

 Marathon Petroleum Company LP		REFINERY-WIDE		R-14-014
ANACORTES REFINERY		Respirable Crystalline Silica		Page 1 of 30
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1.0 INTRODUCTION

1.1 Purpose

The purpose of this procedure is to ensure policies and procedures are in place to effectively minimize occupational exposures to Respirable Crystalline Silica of both Marathon Petroleum Company employees and contractors. This standard applies to normal operations, shutdown/turnaround operations, and major project work.

1.2 Scope

This procedure will outline the minimum requirements for evaluating and controlling personnel exposure to Respirable Crystalline Silica.

The requirements of this standard have been summarized in Appendix D.

2.0 REFERENCES

2.1 Marathon Standards, Policies & Procedures

- HLT-2038, Respirable Crystalline Silica Exposure Control Program
- HLT-2025, Employee Health Monitoring Examination Protocols Standard

2.2 Government Regulations

- 29 CFR 1910.1153, Respirable Crystalline Silica (General Industry)
- 29 CFR 1926.1153, Respirable Crystalline Silica (Construction)
- WAC 296-840, Respirable Crystalline Silica

3.0 DEFINITIONS

The following definitions are applicable to this procedure.

Table 1 Definitions

Term	Description
Action Level (AL)	A concentration of airborne respirable crystalline silica of 0.025 mg/m ³ , calculated as an 8-hour Time Weighted Average (TWA). The AL is established at one half of the Permissible Exposure Limit (PEL). Exposures exceeding the AL require specific actions as outlined in the WAC 296-840, Respirable Crystalline Silica Standard.
Competent Person	An individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability necessary to fulfill the responsibilities set forth in WAC 296-840, Respirable Crystalline Silica Standard.

Table 1 Definitions

Term	Description
Covered Employee	An individual included in the respirable crystalline silica exposure control program due to potential exposure above the AL for 30 days or more per year or if required to wear a respirator to protect against respirable crystalline silica exposure for 30 or more days per year.
DOSH	The division of occupational safety and health, Washington state department of labor and industries.
Employee Exposure	The exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.
High-Efficiency Particulate Air (HEPA) Filter	A filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.
MPC Exposure Assessment Methodology (EXAM)	A comprehensive strategy for the qualitative and quantitative assessment, statistical analysis, addition of controls, and reassessment of occupational exposure risks.
Regulated Area	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 Permissible Exposure Limit.
Respirable Crystalline Silica	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 as specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality – Particle Size Fraction Definitions for Health-Related Sampling.
Permissible Exposure Limit (PEL)	The legal limit established by DOSH. This limit is identified as the amount or concentration of a chemical to which workers may be exposed for a predefined time limit. For respirable crystalline silica, DOSH has established a limit at 0.05 mg/m ³ for an 8-hour Time Weighted Average (TWA).
Similar Exposure Group (SEG)	A group of employees having the same general exposure profile because of the similarity and frequency of the tasks they perform, the materials and processes with which they work, and the similarity in the way they perform the task.
Similar Exposure Task (SET)	A routine work element or series of work elements, identified with a specific SEG that has a potential for exposure.

4.0 EXPOSURE ASSESSMENT

4.1 Material Determination

Determine if materials contain silica.

- Refer to material's Safety Data Sheet (SDS) and determine material's contents under Section Three of the material's SDS.
- Common construction materials that contain silica include but are not limited to: asphalt, brick, catalyst, cement, ceramic coatings, concrete, drywall, grout, insulation materials, mortar, refractory, stone, sand (including sand blasting materials), and tile.

- Other materials that have been found to contain silica in the refining industry include some forms of the following; refractory, catalysts, ceramic coatings, and insulation materials.

4.2 Exposure Determination

Determine if work activity to be performed has the potential to expose employees to Respirable Crystalline Silica. Known work activities to have the potential to expose employees include, but are not limited to:

- Sawing, chipping, cutting, drilling stone and concrete
- Loading and unloading of catalyst
- Abrasive blasting
- Chipping, dumping, gunning, loading, and mixing of refractory
- Demolition activities

For a complete list of activities known to have a potential to expose employees to respirable crystalline silica, refer to Table 1 of WAC 296-840 or Appendix A.

