

Limited Silica Dust Monitoring Report



HEALTH & SAFETY • ENGINEERING • ENVIRONMENTAL

Presented To:

DustRam
Jeff Hammons
947 S. 48th Street
Tempe, AZ 85281

Project:

Residential Ceramic Tile/Grout/Mortar Removal Project
21508 N. 65th Avenue
Glendale, AZ 85038

CSC Project No. 5005709

Inspection Date: March 7, 2022

Report Date: March 15, 2022



PROJECT SUMMARY

Project Name & Address: Limited Silica Dust Monitoring Report
Residential Ceramic Tile/Grout/Mortar Removal
Project
21508 N. 65th Avenue
Glendale, AZ 85038

CSC Project Number: 5005709

Client: DustRam
Jeffrey Hammons
947 S. 48th Street
Tempe, AZ 85281
Ph: 480-428-3880
jeff.h@dustram.com

Consultant: Clark Seif Clark, Inc. (CSC)
7302 W. Chicago Street
Chandler, Arizona 85226
Phone: 480-460-8334
Fax: 480-460-8335

Project Manager: Derrick A. Denis, CIAQP, CAC, CIEC

IAQ Specialist: Paul V. Anderson, MS, CIEC

Project Date: March 7, 2022

Report Date: March 15, 2022

ATTACHMENTS:

- Laboratory Crystalline Silica Analysis Air Results & Chains of Custody
- *OSHA Standard 1926.1053 Subpart D Occupational Health and Environmental Controls: Respirable Crystalline Silica*



EXECUTIVE SUMMARY

Jeffrey Harmon of DustRam retained Clark Seif Clark, Inc. (CSC) to perform limited crystalline silica air sampling at a job site location where ceramic tile and grout removal from a concrete slab was being performed. DustRam uses specialized equipment to reduce the creation of dust when removing ceramic tile, grout, and mortar. The test was performed to determine worker exposure to silica for three (3) separate employees performing three (3) separate tasks. An area sample was also obtained to determine general silica exposure potential within the work area.

On March 7, 2022, CSC industrial hygienist, Paul V. Anderson, visited the residential home located at 21508 N. 65th Avenue in Glendale, AZ (referred to hereunder as work site or job site) to perform crystalline silica air testing for three (3) types of crystalline silica including Alpha Quartz, Cristobalite and Tridymite. Testing consisted of attaching personal low flow pumps with aluminum cyclone collection vessels (used for dust size selection) to three (3) workers at the site performing three (3) different tasks (mechanical chipping, rubbing or bulk debris removal and mechanical grinding). An area sample in the general work area was also set at breathing height to collect any generated dust. Per the sampling method, pump flow rate was set at ~2.0 liters/minute and sample time was chosen to draw in at least 400 Liters of air. Sampling occurred for ~4-7 hours. A field blank was collected at the job site location as well.

Results were as follows:

- Chipper: **11 ug/m³** (all Alpha Quartz Silica Detected)
- Rubbler (bulk debris removal): **23 ug/m³** (all Alpha Quartz Silica Detected)
- Grinding: **23 ug/m³** (all Alpha Quartz Silica Detected)
- Area Test (Kitchen/Living Area): **24 ug/m³** (all Alpha Quartz Silica Detected)
- Field Blank: None Detected

The Occupational safety and Health Administration (OSHA) “action level” for silica dust exposure is 25 ug/m³ over an 8-hour time weighted average (TWA) and the OSHA permissible exposure limit (PEL) over an 8-hour TWA is 50 ug/m³. Neither the OSHA PEL nor the EPA action level was exceeded in the four (4) air samples. The field blank showed no silica dust detected. Based on the above data, no adjustments need to be made to the process of ceramic tile, grout, and mortar removal to reduce dust generation. Current personal protective equipment (PPE) is adequate to reduce employee exposure potential to dust generated from the process of ceramic tile, grout, and mortar removal.

