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Respirable Crystalline Silica

Respirable crystalline silica exposure at hazardous levels can lead to lung cancer, silicosis, chronic obstructive pulmonary disease, and kidney disease. Crystalline silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica. All three forms may become respirable size particles when individuals chip, cut, drill, or grind objects that contain crystalline silica. The principle objective of the University of Pittsburgh’s Silica Exposure Control Plan is to minimize the potential exposure of all faculty, students, and staff to airborne respirable crystalline silica. This plan follows the requirements of both the OSHA General Industry Rule (29 CFR 1910.1053) and the OSHA Construction Rule (29 CFR 1926.1153) as University employees may be involved in activities that are covered under either rule relative to potential crystalline silica exposures. This policy requires that exposures be minimized, in order of preference, via:

1. Hazard Elimination or Substitution;
2. Engineering Controls;
3. Administrative Controls; and
4. Personal Protective Equipment.

The requirements in this plan apply to all Pitt University employees who are exposed to respirable crystalline silica at or above the OSHA action level or permissible exposure limit or perform construction-related tasks which are identified in Table 1 of the standard, as determined by Environmental Health and Safety. All work involving chipping, cutting, drilling, grinding, or similar activities of materials containing crystalline silica can lead to the release of respirable-sized particles. Such exposure levels require mitigation via the hierarchy of controls listed above.

Definitions

AL – action level (25 µg/m³ as an 8-hour time-weighted average)
 HEPA filter – high-efficiency particulate air filter
 PEL – permissible exposure limit (50 µg/m³ as an 8-hour time-weighted average)
 PLHCP – physician or other licensed health care professional
 SAE – sampling and analytical error
 TWA – time-weighted average

Responsibilities

Various Pitt University departments and employees have responsibility under this plan:

Environmental Health and Safety (EH&S)

- Providing oversight and consultation to Pitt University employees regarding potential risks, exposure prevention, and training relating to potential crystalline silica dust exposures.
- Implementing a suitable respirable crystalline silica exposure monitoring program, or otherwise ensuring representative exposure monitoring results are available.
- Designating a “Competent Person” and defining/assigning appropriate responsibilities.
- Ensuring project and/or task specific Exposure Control Plans (ECPs) are developed, communicated, and effectively implemented as appropriate.

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- Ensuring that all affected employees and their managers or supervisors receive the necessary training related to this plan, as well as task specific ECPs.
- Maintaining applicable records, i.e. exposure sampling, respirator fit tests, training, etc. in accordance with OSHA regulations.
- Notifying Employee Health Services of any employee/job category that meets any of the criteria for inclusion in this plan.
- Conducting a review of this plan annually and updating it as necessary.

Employee Health Services (MyHealth@Work)

- Conducting medical surveillance in accordance with OSHA standards (1910.1053 and 1926.1153).
- Maintaining records of the physical examinations, x-rays and tests.
- Providing the Employee and Employer (EH&S) with the PHLCP's Written Medical Opinion, as required under the standard.

Supervisors/Foremans

- Acting as the "Competent Person" as appropriate:
 - Inspecting job sites, materials, and equipment on a regular and frequent basis;
 - Identifying existing and foreseeable respirable crystalline silica hazards and taking prompt corrective action to minimize or eliminate these hazards;
 - Being familiar with the Silica Exposure Control Plan;
 - Notifying EH&S when problems arise, there is a change in engineering controls and work practices, or in situations of uncontrolled releases of visible dust in occupied buildings.
- Providing affected new employees with informal on-the-job training about this plan.
- Notifying EH&S and Employee Health Services about workplace conditions and potentially affected employees.
- Making information and training materials available to potentially affected employees.
- Supplying appropriate equipment and personal protective equipment (PPE) to affected employees free-of charge.
- Requiring affected employees to wear personal protective equipment as outlined in this plan.
- Ensuring that affected employees receive medical surveillance and attend required training.

Affected Employees

- Observing the procedures and requirements outlined in this plan.
- Attending training sessions.
- Complying with medical surveillance requirements.
- Wearing respiratory protection and other PPE, as required.
- Notifying supervisors of changes in the workplace that could cause an increase in exposures to respirable crystalline silica.

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Requirements

Specific Exposure Control Methods

The University's Facilities Management staff are responsible for maintaining and renovating buildings. Potential silica-containing substrates and materials encountered include brick, cement, concrete, concrete block, drywall, grout, mortar, paints containing silica, plasters, roof tile, and various types of tile. Activities impacting these materials also vary, including cutting/sawing, demolishing/disturbing, drilling/coring, grinding, jackhammering, milling, mixing/pouring, sanding, scraping, and even clean-up activities such as sweeping and vacuuming.