- For all tasks involving silica containing materials listed in Table 1 of WAC 296-840 (Appendix A), employees shall utilize the listed work practices, engineering controls, and PPE.

For tasks not listed in Table 1 of WAC 296-840, or where the Table 1 (Appendix A) controls cannot be fully implemented, the following actions must be taken:

- Initial and periodic air monitoring must be performed in accordance with either the performance option or the scheduled monitoring option.
 - **Performance Option:** The employer shall assess the 8-hour TWA exposure for **EACH** employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.
 - **Scheduled Monitoring Option:** The employer may sample a representative fraction of employees if they conduct similar tasks, on the same shift, in the same work area as long as the sampling includes the employee(s) who are expected to have the highest exposure to respirable crystalline silica. If this option is selected, reassessment shall be conducted in accordance with the following table.

If initial monitoring indicates that employee exposures are...	Then...
≤ 25 µg/m ³ (Below Action Level (AL))	Discontinue monitoring for that representative task.
25 µg/m ³ and < 50 µg/m ³ (Greater than the AL & Below PEL)	Repeat such monitoring within six months of the most recent monitoring.
≥ 50 µg/m ³ (Greater than the PEL)	Repeat such monitoring within three months of the most recent monitoring.

- The employer must reassess exposures whenever there is a change in the production, process, control equipment, personnel, or work practices which may reasonably be expected to result in a change in exposure to respirable crystalline silica.

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4.3 Exposure Monitoring

Exposure monitoring performed by the Anacortes Refinery will be conducted in accordance with the Marathon IH Exposure Assessment Methodology (EXAM) process including utilizing an accredited laboratory, notifying employees of sampling results, and retaining documentation of all monitoring data.

Written notification of exposure assessment results will be communicated to affected employees within five working days of receiving sample analysis results and will include any corrective actions necessary to reduce employee exposure.

5.0 ENGINEERING CONTROLS AND WORK PRACTICES

The use of alternatives to silica containing materials must be investigated in order to minimize the potential for employee exposure to respirable crystalline silica, without compromising quality or integrity of operations (i.e., abrasive blasting agents that DO NOT contain silica, etc.).

Engineering controls, principally ventilation and wet methods, are the primary methods used to reduce employee exposure to respirable crystalline silica. Where engineering controls are not adequate to reduce exposures to less than the PEL, they must still be used to reduce exposures to the lowest feasible level. Where engineering controls are not adequate, or while they are being installed, respiratory protection must be used.

Refer to Appendix A to determine the control measures and respiratory protection required

6.0 RESPIRATORY PROTECTION

Whenever practical engineering controls or work practices are not sufficient to reduce exposure to or below the PEL, appropriate respiratory protection shall be worn.

Employees who are required to wear respiratory protection covered by this standard must be enrolled in the Respiratory Protection Program. The Anacortes Refinery must provide the appropriate respiratory protection and personal protective equipment. (Refer to R-14-008 , Respiratory Protection Program for specific requirements including medical surveillance, fit-testing, selection, use, cleaning, cartridge disposal, etc.).

All contractors that are expected to wear respiratory protection must be included in their company's respiratory protection program.

7.0 HYGIENE/HOUSEKEEPING

Utilize wet sweeping and/or HEPA-filtered vacuuming to minimize the likelihood of additional exposure. Dry sweeping or brushing shall not be used unless wet sweeping, HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.

Compressed air shall NEVER be used to clean clothing. Compressed air can only be used for cleaning surfaces if used in conjunction with a ventilation system that effectively captures the dust cloud.

8.0 REGULATED AREAS

Regulated areas must be established wherever airborne concentrations of respirable crystalline silica are, or can reasonably be expected to be, in excess of the PEL.

For all regulated areas, the area must be barricaded and warning signs (Appendix B: Danger Sign) must be clearly visible from all access to the work area stating the following:

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DANGER
Respirable Crystalline Silica
May Cause Cancer
Causes Damage to Lungs
Wear Respiratory Protection in this Area
Authorized Personnel Only

9.0 MEDICAL SURVEILLANCE

Any employee(s) who are required to wear respiratory protection for respirable crystalline silica exposure control for more than 30 days per year will be included in the Silica Medical Surveillance Program in accordance with the Corporate Employee Health Monitoring Examination Protocols Standard, HLT-2025.