SAMPLING METHODOLOGY

Air samples for respirable silica are collected on a 37mm 5µm PVC filter using a size-selective sampler (Aluminum cyclone) meeting the ISO/CEN criteria for the respirable fraction. A low flow pump is used to achieve a flowrate of ~2.0 liters/minute (L/min) through the filter media. Pumps are attached to workers for personal exposure monitoring and on a countertop for stationary area sampling. Samples are collected in the breathing zone of the worker and approximately 3-6 feet off of the ground for stationary area samples. Approximately 400 to 1000 L of air are collected on the filter media. Samples are taken to represent an 8-hour day or a “worst case scenario” to represent the potential for exposure to silica dust. Samples are transported to a qualified third party laboratory, Fiberquant Analytical, for analysis. Analysis of the samples is by NIOSH 7500 method, analysis of crystalline silica by X-Ray Diffraction (XRD).



LABORATORY

Fiberquant Analytical is accredited by the American Industrial Hygiene Association (AIHA-LAP) and successful participants in the AIHA PAT Programs silica PT program. The OSHA Silica standard requires analytical labs to be accredited against ISO 17025:2005 quality standards as well as to maintain successful participation in a silica proficiency testing (PT) program.

SILICA AIR SAMPLE RESULTS

On March 7, 2021, three (3) personal air samples, one (1) area sample and one (1) field blank sample were collected at the job site. The analytical results indicated the following:

Analysis Results:					Job Number: 202202050						
Lab Number	Client Number	Date	An?	Vol(L)	Silica						
					Quartz		Cristobalite		Tridymite		
					µg/smp	µg/m ³	µg/smp	µg/m ³	µg/smp	µg/m ³	
2022-02050-1	1	3/7/2022	OK	779	Results	8.8	11	< 10	< 13	< 10	< 13
					Reporting Limits	5	6.4	10	13	10	13
2022-02050-2	3	3/7/2022	OK	657	Results	15	23	< 10	< 15	< 10	< 15
					Reporting Limits	5	7.6	10	15	10	15
2022-02050-3	14	3/7/2022	OK	527	Results	12	23	< 10	< 19	< 10	< 19
					Reporting Limits	5	9.5	10	19	10	19
2022-02050-4	19	3/7/2022	OK	840	Results	20	24	< 10	< 12	< 10	< 12
					Reporting Limits	5	6	10	12	10	12
2022-02050-5	21	3/7/2022	OK	0	Results	6.3	-	< 10	-	< 10	-
					Reporting Limits	5	-	10	-	10	-

- Sample 1 - Chipper: **11 ug/m³** (all Alpha Quartz Silica Detected)
- Sample 2 - Rubbler: **23 ug/m³** (all Alpha Quartz Silica Detected)
- Sample 3 - Grinder: **23 ug/m³** (all Alpha Quartz Silica Detected)
- Sample 4 – Area Sample: **24 ug/m³** (all Alpha Quartz Silica Detected)
- Sample 4 – Field Blank: none detected

The results showed that the three (3) employee samples and one (1) area sample did not exceed the OSHA action level of 25 ug/m³ or OSHA PEL of 50 ug/m³.

CONCLUSIONS

- The Occupational safety and Health Administration (OSHA) “action level” for silica dust exposure is 25 ug/m³ over an 8-hour time weighted average (TWA) and the OSHA permissible exposure limit (PEL) over an 8-hour TWA is 50 ug/m³.
- Neither the OSHA PEL nor the EPA action level was exceeded in the four (4) air samples.
- The field blank showed no silica dust detected.



RECOMMENDATIONS

Based on the above data, no adjustments need to be made to the process of ceramic tile, grout and mortar removal to reduce dust generation. Current personal protective equipment (PPE) is adequate to reduce employee exposure potential to dust generated from the process of ceramic tile, grout, and mortar removal. If the current process of ceramic tile, grout, and mortar removal is changed, then additional sampling and evaluation may be necessary. The OSHA website offers recommendations for dust-reducing attachments to machinery, as well as PPE for employees. In addition, the *OSHA Standard 1926.1053 Subpart D Occupational Health and Environmental Controls: Respirable Crystalline Silica* has been attached for your reference to reduce exposure.

