. The competent person can be someone that is also working on the jobsite or task or the project manager.

Each department employing workers affected by the OSHA Silica Standard and this plan shall identify a competent person for each project potentially impacting silica-containing materials and communicate that information to the affected employee and EHS.

Engineering and work practice controls

Some equipment can be equipped with commercially available dust collection systems. In this case, the shroud or cowl must be intact and installed by the manufacturer's instructions, air flow must be provided as recommended by the manufacturer, and the filters must be rated a minimum of 99% efficiency and cleaned and changed in accordance with the manufacturer's instructions.

RESPIRATORY PROTECTION

Respiratory protection will be required during certain activities when engineering controls are not able to reduce exposure or when these controls are not feasible. Respirators will be required:

- When exposures exceed the PEL,
- During periods necessary to install or implement feasible engineering and work practice controls,
- During tasks such as maintenance and repair where these controls are not feasible, and
- During the initial exposure assessment period, prior to identifying exposure levels or the appropriate engineering controls to limit exposure to below the action level.

Respirator use at PSU must be in accordance with OSHA's Respirator Standard and PSU's Respiratory Protection Program. When respirators are required, employees must receive medical clearance by a physician or other healthcare professional and attend training and fit testing offered by EHS prior to the use of respiratory protection.

Silica dust is a particulate so respirators with particulate filters will be selected. For most operations and tasks where respirators are required (either by OSHA's Table 1 or by exposure assessment results), respirators with an assigned protection factor of 10 will be assigned. These include half-face respirator with HEPA (P100) cartridges or dust masks with an N95 filter.

WORK AREA ISOLATION AND REGULATED AREA SIGNAGE

Anywhere the exposure is above the PEL, a regulated area must be established. The regulated area must be separated from other areas in a way to minimize the number of people potentially exposed to airborne silica levels. At each entrance to the regulated area, signage with the following language must be posted:

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

These signs will be posted at each entrance to a regulated area. PPE is required for entry into a regulated area. Regulated area access should be restricted by using caution tape or a similar physical barrier with appropriate signage.

HOUSEKEEPING

In addition to following engineering and work practice controls during activities that produce a respirable crystalline silica exposure potential, housekeeping methods shall also be addressed as this could contribute to employee exposure. Some activities, such as using drills, require the use of HEPA vacuums to clean out the drill holes after they are made.

Clean-up activities involving respirable crystalline silica dust must be done utilizing wet methods and/or HEPA vacuums. Dry brushing, sweeping, and use of compressed air are prohibited when cleaning up silica dust, unless wet

sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible (i.e., the other cleaning methods would not be effective, would cause damage, or would create a hazard in the workplace). In these instances, specific housekeeping practices must be outlined in the site-specific silica exposure control plan and exposure monitoring should be considered.

The use of dry sweeping compounds for dust and debris cleanup is not currently supported or allowed by PSU's SECP. Specific instances where the use of dry sweeping compounds would be of beneficial use should be included in the site-specific silica exposure control plan and EHS should be consulted in order to collect exposure samples to document the effectiveness of this material.

During indoor activities, efforts should be made to contain the dust that is generated with the use of protective floor coverings, HEPA filtered dust collection, temporary plastic walls anchored with zip poles, and/or catch bags when feasible. This will reduce potential for dust becoming airborne, spreading, and aid final cleaning efforts. For projects that may generate silica-containing dust, engineering controls should be considered in order to isolate the work area from the surrounding environment. These may include building temporary walls with sheet plastic and zip-poles to limit the spread of debris and dust. Appropriate engineering controls and containment barriers should be considered and identified by the competent person in the site-specific silica exposure control plan developed for each project.

No visible dust should remain during final cleaning. For demolition projects, multiple layers of floor covering (sheet paper or plastic) may be employed to contain debris and aid in cleanup. During final clean-up, the top layer of material can be wet down and rolled up to contain debris and aid in disposal. For renovation and detail work that prohibit the use of water or wet mopping (ie. drywall finishing dust cleanup), the use of a layer of paper floor protection may create an easier surface for HEPA vacuum cleanup and should be considered.

MEDICAL MONITORING

Employees exposed to crystalline silica levels above the PEL for 30 or more days per year, employees required to wear a respirator for 30 or more days per year, or any employee working with crystalline silica who develops signs/symptoms of excessive exposure, should be enrolled in the Medical Surveillance Program. Medical surveillance is required within 30 days of an employee's initial assignment and must be repeated at least every three years. The medical surveillance program consists of:

- A baseline physical examination with special emphasis on the respiratory system,
- A chest X-ray,
- A pulmonary function test,
- Testing for latent tuberculosis infection,
- Any other tests deemed appropriate by the Physician or other licensed health care professional legally permitted to provide these types of medical surveillances and procedures.

Medical surveillance will be performed by Kaiser Permanente Occupational Health Program and results should be provided to the affected employee and their supervisor within 15 days of the assessment. EHS will oversee the medical surveillance process and ensure that medical surveillance procedures comply with Oregon Administrative Rule (OAR) 437-002-1962.