Contractors must be included in their company's medical surveillance programs if applicable.

10.0 EXPOSURE CONTROL PLAN

1. A written exposure control plan (ECP) must be developed by each site contractor for each project that could have respirable crystalline exposure. Contractors may use the attached ECP Template (Appendix C) as a start to developing their ECP. The company's exposure control plan must contain at least the following elements:
 - A description of the tasks in the workplace that may lead to exposures.
 - A list and description of engineering controls, work practices, and respiratory protection that is in use to limit exposure for each task.
 - A description on all housekeeping activities used to limit exposure.
 - A description of procedures used to restrict access to areas with potential exposure.
 - The exposure control plan must be reviewed and updated annually if needed.
2. A competent person must be designated for each project to make frequent and regular inspections of job sites, materials, and equipment necessary to implement the written exposure control plan.
3. The ECP must be submitted to the Industrial Hygienist for all tasks that could generate respirable crystalline silica exposures before work begins. This can be submitted along with your job/project safety plan.
4. The ECP must be readily available to covered employees, the site project coordinator, and Safety upon request.

11.0 TRAINING

Training for all covered MPC employees will be consistent with the requirements of the OSHA / DOSH Silica Standard and the OSHA / DOSH Hazard Communication standard. Contractors must provide training to their affected employees.

Training must include, at a minimum:

- The health hazards associated with exposure to respirable crystalline silica,
- Specific tasks that could result in exposure to respirable crystalline silica,

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- Specific control measures that are required to protect employees from potential exposure, including:
 - Engineering controls.
 - Work practices including housekeeping and regulated areas.
 - Respiratory Protection.
- The purpose of the medical surveillance program and who qualifies.

12.0 REVIEW AND REVISION HISTORY

Revision #	Preparer	Date	Description
0	Mark Willand	1/23/2022	Reformatted and Numbered per Document Control Policy, R-63-001.
1	Michael Fazio	9/23/2024	Updated Content Custodian to Michael Fazio, Updated Approver to Shannon Logan, Added clarification on page 5 regarding sample notification, Replaced SR-31 with R-14-008 on page 5. Line by line review.



13.0 APPENDIX A – SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA (WAC 296-840)

Table with 6 columns: Task, Engineering Contols, Work Practices Controls, Environment, and Respiratory Protection (< 4 hours, > 4 hours). Rows include Stationary masonry saws, Handheld power saws (any blade diameter), Outdoor use of handheld power saws for cutting fiber-cement board, and Walk-behind saws.

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
			Indoors or in an enclosed area	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
Outdoor use of handheld power saws for cutting fiber- cement board (with blade diameter of 8 inches or less)	Use saw equipped with commercially available dust collection system.	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
		Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.			
Walk-behind 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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
			Indoors or in an enclosed area	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
Outdoor use of Drivable 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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
Rig-mounted core saws or drills	Use tool 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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	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.			
Outdoor use of Dowel drilling rigs for concrete	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.	Outdoors	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50

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Task	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	or			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
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.		Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
			Indoors or in an enclosed area	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	or			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
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.	Indoors or in an enclosed area		<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.		<input type="checkbox"/> None	<input type="checkbox"/> None
	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.			<input checked="" type="checkbox"/> APF 10	<input type="checkbox"/> APF 10
Handheld grinders for uses other than mortar removal	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.	Outdoors	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None
				<input type="checkbox"/> APF 10	<input type="checkbox"/> APF 10
				<input type="checkbox"/> APF 25	<input type="checkbox"/> APF 25
				<input type="checkbox"/> APF 50	<input type="checkbox"/> APF 50
				<input type="checkbox"/> APF >50	<input type="checkbox"/> APF >50
		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.	Outdoors	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None
				<input type="checkbox"/> APF 10	<input type="checkbox"/> APF 10
				<input type="checkbox"/> APF 25	<input type="checkbox"/> APF 25
				<input type="checkbox"/> APF 50	<input type="checkbox"/> APF 50
				<input type="checkbox"/> APF >50	<input type="checkbox"/> APF >50
	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.		Indoors or in an enclosed area	<input checked="" type="checkbox"/> None	<input type="checkbox"/> None
				<input type="checkbox"/> APF 10	<input checked="" type="checkbox"/> APF 10
				<input type="checkbox"/> APF 25	<input type="checkbox"/> APF 25
				<input type="checkbox"/> APF 50	<input type="checkbox"/> APF 50
				<input type="checkbox"/> APF >50	<input type="checkbox"/> APF >50

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	or				
	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	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.			
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	For cuts of four inches in depth or less on any substrate:				
	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	or				
	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.				