LIMITATIONS

The field observations, measurements, and research reported herein are considered sufficient in detail and scope to form a reasonable basis for limited silica dust monitoring performed at the work site. The assessment, conclusions, and recommendations presented herein are based upon the subjective evaluation of limited data. They may not represent all conditions at the work site as they reflect the information gathered from specific locations. CSC warrants the findings and conclusions contained herein have been promulgated in accordance with generally accepted industrial hygiene methodology and only for the site described in this report.

Use by Third Parties

This report was prepared pursuant to the contract CSC has with the client. That contractual relationship included an exchange of information about the subject property that was unique and between CSC and its client and serves as the basis upon which this report was prepared. Because of the importance of the communication between CSC and its client, reliance or any use of this report by anyone other than the client, for whom it was prepared, is prohibited and therefore not foreseeable to CSC.

Reliance or use by any such third party without explicit authorization in the report does not make said third party a third party beneficiary to CSC's contract with the client. Any such unauthorized reliance on or use of this report, including any of its information or conclusions, will be at third party's risk. For the same reasons, no warranties or representations, expressed or implied in this report, are made to any such third party.

Unidentifiable Conditions

This silica dust related environmental consulting report has been developed to provide the client with information regarding apparent conditions relating to the work process and work site. Although CSC believes that the findings and conclusions provided in this report are reasonable, the assessment is necessarily limited to the conditions observed and to the information available at the time of the work. Due to the nature of the work, there is a possibility conditions exist that could not be identified within the scope of the assessment or which were not apparent at the time of our site work. The assessment is also limited to information available from the client at the time it was conducted. It is also possible that the testing methods employed at the time of the report may later be superseded by other methods. CSC does not accept responsibility for changes in the state of the art. This report is limited only to the samples taken and locations sampled. Additional sampling may be needed to further identify other hazards at the work site.

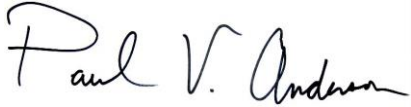


We have employed state-of-the-art practices to perform this analysis of risk and identification, but this evaluation is limited in scope to the areas listed above. No demolition or product review was performed in attempts to reveal material compositions. Our services consist of professional opinions and recommendations made in accordance with generally accepted engineering principles and practices, and are designed to provide an analytical tool to assist the client. Clark Seif Clark or those representing Clark Seif Clark bear no responsibility for the actual condition of the structure or safety of a site pertaining to IAQ contamination regardless of the actions taken by the client.

Thank you for choosing Clark Seif Clark, Inc. to provide professional consulting services. If for some reason you have any questions regarding this report, please do not hesitate to contact us.

Thank you,
Clark Seif Clark, Inc.

Written by,



Paul V. Anderson, MS, CIEC
Industrial Hygienist

Reviewed and Approved by,



Joe Johnson, CSST, CLPM, EPA SHIELD IAQ
Master
Indoor Environmental Specialist



Site Photos: March 7, 2022 – Work Site



Photo 1: Work site - front



Photo 2: Work site address signage



Photo 3: Overview of HEPA vacuum hoses laid out to help collect dust – vacuums kept outdoors



Photo 4: Overview of living area tile to be removed during project



Photo 5: Example of employee fitted with personal pump and filter cassette while performing “chipping” operation with chipping tool and HEPA attachment

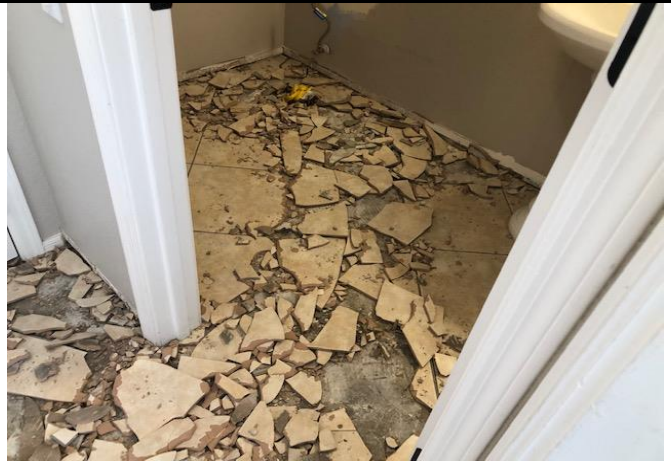


Photo 6: Example of “rubble” created during tile chipping





Photo 7: Example of large portion of tile/grout chipped up – debris to be removed and foundation ground to accept new flooring