OSHA has published a list of typical equipment and tasks, necessary engineering controls and respiratory protection (Table 1 of the standard). Exposure monitoring is not required when following the provisions of Table 1. The table below identifies the tasks which are identified in the Respirable Crystalline Silica Standard's Table 1 that Pitt Facilities Management staff perform.

The table also includes the methods of control applicable to that tool/task that Pitt staff will follow to ensure their respirable crystalline silica exposures are minimized.

Integrated water delivery systems and shrouded power equipment with HEPA exhaust are the primary methods of control for all activities that disturb silica-containing materials. The equipment/tasks identified in the Standard's Table 1 that are likely to be performed by Facilities Management staff include:

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

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	APF 10 APF 10

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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 fiber-cement 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> <ul style="list-style-type: none"> - When used outdoors. - When used indoors or in an enclosed area. 	None APF 10	None APF 10
(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
(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	None None

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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.	None APF 10	APF 10 APF 10
	– When used outdoors. – When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	None
	– When used outdoors. – When used indoors or in an enclosed area.	None None	None APF 10

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Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	<p>Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p> <p>Use machine equipped with dust collection system recommended by the manufacturer.</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 manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.</p>	None	None
(xiv) Small drivable milling machines (less than half-lane)	<p>Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None
(xv) Large drivable milling machines (half-lane and larger)	<p>For cuts of any depth on asphalt only:</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>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. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	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

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Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(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	Operate equipment from within an enclosed cab.	None	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
(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

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

The tasks that Facilities Management staff may perform on silica-containing materials that are not represented in the Table 1 list include scraping off painted drywall and plasters, light demolition activities involving handheld tools and reciprocating saws, mixing and pouring, and cleanup methods. Engineering and work practice controls will be used, employee exposure monitoring will be conducted, and respiratory protection will be employed, as necessary.

In addition to Facilities Management staff, there may be other University staff who have the potential to be exposed to respirable crystalline silica above the action limit while performing various tasks. If these tasks fall outside the scope of Table 1, EH&S will perform an exposure assessment to determine the risk and necessary controls. 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. Exposure monitoring is not required if the task is listed under the Specified Exposure Control Methods section of this plan and the engineering controls, work practices, and PPE are used as listed. Exposure monitoring is also not required if EH&S has either objective or historic data that shows employees will not be exposed above limits for the task being performed.

Employees will be notified in writing of the results of the monitoring within 15 workdays of completing the exposure assessment. If the results indicate exposures above the PEL, then the report will include recommended corrective actions to reduce exposures.

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Housekeeping

Dry sweeping or dry brushing of dust containing respirable crystalline silica is prohibited. Instead, use a HEPA filtered vacuum cleaner, followed by wet mopping or wet sweeping as necessary. Wet sweeping compounds can be an acceptable dust suppression housekeeping method provided that the compounds are non-grit, oil, or wax based. If HEPA vacuuming or wet mopping/sweeping is not feasible because doing so may cause damage to equipment or create a greater hazard, then EH&S must be contacted to discuss alternative cleaning methods.

Do not use compressed air to clean an employee's clothes that have become soiled with dust containing respirable crystalline silica or use compressed air to clean skin and clothing at any time. A HEPA filtered vacuum should be used to remove dust followed by laundering. Coveralls can be used to minimize the transfer of dust to other areas such as an office, break room, vehicle or home environment. Vacuum the coveralls with a HEPA filtered vacuum before removing to launder or, if disposable, place in the normal trash. Vacuum filters can also be placed in the normal trash.

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. 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.

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 respiratory use will comply with the OSHA Respirator Standard (29 CFR 1910.134 and 29 CFR 1926.103) and the University's Respiratory Protection Program (EH&S Guideline Number: 07-001).

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.

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Training

Training is required upon initial assignment to a job where silica-containing materials will be impacted and may result in exposures above the AL or where tasks in Table 1 are performed. 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,
- The contents and availability of the Construction and General Industry OSHA Silica Standards, as applicable,
- The identification of the Competent Person (for construction related activities),
- The purpose and description of the medical surveillance program.

Record-keeping

Environmental Health and Safety will maintain employee exposure information for at least 30 years. Medical Surveillance records will be kept by the Employee Health Services for the duration of the employee's employment, plus 30 years. Medical records for staff employed by the University for less than one year need not be retained beyond the term of employment, as long as they are provided to the employee upon termination of employment.