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Task	Engineering Contols ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶	
				< 4 hours	> 4 hours
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.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silicacontaining materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50
	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50

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 Marathon Petroleum Company LP	REFINERY-WIDE	R-14-014
ANACORTES REFINERY	Respirable Crystalline Silica	Page 16 of 30

NOTES:

<p>1.) Any deviation from Table 1 Tasks requires air monitoring to determine control measures and respiratory protection requirements.</p>
<p>2.) Where an employee performs more than one task on Table 1 during the course of a shift:</p> <ul style="list-style-type: none"> • If 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.
<p>3.) Engineering and Work Practice Controls are required to be used at all times unless the employer can demonstrate that such controls are not feasible.</p>
<p>4.) If engineering and work practice controls are inadequate to reduce exposures to below the PEL, they still need to be used to reduce employee exposure to the lowest feasible level and must be supplemented with the appropriate respiratory protection.</p>
<p>5.) When implementing the control measures specified in Table 1, each employer shall:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ○ 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.
<p>6.) Respiratory Protection APF Levels:</p> <ul style="list-style-type: none"> • APF 10 = Half Mask • APF 25 = Loose Fitting PAPR, Hood PAPR • APF 50 = Full Face • APF 1,000 = Full Face PAPR, Full Face Abrasive Blasting Hood, Full Face Supplied Air • APF 10,000 = Full Face SCBA
<p>7.) Housekeeping may NOT include dry sweeping or dry brushing where it could contribute to the employee exposure unless wet sweeping, HEPA-filtered vacuuming or other methods are not feasible.</p>
<p>8.) Compressed air may NEVER be used to clean clothing or surfaces, unless used in conjunction with a ventilation system that effectively captures the dust cloud.</p>
<p>9.) Regulated areas will be established wherever airborne concentrations of respirable crystalline silica are, or can reasonably be expected to be, in excess of the PEL and must be barricaded and warning signs must be clearly visible from all entrances to the work area stating the following:</p>

<p>10.) Access must be limited to employees and/or contractors that are required by work duties to be present in the area and are familiar with the requirements of their Written Exposure Control Plan.</p>



14.0 APPENDIX B – DANGER SIGN



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15.0 APPENDIX C – WRITTEN EXPOSURE CONTROL PLAN – RESPIRABLE CRYSTALLINE SILICA

Company Name: _____
Person Completing the Plan, Title: _____
Designated Competent Person: _____ Competent Person Phone # _____
Type of Exposure Control Plan: _____ Date Review Due: _____
Annual for Nested Contractors Safety Approval: _____
Project Specific Date Approved: _____
Project Name (if applicable): _____
Description of Task(s): _____

Table with 9 columns: Task, Source of Control Measures, Air Monitoring Results, Engineering Controls, Work Practices Controls, Environment (if specified), Respiratory Protection, Housekeeping Measures, Access Restriction Methods. Rows include Stationary masonry saws, Handheld power saws (any blade diameter), and Outdoor use of handheld power saws for cutting fiber-cement board.

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls _{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Walk-behind saws	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
					Indoors or in an enclosed area	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Outdoor use of Drivable saws	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Rig-mounted core saws or drills	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	Use tool 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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Handheld and stand-mounted drills (including impact and rotary hammer drills)	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			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.					