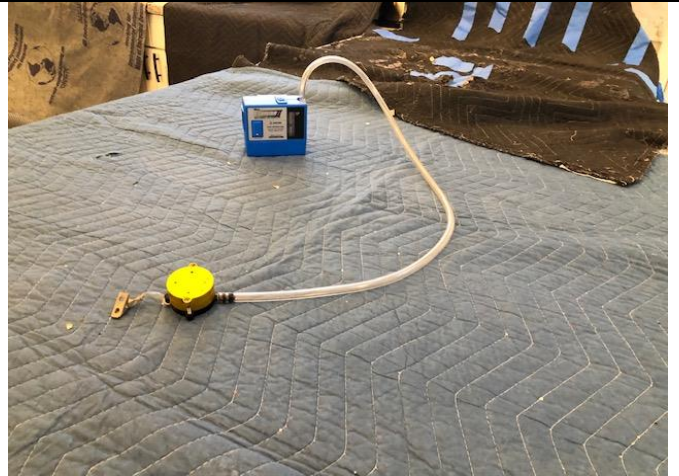


Photo 8: Area sample taken from kitchen island



Photo 9: Field blank sample (no air pump) placed on kitchen island



Photo 10: Example of rubberer collecting debris and placing into containers for removal



Photo 11: Example of concrete grinder with debris collection attachment



Photo 12: Example of concrete foundation slab area where tile was removed – grinder with HEPA attachment used on left side and not used yet on right side





Analysis of Silica in Air Samples Using Filter Re-deposition

JobNumber: 202202050

Client: CLARK SEIF CLARK INC

7302 W CHICAGO ST

CHANDLER, AZ 85226-0000

Office Phone: (480) 460-8334

FAX: (480) 460-8335

Samples: 5 **XRD Rec:** 3/8/2022 **Method:** NIOSH 7500 **PO Number:** XRD Quantificaiton of Silica in Air
Client Job: 5005709 / Dust Ram
Report Date: 3/9/2022 **Date Analyzed:** 3/9/2022 **Routing Number:** -

Method and Analysis Information: **Fiberquant Internal SOP:** Silica

Samples received for silica analysis were tested using NIOSH Method 7500 with filter re-deposition. Briefly, incoming sample cassettes were disassembled and the PVC filter removed. The filter was placed in a 50 milliliter centrifuge tube and dissolved with tetrahydrofuran (THF). The digestion is then transferred quantitatively to a vacuum filtration apparatus containing a 0.45 um silver membrane filter. The filter is then fixed with a 1.5% solution of parlodion. To the run stream are added the quality assurance samples described below.

After filtration the silver membrane filters are analyzed quantitatively using a Siemens D-500 X-ray Diffractometer equipped with a Cu X-ray tube and monochromometer and reported below. The filters are scanned from (2Theta) 21.4-23o to analyze for tridymite and cristobalite from 26.0-27.3o to analyze for quartz. The data for the samples, quality assurance samples and calibration standards are analyzed for area counts using Jade™ software to quantify the concentrations of these three silica polymorphs. A calibration curve is fitted with at least 6 standard filters and the concentration of the silica is calculated from the curve.

The results from this analysis are generally compared to the OSHA "Respirable Crystalline Silica" standard, 1926.1153. The standard promulgates an action level of 25 micrograms per cubic meter (ug/M3) for an 8-hour time-weighted average and a permissible exposure level (PEL) of 50 micrograms per cubic meter, 8-hour time weighted average. The overall sampling and analytical error (SAE) is ±17% (±35% at the 95% confidence level) for samples containing 25 to 200 micrograms. The SAE at the reporting limits are 35% for quartz, 36% for cristobalite and 30% for tridymite at the 95% confidence level. These values include and estimated pump flow rate error of 5%. The results are reported to two significant figures. The reporting limit for quartz is 5 micrograms per sample. The reporting limits for cristobalite and tridymite are 10 micrograms per sample. Therefore samples with volumes less than 200 liters will not achieve a reporting limit below the action level for quartz and samples with volumes less than 400 liters will not achieve a reporting limit below the action levels of cristobalite and tridymite. Blanks, if analyzed, are treated the same as the samples and are not used for correcting non-blank results. Problems in analyses or other information are provided in the "Analytical Results" below.

