

Silica Exposure Control Plan–5500-1.0

Associated OHS Process: Industrial Hygiene

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1. Summary

1.1 Objective

The purpose of this plan is to comply with provisions set forth in the Occupational Safety & Health Administration's (OSHA) 29 CFR 1910.1053 and 1926.1153, *Respirable Crystalline Silica*, to limit employee exposure to airborne respirable crystalline silica (RCS). Chronic exposure to dust containing crystalline silica has been shown to result in Silicosis, an irreversible illness of the lungs. Additionally, crystalline silica has been classified as a human lung carcinogen. Facilities Management Occupational Health and Safety (FM-OHS) works with various University of Virginia Facilities Management (FM) departments to implement exposure controls which protect employees from exposure to airborne RCS. While implementing control measures to further reduce occupational exposure to silica, employees may be enrolled in this Silica Exposure Control Plan.

1.2 Scope

This Silica Exposure Control Plan (ECP) covers FM employees whose job duties potentially expose them to hazardous levels of respirable crystalline silica. This program takes appropriate measures to comply with the permissible exposure limit (PEL) and action level (AL) included in OSHA Standards 29 CFR 1910.1053 and 1926.1153. Elements of this program include engineering and administrative exposure controls, use of respiratory protection, exposure monitoring, medical surveillance, training, recordkeeping, and program evaluation.

2. Regulations & Other Requirements

2.1 Occupational Safety & Health Administration (OSHA)

This Silica Exposure Control Plan complies with the following OSHA standards:

- 29 CFR 1910.1053 and 1926.1153, *Respirable Crystalline Silica*
- 29 CFR 1910.134 and 1926.xxx, *Respiratory Protection Standard*
- 29 CFR 1910.1200 and 1926.xxx, *Hazard Communication*

2.2 University of Virginia

This Silica Exposure Control Plan complies with UVA-FM requirements.

3. Roles and Responsibilities

This Silica Exposure Control Plan for FM personnel is a cooperative effort between the FM-OHS, healthcare providers, supervisors, and employees. Specific responsibilities relating to this Silica Exposure Control Plan are outlined below.

3.1 Facilities Management Occupational Health & Safety

- a) Develop, administer, and review this Silica ECP
- b) Conduct RCS hazard and exposure assessments
- c) Determine appropriate control measures, in accordance with this ECP
- d) Enroll employees into the FM Respiratory Protection Program if they conduct activities that could result in exposure to RCS
- e) Train personnel on this Silica ECP
- f) Coordinate x-ray services for employees as part of medical surveillance requirements

- g) Maintain training records
- h) Conduct program evaluations

3.2 Supervisors

- a) Comply with the control methods listed in this ECP
- b) Provide employees with respiratory protection equipment when engineering controls are not compliant with OSHA silica exposure control methods (see Appendix C.1)
- c) Ensure that employees properly use respiratory protection equipment and comply with requirements in the FM Respiratory Protection Program
- d) Contact FM-OHS if they are unsure of which control method should be used when working with airborne RCS
- e) Assist in coordinating employee x-rays at least every three years if medical surveillance requirements of this ECP apply

3.3 Employees

Employees that have attended Silica Training provided by FM-OHS, shall be deemed Competent Persons. Only Competent Persons shall be allowed to participate in activities that potentially produce airborne RCS. Their responsibilities are as follows:

- a) Review and comply with requirements in this ECP
- b) Attend required Silica Training prior to working on silica-based activities
- c) Participate in the FM Respiratory Protection Program
- d) Report concerns to their supervisor and/or FM-OHS
- e) Report equipment, tool, and PPE malfunctions to their supervisor
- f) Use equipment, tools, and PPE in a manner that complies with instruction and training
- g) Provide feedback for annual program evaluation as requested by FM-OHS
- h) Attend initial and periodic medical examination if medical surveillance requirements of this ECP apply

4. Silica Exposure Control

4.1 Airborne Respirable Crystalline Silica-Associated Activities (ARCS)

Work conducted by FM that potentially exposes employees to ARCS has been identified as, but not limited to:

- a) Drilling concrete, masonry block, or gypsum board
- b) Using core-drilling machines to create access and pathways for utility lines
- c) Using handheld, stationary, or walk-behind saws for the cutting of asphalt, concrete, masonry block, gypsum board, and other material containing any silica or quartz product that could generate airborne respirable crystalline silica particles
- d) Mixing, setting, and finishing of any concrete mixture containing respirable crystalline silica material
- e) Installation, preparation, finishing, and demolition operations where sheetrock is found including tapping, mudding, and texturizing work is performed
- f) Using jack-hammers or other impact tools used for chipping or demolition of concrete or other masonry material
- g) All clean-up and housekeeping activities used in conjunction or as a result of the above activities listed above