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Outdoor use of Dowel drilling rigs for concrete	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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	Use a HEPA-filtered vacuum when cleaning holes.	Outdoors	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Vehicle-mounted drilling rigs for rock and concrete	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			Operate from within an enclosed cab and use water for dust suppression on drill bit.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Jackhammers and handheld powered chipping tools	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
					Indoors or in an enclosed area	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
					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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
		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.	Indoors or in an enclosed area		<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
Handheld grinders for mortar removal (i.e., tuckpointing)	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	Use grinder equipped with commercially available shroud and dust collection	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input checked="" type="checkbox"/> APF 25		
			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.			<input type="checkbox"/> APF >50	<input type="checkbox"/> APF >50		

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹	
						< 4 hours	> 4 hours			
Handheld grinders for uses other than mortar removal	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
			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.	Outdoors	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
			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.	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	Indoors or in an enclosed area	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input checked="" type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹	
						< 4 hours	> 4 hours			
Walk-behind milling machines and floor grinders	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
			or				<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			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.						
Small drivable milling machines (less than half-lane)	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹	
						< 4 hours	> 4 hours			
Large drivable milling machines (half-lane and larger)	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	For cuts of any depth on asphalt only:				<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			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.						
			For cuts of four inches in depth or less on any substrate:							
			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.						
			or							
			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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
Crushing machines	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	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.		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50			
			Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote-control station.							

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
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	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	Operate equipment from within an enclosed cab.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica containing materials	<input checked="" type="checkbox"/> Table 1 <input type="checkbox"/> Air Monitoring	Not Necessary if Table 1 Controls are being followed.	Apply water and/or dust suppressants as necessary to minimize dust emissions.	or		<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
			When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.			<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input checked="" type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Drywall finishing with silica-containing materials	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Mixing cement	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Mixing/dumping refractory	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Refractory removal / chipping	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Gunned refractory tasks	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Removal/installation of silica containing insulation	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Loading / unloading silica containing catalyst	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Spraying ceramic coatings	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Sweeping with sweeping compound	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Sweeping without sweeping compound	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Sweeping with HEPA Vac	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Mixing mortar or grout	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
Abrasive blasting	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		

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Task	Source of Control Measures ^{1,2}	Air Monitoring Results AL = 25µm/m3 PEL = 50µm/m3	Engineering Controls ^{3,4,5}	Work Practices Controls	Environment (if specified)	Respiratory Protection ⁶		Housekeeping Measures ^{7,8}	Access Restriction Methods ⁹
						< 4 hours	> 4 hours		
Support crew for any of the above tasks (i.e. Fire Watch, CSE Attendant, etc.) that need to be in area of silica regulated areas	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		
	<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Air Monitoring					<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50	<input type="checkbox"/> None <input type="checkbox"/> APF 10 <input type="checkbox"/> APF 25 <input type="checkbox"/> APF 50 <input type="checkbox"/> APF >50		

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NOTES:

- 1.) **Any deviation from Table 1** Tasks requires air monitoring to determine control measures and respiratory protection requirements.
- 2.) 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.
- 3.) Engineering and Work Practice Controls are required to be **used at all times** unless the employer can demonstrate that such controls are not feasible.
- 4.) If engineering and work practice controls are inadequate to reduce exposures to below the PEL, they still need to be used to reduce employee exposure to the **lowest feasible level** and must be supplemented with the appropriate respiratory protection.
- 5.) 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.
- 6.) Respiratory Protection **APF Levels**:
- APF 10 = Half Mask
 - APF 25 = Loose Fitting PAPR, Hood
 - PAPR APF 50 = Full Face
 - APF 1,000 = Full Face PAPR, Full Face Abrasive Blasting Hood, Full Face Supplied Air APF 10,000 = Full Face SCBA
- 7.) Housekeeping **may NOT include dry sweeping or dry brushing** where it could contribute to the employee exposure unless wet sweeping, HEPA-filtered vacuuming or other methods are not feasible.
- 8.) **Compressed air may NEVER** be used to clean clothing or surfaces, unless used in conjunction with a ventilation system that effectively captures the dust cloud.
- 9.) Regulated areas will be established wherever airborne concentrations of respirable crystalline silica are, or can reasonably be expected to be, in excess of the PEL and **must be barricaded and warning signs** must be clearly visible from all entrances to the work area stating the following:
-
- 10.) Access must be limited to employees and/or contractors that are **required by work duties** to be present in the area and are familiar with the requirements of their Written Exposure Control Plan.