Interferences are expected in the presence of micas, potash, zircon, graphite, and aluminosilicates. As such, the silica concentrations reported should be considered the maximum as these interferences are not controlled for.

The following on-going quality assurance program was followed to ensure reproducible and dependable results: All analysts are degreed scientists trained extensively in-house for at least six months prior to un-supervised runs. Blank matrix samples are analyzed at a rate of 5% (at least one per run). Reference standards are analyzed at a rate of 5% (at least one per run), and compared to statistical records. Laboratory characterization (LCS) matrix samples are analyzed at a rate of 5% (at least one per run), and compared to statistical records. Two calibration checks bracketing the customer sample concentrations for each for each polymorph tested are run with each set of customer samples. For each instrumental run, the diffractometer is checked for sensitivity and stability. All quality checks performed for these samples were in control except as detailed in the "Analytical Notes" below. Fiberquant participates in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) IHPAT Silica, and Fiberquant is accredited by the AIHA-LAP, LLC, scope NIOSH 7500 (AIHA Lab # 101593). Accreditation does not imply endorsement by the EPA, any other United States governmental agency or any private agency or association. Each lab analysis refers only to the sample tested, and may not, due to the sampling process, be representative of the material sampled. This report may not be reproduced except in full, without the approval of Fiberquant Analytical Services.

Sample volume information was supplied by the customer and these data can affect the validity of the results. Fiberquant was not responsible for the sampling stage. As such, these results only apply to the sample as received.

Some results may have been calculated using client supplied data, such as volume or area sampled, for which Fiberquant assumes no liability for accuracy.

Job Analysis Notes:

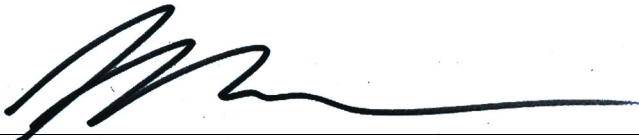
Analysis Results:

Job Number:

202202050

Lab Number	Client Number	Date	An?	Vol(L)
2022-02050- 1	1	3/7/2022	OK	779
2022-02050- 2	3	3/7/2022	OK	657
2022-02050- 3	14	3/7/2022	OK	527
2022-02050- 4	19	3/7/2022	OK	840
2022-02050- 5	21	3/7/2022	OK	0

	Silica					
	Quartz		Cristobalite		Tridymite	
	µg/smp	µg/m3	µg/smp	µg/m3	µg/smp	µg/m3
Results	8.8	11	< 10	< 13	< 10	< 13
Reporting Limits	5	6.4	10	13	10	13
Results	15	23	< 10	< 15	< 10	< 15
Reporting Limits	5	7.6	10	15	10	15
Results	12	23	< 10	< 19	< 10	< 19
Reporting Limits	5	9.5	10	19	10	19
Results	20	24	< 10	< 12	< 10	< 12
Reporting Limits	5	6	10	12	10	12
Results	6.3	-	< 10	-	< 10	-
Reporting Limits	5	-	10	-	10	-



Analyst: MARK C. JEFFERSON

Printed: 09-Mar-22

Original Print Date: 09-Mar-22



Larry S. Pierce, Approved Accreditation Signatory

FIBERQUANT ANALYTICAL SERVICES

Fiberquant Analytical Services 5025 S. 33rd St.;
Phoenix, AZ 85040; Phone: 602-276-6139; FAX: 602-276-4558;
info@fiberquant.com

Analysis Request/Chain-of-Custody Form

Submitted by (Company) CSC	
Address 7302 W. Chicago St.	
City, State, Zip Code Chandler AZ 85226	
Phone 480-460-8334	FAX
Email Panderson@csceng.com	
Invoice to (Company) Same	
Address	
City, State, Zip Code	
Phone	FAX
Contact (print) Paul Anderson	
Sampled by (signature) <i>Paul Anderson</i>	
Job Number or Project Name 5005709 / Dnst Ram	
PO Number	