4.2 Exposure Control Methods

- a) For each employee working with materials containing crystalline silica and engaged in a task that has the potential to produce airborne RCS, supervisors and employees shall properly implement the engineering controls, work practices, and respiratory protection specified.
- b) Appendix C.1, "Silica Control Methods and PPE Requirements," shall be referenced to determine acceptable equipment use and respirator requirements. If equipment use does not comply with the standards in Appendix C.1, respiratory protection is mandatory until objective data can be obtained by FM-OHS to confirm acceptable levels of RCS.

4.3 Engineering Controls

4.3.1 Wet Method Controls

Wet method control involves using equipment and tools in conjunction with a water delivery system, either integrated into the equipment manufacturer's design, or by other means of providing a constant source of water at the point of contact with the material surface. Water must be sufficient to minimize the release of visible dust.

4.3.2 Dust Collection System Controls

Dust collection system controls involve using equipment and tools equipped with a dust collector, either integrated into the equipment manufacturer's design, or by other means of providing dust filtration with 99% or greater efficiency. Dust collectors' air flow and filtering efficiency must be sufficient to minimize the release of visible dust.

4.3.3 Ineffective Engineering Controls

Equipment that ineffectively reduces the generation of airborne RCS shall be inspected and repaired or replaced as needed. Work shall not continue until the required engineering controls are functioning properly.

4.4 PPE

- a) Employees that use respiratory protection must be enrolled in, and comply with, the FM-Respiratory Protection Program. Requirements of this program include, but are not limited to:
 - Medical clearance to wear respiratory protection
 - Fit-testing at least annually
 - Being clean-shaven (except if using a loose-fitting powered air-purifying respirator)
 - Use of respirators that are fit-tested and issued by FM
- b) The use of N-95 filtering facepieces is for voluntary use only, and may not be used for protection against airborne RCS.

4.5 Housekeeping

- a) For activities that potentially generate RCS, the clean-up of any dust generated is mandatory.
- b) Employees shall not dry sweep or dry brush where such activity could contribute to employee exposure to respirable crystalline silica.

4.5.1 Clean-up Methods

Jobsite clean-up shall be conducted using the following methods:

- a) Wet sweeping
- b) HEPA-filtered vacuuming

4.5.2 Compressed Air

Employees shall not use compressed air to clean clothing or surfaces where such activity could contribute to employee exposure to RCS.

4.5.3 Disposal

Dust may be disposed of with standard trash, but must be done in a manner that limits both dust generation and exposure to airborne RCS.

4.6 Exposure Assessment

FM-OHS will conduct representative RCS exposure assessments when necessary, and on a routine basis, to identify additional activities beyond those indicated in Appendix C.1 that may require the use of engineering control methods or PPE.

4.6.1 Air Monitoring

Personnel exposure monitoring shall be conducted by FM-OHS through air sampling to determine:

- a) Employees' level of exposure to RCS during specific activities
- b) If engineering controls are effectively working to reduce dust generation
- c) The need for respiratory protection during a specific activity

4.6.2 Requests for Air Monitoring

- a) If an employee is potentially exposed to respirable crystalline silica and engaged in a task using equipment in a way that is not listed in Appendix C.1, they must contact FM-OHS for an exposure assessment to determine the engineering controls, work practices, and respiratory protection requirements for that task.
- b) Air monitoring can be requested by either calling FM-OHS or by filling out an Air Monitoring Request form from the FM-OHS website.

4.7 Medical Surveillance

- a) FM employees that are required to wear a respirator for protection against ARCS for 30 or more days per year shall be entered in the FM-OHS Medical Surveillance Program. If a respirator is worn for any portion of a day, it counts as one day for the purpose of this 30-day provision.
- b) This medical surveillance program will follow guidelines set forth in OSHA 29 CFR 1926.1153 and all applicable regulations.
- c) All contractors will be responsible for implementing a medical surveillance program for their own employees.

4.7.1 Initial Examination Requirements

Medical surveillance requires an initial medical examination by a physician or other licensed health-care professional (PLHCP) consisting of a chest x-ray and establishment of a medical and work history with emphasis on past, present, and anticipated exposure to silica, dust, and other agents affecting the respiratory system.

4.7.2 Period Examination Requirements

Employees enrolled in the Medical Surveillance Program for RCS exposure are required to have periodic medical examinations, which include a chest x-ray, at least once every 3 years.