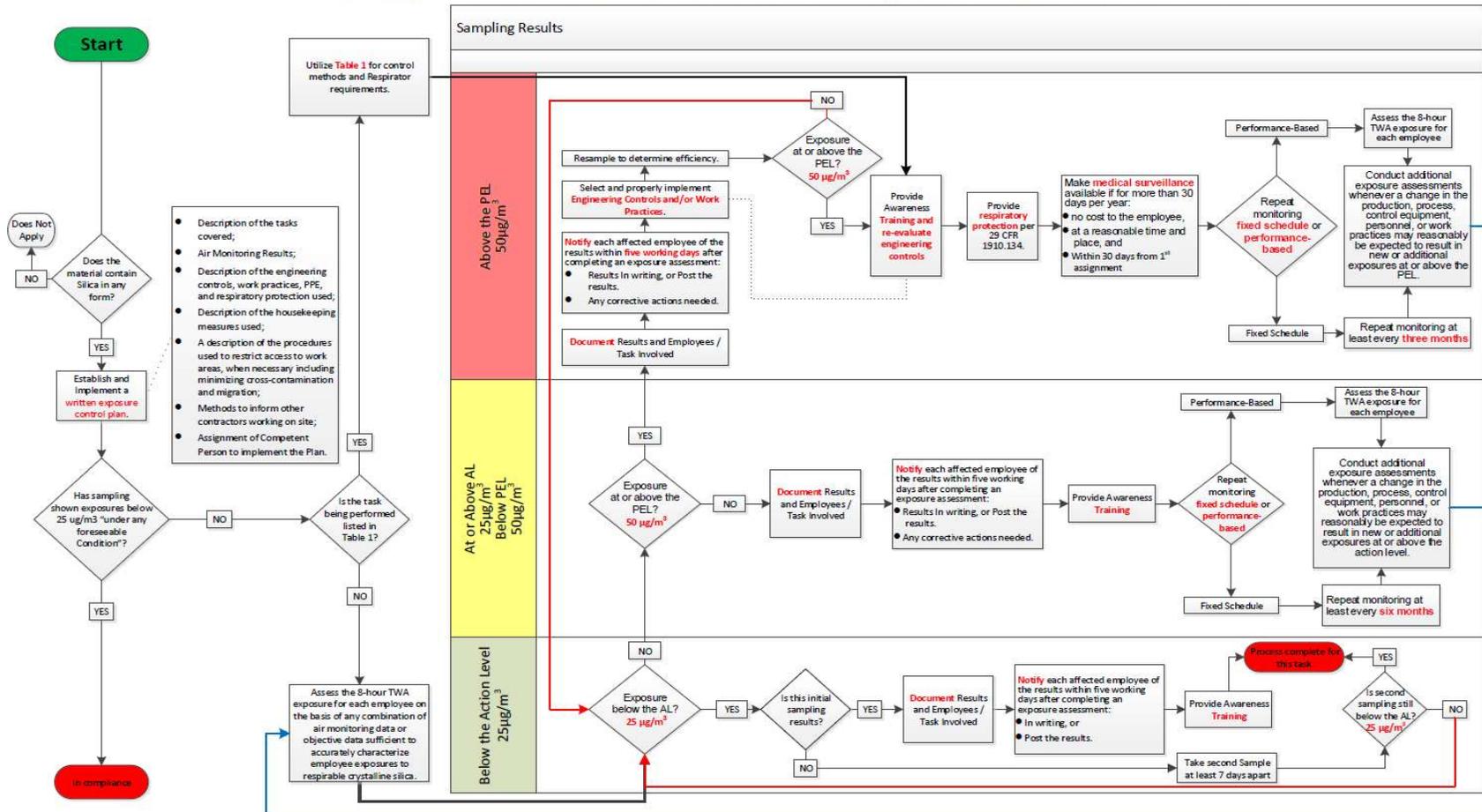
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16.0 APPENDIX D – RESPIRABLE CRYSTALLINE SILICA STANDARD FLOW CHART

RESPIRABLE CRYSTALLINE SILICA STANDARD FLOW CHART



Key Notes to Remember:

1. If there are any changes in production, process, control equipment, personnel, or work practices that may reasonably be expected to result in new or additional exposures, reassessment is required.
2. Awareness training requirements – Employee should be able to demonstrate knowledge of Health hazards, Tasks cover at this location, Control Methods, This standard, Identity of the site Competent Person, Purpose and description of the medical surveillance program.
3. Do not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to respirable crystalline silica unless wet sweeping, HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.
4. Do not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to respirable crystalline silica unless the compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air or **No alternative method is feasible.**

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