WILLIAM & MARY | ENVIRONMENTAL HEALTH & SAFETY

Title: Respirable Crystalline Silica Program	**No.**
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I. Objective

The William & Mary respirable crystalline silica program has been developed to prevent employee exposure to hazardous levels of respirable crystalline silica that could result through construction activities or general industry activities within job locations. It is written in compliance with the federal Occupational Safety and Health Administration (OSHA) respirable crystalline silica standards for General Industry (29 CFR 1910.1053) and Construction (29 CFR 1926.1153).

Crystalline silica is a basic component of soil, sand, granite and many other minerals. Quartz is its most common form. Materials composed of crystalline silica, include, but are not limited to, the following: concrete, asphalt, pre-formed structures (inlets, pipe, etc.). All work involving chipping, cutting, drilling, grinding, or similar activities of materials containing crystalline silica can potentially lead to the release of respirable-sized particles.

II. Scope

This program applies to all employees who have the potential to be exposed to respirable crystalline silica. It applies to all occupational exposures to respirable crystalline silica in construction and general industry work, except for the following:

A. Where the employer has objective data demonstrating employee exposure will remain below 25 micrograms of respirable crystalline silica per cubic meter of air (25 µg/m3) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

B. Exposures that result from the processing of sorptive clays.

In addition to the requirements of this program, William & Mary will comply with other programs and OSHA standards, such as 29 CFR 1910.134 (Respiratory Protection).

III. Definitions

Action Level means a concentration of airborne respirable crystalline silica of 25 µg/m3, calculated as an 8-hour TWA.

Competent Person means an individual who can identify existing and foreseeable respirable crystalline silica hazards in the workplace and who has the authorization to take prompt corrective measures to eliminate or minimize them, per 29 CFR 1926.1153.

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) means the employer shall ensure that no employee is exposed to an airborne concentration of Respirable crystalline silica in excess of 50 µg/m3, 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 the medical surveillance section of the OSHA respirable crystalline silica standard.

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-particle size 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.

IV. Responsibilities

Responsibilities for implementing the respirable crystalline silica program are as follows:

A. Office of Environmental Health & Safety (EH&S)

i. Assist departments with job site and hazard assessments for silica containing materials, as needed.

- Hazard assessments will determine if an employee's exposure to respirable crystalline silica will be above or below the Action Level, 25 µg/m^3 as an 8-hour TWA under any foreseeable conditions.

ii. Update, when necessary, the Exposure Control Plan (ECP) included in this program with the appropriate control measures for any task identified to EH&S that involves exposure to respirable crystalline silica. This plan is in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1; and potentially including (but not limited to) - exposure monitoring, Hazard Communication training, medical surveillance, and housekeeping. (See Appendix A)

- OSHA's Construction Standard Table 1 is a list of 18 common construction tasks along with acceptable exposure control methods and work practices that limit exposure for those tasks

iii. Ensure that William & Mary employees are educated in the hazards of silica and trained to work safely with it in accordance with OSHA's respirable crystalline silica standards and OSHA's hazard communication standard.

iv. Maintain the William & Mary respiratory protection plan, including written records of respirator training and respirator fit test results.

v. Conduct an annual review of the effectiveness of this program.

B. Competent Person

i. Implement this respirable crystalline silica program.

ii. The duties of the competent person are as follows:

- Make frequent and regular inspections of job/project sites, materials, and equipment to implement the written ECP

- Identify existing and foreseeable respirable crystalline silica hazards in the workplace and take prompt corrective measures to eliminate or minimize them.

- Notify the project manager and EH&S of any deficiencies identified during inspections in order to coordinate and facilitate prompt corrective action.

- Facilitate the job hazard analysis (JHA) for silica containing materials in collaboration with supervisors.

iii. Conduct job hazard analysis (JHA) for silica containing materials in conjunction with supervisors and impacted employees.

iv. Select and implement the appropriate control measures in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1.

v. Ensure that work is conducted in a manner that minimizes and adequately controls the risk to employees and others. This includes ensuring that employees use appropriate engineering controls, work practices, and/or wear the necessary PPE.

vi. Where there is risk of exposure to dust, verify employees are properly trained on the relevant contents of this program, the specific ECP, and the applicable OSHA standards (such as hazard communication). Ensure employees are provided the appropriate PPE when conducting such work.

vii. Ensure that employees using respirators have been trained, medically cleared, and fit-tested in accordance with the William & Mary respiratory protection program.

C. Supervisors and Employees

i. Follow recognized work procedures (such as the Construction Tasks identified in OSHA's Construction Standard Table 1) as established in the project's ECP and this program.

ii. Use the assigned PPE in an effective and safe manner.

iii. Participate in respirable crystalline silica exposure monitoring and the medical surveillance program, when applicable.

iv. Report any unsafe conditions or acts to their supervisor or EH&S.

v. Report any exposure incidents or any signs or symptoms of silica illness.

vi. Participate in Respirable Crystalline Silica training.

vii. Notify EH&S whenever a change in the production, process, control equipment, personnel, or work practices occurs.

V. Requirements

Specified Exposure Control Methods

When possible and applicable, William & Mary will conduct activities with potential silica exposure to be consistent with OSHA's Construction Standard Table 1. Supervisors will ensure each employee under their supervision that engage in a task identified on OSHA's Construction Standard Table 1 have fully and properly implemented the engineering controls, work practices, and respiratory protection specified for the task on Table 1, unless EH&S has assessed and limited the exposure of the employee to respirable crystalline silica in accordance with the Alternative Exposure Control Methods Section of this program.

Please refer to OSHA's Construction Standard Table 1 below for task(s) that may be performed by William & Mary employees.