4.8 Training

FM employees that conduct work that potentially exposes them to airborne RCS shall attend Silica Training, provided by FM-OHS, prior to conducting such work. Training is designed to educate employees on the hazards involved with RCS, as well as regulatory and procedural requirements. Once training is complete, employees will be deemed Competent Persons.

4.8.1 Competent Person

Employees that are deemed Competent Persons for work involving airborne RCS are expected to identify and address hazards that are non-compliant with this Silica ECP.

5. Review and Recordkeeping

5.1 Program Review

This Silica Exposure Control Program shall be reviewed and updated at least annually and whenever necessary to reflect changes in UVA FM policies or procedures, industry standards, or government regulations.

5.2 Records

FM-OHS will maintain training records related to Silica Exposure Control.

5.3 Program Recordkeeping

Records of this Silica Exposure Control Program will be considered obsolete when the new version is issued. Obsolete versions will be destroyed after three years.

Appendix A: Definitions

Action Level (AL) means a concentration designated for specific substance that initiates certain required activities, such as implementing exposure controls, or conducting exposure monitoring.

Competent Person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Permissible Exposure Limit (PEL) means the maximum concentration of a specific substance that an employee is allowed to be exposed to over an 8-hour shift, without suffering adverse health effects. The PEL for RCS is 50 micrograms per cubic meter.

Silicosis means lung fibrosis caused by the inhalation of dust containing silica.

Time-Weighted Average (TWA) means a method used to calculate an employee's daily exposure to a hazardous substance, averaged over an 8-hour workday. TWAs take into account the substance concentrations and the amount of time an employee is exposed to that substance.

Appendix B: Acronyms

AL	Action Level
CFR	Code of Federal Regulations
ECP	Exposure Control Plan
FM	University of Virginia Facilities Management
FM-OHS	Facilities Management Occupational Health & Safety
OSHA	Occupational Safety & Health Administration
PAPR	Powered Air-Purifying Respirator
PEL	Permissible Exposure Limit
PPE	Personal Protective Equipment
RCS	Respirable Crystalline Silica
TWA	Time-Weighted Average

Appendix C.1: Silica Control Methods and PPE Requirements

Equipment/Task	Engineering and Work Practice Control Methods	Required respiratory protection and minimum assigned protection factor (APR)		
		Indoor/Outdoor	≤ 4 hours/shift	> 4 hours/shift
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
Handheld power saws (any blade diameter)	<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: 	When used outdoors	None	APF 10
		When used indoors or in an enclosed area	APF 10	APF 10
Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	<p><u>For tasks performed outdoors only:</u></p> <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
Walk-behind 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: 	When used outdoors	None	None
		When used indoors or in an enclosed area	APF 10	APF 10
Drivable saws	<p><u>For tasks performed outdoors only:</u></p> <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
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 Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	-	None	None
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
Dowel drilling rigs for concrete	<p><u>For tasks performed outdoors only:</u></p> <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 	-	APF 10	APF 10
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
	OR			
	<ul style="list-style-type: none"> Operate from within an enclosed cab and use water for dust suppression on drill bit 	-	None	None

Equipment/Task	Engineering and Work Practice Control Methods	Required respiratory protection and minimum assigned protection factor (APR)		
		Indoor/Outdoor	≤ 4 hours/shift	> 4 hours/shift
Jackhammers and handheld powered chipping tools	<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 	When used outdoors	None	APF 10
		When used indoors or in an enclosed area	APF 10	APF 10
	OR			
	<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 	When used outdoors	None	APF 10
When used indoors or in an enclosed area		APF 10	APF 10	
Handheld grinders for mortar removal (<i>i.e.</i> tuck-pointing)	<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 	-	APF 10	APF 25
Handheld grinders for uses other than mortar removal	<p><u>For tasks performed outdoors only:</u></p> <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
	OR			
	<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: 	When used outdoors	None	None
When used indoors or in an enclosed area		None	APF 10	
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
	<p style="text-align: center;">OR</p> <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
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

Equipment/Task	Engineering and Work Practice Control Methods	Required respiratory protection and minimum assigned protection factor (APR)		
		Indoor/Outdoor	≤ 4 hours/shift	> 4 hours/shift
Large drivable milling machines (half-lane and larger)	<u>For cuts of any depth on asphalt only:</u> <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
	<u>For cuts of four inches in depth or less on any substrate:</u> <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 <p style="text-align: center;">OR</p>	-	None	None
	<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
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) 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
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 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
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 <p style="text-align: center;">OR</p>	-	None	None
	<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

Table 1: "Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica;" OSHA 29 CFR 1926.1153(c)(1)