<Analysis Method Requested> ONLY ONE METHOD per COC				Turn-around-time (circle one)				
				Rush	Norm	Ext.		
Asbestos by PLM	Method >	Improved	Interim	Urgent Rush <3 hrs	<6 hrs	1-3 days	15- 30 days	
	Analyze >	ALL	ATPF					
	If ATPF then >	by Layer	by Sample					
	Single Layer Protocol >	Yes	No					
Fibers by PCM	Method >	7400 (Area)	ORM (Personal)	<4 hrs	24 hrs	-		
Asbestos by TEM	In Air >	AMERA	Mod. AMERA	1-2 days	3-5 days	N/A		
	In Water >	Water	Sludge					
	In Bulk (Annex 2) >	Chatfield	Full Quant.					
	In Dust >	ASTM D5755						
Pb by FLAA	Analyze >	Pb	Other	<6 hrs	2-3 days	N/A		
	Matrix >	Filter >	MCE					FG
		Paint >	by Area (ng/cm ²) by Weight (ppm)					
		Soil >						
		Wipe >						
Initial here certifying wipes used are ASTM E1792 compliant								
Fungi	Air Sample >	Zefon	Alter	Other	<6 hrs	1-2 days	N/A	
	Bulk >	Sample	Swab					
	Tape Lift >	Qualitative (% & type)						
		Quantitative (type/cm ²)						
Soot	ASTM D6602-03b	Optical		<6 hrs	1-2 days	N/A		
		Optical & TEM		1-2 days	3-5 days	N/A		
Other	Silica Dust			Call	Call			

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) 1	Chipper - Pump 11	3/7/22	380 mins	779 Liters
2) 3	Rubbler - Pump 12		327 mins	657
3) 14	Grinder - Pump 9		265 mins	527
4) 19	Area Sample - Pump 1		418 mins	840 ↓
5) 21	Field Blank - no pump		382 mins	0 Liters
6)				
7)				
8)				
9)				
10)				
11)	Pump 2 / Sample 11			
12)	not used			
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				

1) Relinquished by: <i>Paul Anderson</i>	Date: 3/8/22	Time: 9:52 am	3) Relinquished by:	Date:	Time:
2) Received by: <i>Kathy...</i>	Date: 3-8-22	Time: 952	4) Received by:	Date:	Time:
* TEM Water: Sampler's name Required by State of Arizona		Print Name	Fiberquant assigned Job Number >		Page 1 of 1

Review of Analysis Request (Initials): *UU*

Important: By signing above you as Fiberquant's customer are agreeing to payment within 30 days unless other arrangements are made in writing.
Note: Data completed by client (including number and identity of samples) is assumed to be correct until it is verified at time of sample preparation.

§1926.1153 Respirable crystalline silica.

(a) Scope and application. This section applies to all occupational exposures to respirable crystalline silica in construction work, except where employee exposure will remain below 25 micrograms per cubic meter of air ($25 \mu\text{g}/\text{m}^3$) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

(b) Definitions. For the purposes of this section the following definitions apply:

Action level means a concentration of airborne respirable crystalline silica of $25 \mu\text{g}/\text{m}^3$, calculated as an 8-hour TWA.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Director means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

Competent person means 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 paragraph (g) of this section.

Employee exposure means the exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.

High-efficiency particulate air [HEPA] filter means a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

Objective data means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee

exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

Physician or other licensed health care professional [PLHCP] means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by paragraph (h) of this section.

Respirable crystalline silica means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality – Particle Size Fraction Definitions for Health-Related Sampling.

Specialist means an American Board Certified Specialist in Pulmonary Disease or an American Board Certified Specialist in Occupational Medicine.

This section means this respirable crystalline silica standard, 29 CFR 1926.1153.

(c) Specified exposure control methods. (1) For each employee engaged in a task identified on Table 1, the employer shall fully and properly implement the engineering controls, work practices, and respiratory protection specified for the task on Table 1, unless the employer assesses and limits the exposure of the employee to respirable crystalline silica in accordance with paragraph (d) of this section.