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

Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
			≤ 4 hours/shift	>4 hours/shift
1	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
2a	Handheld power saws (any blade diameter) when used outdoors	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 Face Piece or Half Mask
2b	Handheld power saws (any blade diameter) when used indoors or in an enclosed area	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 Face Piece or Half Mask	N95 (or Greater Efficiency) Filtering Face Piece or Half Mask
3	Handheld power saws for cutting fiber-cement board (with	Use saw equipped with commercially available dust collection system.	None	None

	blade diameter of 8 inches or less) for tasks performed outdoors only	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.		
4a	Walk-behind saws when used outdoors	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	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 Face piece or Half Mask	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
5	Drivable saws for tasks performed outdoors only	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None
6	Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
7	Handheld and stand mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the 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	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 Face piece or Half Mask	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
9a	Vehicle-mounted drilling rigs for rock and concrete	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	Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

	and concrete			
10a	Jackhammers and handheld powered chipping tools when used outdoors	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 Face piece or Half Mask
10b	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	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 Face piece or Half Mask	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
10c	Jackhammers and handheld powered chipping tools when used outdoors	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	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
10d	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	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 Face piece or Half Mask	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
11	Handheld grinders for mortar removal (i.e., tuck-pointing)	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 Face piece or Half Mask	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
12a	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	None	None
12b	Handheld grinders for uses other than mortar removal when used outdoors	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with	None	None

		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.		
12c	Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area	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	N95 (or Greater Efficiency) Filtering Face piece or Half Mask
13a	Walk-behind milling machines and floor grinders	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	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)	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	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	Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.	None	None

	four inches in depth or less on any substrate	Operate and maintain machine to minimize dust emissions.		
15c	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	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	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station	None	None
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	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	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	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	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

	and excavating but not including demolishing, abrading, or fracturing silica-containing materials			

Activities not included in Table 1 that involve working with materials containing Crystalline silica:

- Dry mixing clay and glazes during the ceramic process
- Operating a pug mill during the clay making process
- Cleaning areas where clay making occurs

When implementing the control measures specified in Table 1, William & Mary shall:

- For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust.

- For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust.

- For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:

    - Is maintained as free as practicable from settled dust;

    - Has door seals and closing mechanisms that work properly;

    - Has gaskets and seals that are in good condition and working properly;

    - Is under positive pressure maintained through continuous delivery of fresh air;

    - 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

    - Has heating and cooling capabilities

- Where an employee performs more than one task included on OSHA's Construction Standard 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.

Additional requirements when working indoors:

- Ensure work area is protected by installing plastic or poly barriers between workers and the general public.

- Ensure exhaust ventilation and air conditions systems are either shut down or sealed in the area in which the work is performed.

- Utilize HEPA exhaust ventilation to minimize dust in the work area.

- Use wet method or HEPA vacuum to minimize potential exposures.

- Have all personnel in the immediate area wear the appropriate PPE, such as a respirator as required (must be enrolled in respiratory protection program).

Alternative Exposure Control Methods

Alternative Exposure Control Methods apply for tasks not listed in OSHA's Construction Standard Table 1, or where William & Mary cannot not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1.

EH&S will assess the exposure of each employee who is or may be reasonably expected to be exposed to respirable crystalline silica at or above the action level in accordance with either the Performance Option or the Scheduled Monitoring Option.

- **Performance Option** – EH&S or a third-party consultant will assess the 8-hour TWA exposure for each employee based on any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.

- **Scheduled Monitoring Option**

    - EH&S or a third-party consultant will perform initial monitoring to assess the 8-hour TWA exposure for each employee based on one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, and in each work area.
        - Where several employees perform the same tasks on the same shift and in the same work area, EH&S will plan to monitor a representative fraction of these employees.
        - When using representative monitoring, EH&S will sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.

- If initial monitoring indicates that employee exposures are below the Action Level, EH&S will discontinue monitoring for those employees whose exposures are represented by such monitoring.

- Where the most recent exposure monitoring indicates that employee exposures are at or above the Action Level but at or below the PEL, EH&S will repeat such monitoring within six months of the most recent monitoring.

- Where the most recent exposure monitoring indicates that employee exposures are above the PEL, EH&S will repeat such monitoring within three months of the most recent monitoring.

- Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, EH&S will repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time EH&S will discontinue monitoring for those employees whose exposures are represented by such monitoring, except when a reassessment is required.

- EH&S will reassess exposures 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, or when EH&S has any reason to believe that new or additional exposures at or above the Action Level have occurred.

Employee Notification

- Within 15 working days after completing an exposure assessment EH&S will individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

- Whenever an exposure assessment indicates that employee exposure is above the PEL, the employer shall describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

Regulated Areas

- A regulated area shall be established wherever an employee's exposure to airborne concentrations of respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL.

- Regulated areas shall be demarcated from the rest of the workplace in a manner that minimizes the number of employees exposed to respirable crystalline silica within the regulated area. 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 respirator use shall comply with the OSHA Respirator Standard and the University's Respiratory Protection Program.

Medical Surveillance

Medical Surveillance, per 29 CRF 1926.1153(h), will be required for any employee who meets any of the following criteria:

- Exposure to respirable crystalline silica above the PEL.
- Exposure to respirable crystalline silica at or 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.

Housekeeping

Where such activities could contribute to exposed employees to silica, the following specific housekeeping requirements shall be implemented:

- Prohibit dry sweeping or dry brushing. Wet sweeping and/or HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure shall be used.

- Prohibit use of compressed air to clean clothing or surfaces.

Training

Training is required upon initial assignment to a job where silica-containing materials will be impacted and may result in exposures at or above the Action Level 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 identity of the competent person (for the construction related activities),
- The purpose and description of the medical surveillance program.

For questions regarding this program, contact EH&S at Safety@wm.edu