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA
--

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	None	None
(ii) Handheld power saws (any blade diameter)	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	<p>None</p> <p>APF 10</p>	<p>APF 10</p> <p>APF 10</p>
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with commercially available dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.</p>	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iv) Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	<p>None</p> <p>APF 10</p>	<p>None</p> <p>APF 10</p>
(v) Drivable saws	<p>For tasks performed outdoors only:</p> <p>Use saw equipped with integrated water delivery system that continuously feeds water to the blade.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	<p>None</p>	<p>None</p>
(vi) Rig-mounted core saws or drills	<p>Use tool equipped with integrated water delivery system that supplies water to cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p>	<p>None</p>	<p>None</p>

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowling with dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	None	None
(viii) Dowel drilling rigs for concrete	<p>For tasks performed outdoors only:</p> <p>Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>Use a HEPA-filtered vacuum when cleaning holes.</p>	APF 10	APF 10

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
	OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10
	OR		
	Use tool equipped with commercially available shroud and dust collection system.		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	<p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 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.</p>	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	<p>For tasks performed outdoors only:</p> <p>Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p>	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
	<p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 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.</p> <ul style="list-style-type: none"> – When used outdoors. – When used indoors or in an enclosed area. 	<p>None</p> <p>None</p>	<p>None</p> <p>APF 10</p>

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	<p>Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p>	None	None
	<p>Use machine equipped with dust collection system recommended by the manufacturer.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.</p>	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) Large drivable milling machines (half-lane and larger)	<p>For cuts of any depth on asphalt only:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None
	<p>For cuts of four inches in depth or less on any substrate:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None
	<p>OR</p> <p>Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	None	None

**TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS
WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA**

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).</p> <p>Operate and maintain machine in accordance with manufacturer’s instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	<p>Operate equipment from within an enclosed cab.</p> <p>When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.</p>	None	None

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
	OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

(2) When implementing the control measures specified in Table 1, each employer shall:

(i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;

(ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;

(iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:

(A) Is maintained as free as practicable from settled dust;

(B) Has door seals and closing mechanisms that work properly;

(C) Has gaskets and seals that are in good condition and working properly;

(D) Is under positive pressure maintained through continuous delivery of fresh air;

(E) Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 μm range (e.g., MERV-16 or better); and

(F) Has heating and cooling capabilities.

(3) Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

(d) Alternative exposure control methods. For tasks not listed in Table 1, or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1:

(1) Permissible exposure limit (PEL). The employer shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of $50 \mu\text{g}/\text{m}^3$, calculated as an 8-hour TWA.

(2) Exposure assessment—(i) General. The employer shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level in accordance with either the performance option in paragraph (d)(2)(ii) or the scheduled monitoring option in paragraph (d)(2)(iii) of this section.

(ii) 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.

(iii) Scheduled monitoring option. (A) The employer shall perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job

classification, in each work area. Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative fraction of these employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.

(B) If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(C) Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring.

(D) Where the most recent exposure monitoring indicates that employee exposures are above the PEL, the employer shall repeat such monitoring within three months of the most recent monitoring.

(E) Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, the employer shall repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring, except as otherwise provided in paragraph (d)(2)(iv) of this section.

(iv) Reassessment of exposures. The employer shall reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or

when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.

(v) Methods of sample analysis. The employer shall ensure that all samples taken to satisfy the monitoring requirements of paragraph (d)(2) of this section are evaluated by a laboratory that analyzes air samples for respirable crystalline silica in accordance with the procedures in Appendix A to this section.

(vi) Employee notification of assessment results. (A) Within five working days after completing an exposure assessment in accordance with paragraph (d)(2) of this section, the employer shall individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

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

(vii) Observation of monitoring. (A) Where air monitoring is performed to comply with the requirements of this section, the employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to respirable crystalline silica.

(B) When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required for any workplace hazard, the employer shall provide the observer with protective clothing and equipment at no cost and shall ensure that the observer uses such clothing and equipment.

(3) Methods of compliance—(i) Engineering and work practice controls. The employer shall use engineering and work practice controls to reduce and maintain employee exposure to

respirable crystalline silica to or below the PEL, unless the employer can demonstrate that such controls are not feasible. Wherever such feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them with the use of respiratory protection that complies with the requirements of paragraph (e) of this section.

(ii) Abrasive blasting. In addition to the requirements of paragraph (d)(3)(i) of this section, the employer shall comply with other OSHA standards, when applicable, such as 29 CFR 1926.57 (Ventilation), where abrasive blasting is conducted using crystalline silica-containing blasting agents, or where abrasive blasting is conducted on substrates that contain crystalline silica.

(e) Respiratory protection—(1) General. Where respiratory protection is required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph and 29 CFR 1910.134. Respiratory protection is required:

(i) Where specified by Table 1 of paragraph (c) of this section; or

(ii) For tasks not listed in Table 1, or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1:

(A) Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls;

(B) Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; and

(C) During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL.

(2) Respiratory protection program. Where respirator use is required by this section, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134.

(3) Specified exposure control methods. For the tasks listed in Table 1 in paragraph (c) of this section, if the employer fully and properly implements the engineering controls, work practices, and respiratory protection described in Table 1, the employer shall be considered to be in compliance with paragraph (e)(1) of this section and the requirements for selection of respirators in 29 CFR 1910.134(d)(1)(iii) and (d)(3) with regard to exposure to respirable crystalline silica.

(f) Housekeeping. (1) The employer shall 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.

(2) The employer shall 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:

(i) The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or

(ii) No alternative method is feasible.

(g) Written exposure control plan. (1) The employer shall establish and implement a written exposure control plan that contains at least the following elements:

(i) A description of the tasks in the workplace that involve exposure to respirable crystalline silica;

(ii) A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task;

(iii) A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and

(iv) A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystalline silica and their level of exposure, including exposures generated by other employers or sole proprietors.

(2) The employer shall review and evaluate the effectiveness of the written exposure control plan at least annually and update it as necessary.

(3) The employer shall make the written exposure control plan readily available for examination and copying, upon request, to each employee covered by this section, their designated representatives, the Assistant Secretary and the Director.

(4) The employer shall designate a competent person to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

(h) Medical surveillance—(1) General. (i) The employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for each employee who will be required under this section to use a respirator for 30 or more days per year.

(ii) The employer shall ensure that all medical examinations and procedures required by this section are performed by a PLHCP as defined in paragraph (b) of this section.

(2) Initial examination. The employer shall make available an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of this section within the last three years. The examination shall consist of:

(i) A medical and work history, with emphasis on: past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system;

any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing); history of tuberculosis; and smoking status and history;

(ii) A physical examination with special emphasis on the respiratory system;

(iii) A chest X-ray (a single posteroanterior radiographic projection or radiograph of the chest at full inspiration recorded on either film (no less than 14 x 17 inches and no more than 16 x 17 inches) or digital radiography systems), interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader;

(iv) A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV₁) and FEV₁/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course;

(v) Testing for latent tuberculosis infection; and

(vi) Any other tests deemed appropriate by the PLHCP.

(3) Periodic examinations. The employer shall make available medical examinations that include the procedures described in paragraph (h)(2) of this section (except paragraph (h)(2)(v)) at least every three years, or more frequently if recommended by the PLHCP.

(4) Information provided to the PLHCP. The employer shall ensure that the examining PLHCP has a copy of this standard, and shall provide the PLHCP with the following information:

(i) A description of the employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to respirable crystalline silica;

(ii) The employee's former, current, and anticipated levels of occupational exposure to respirable crystalline silica;

(iii) A description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and

(iv) Information from records of employment-related medical examinations previously provided to the employee and currently within the control of the employer.

(5) PLHCP's written medical report for the employee. The employer shall ensure that the PLHCP explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of each medical examination performed. The written report shall contain:

(i) A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica and any medical conditions that require further evaluation or treatment;

(ii) Any recommended limitations on the employee's use of respirators;

(iii) Any recommended limitations on the employee's exposure to respirable crystalline silica; and

(iv) A statement that the employee should be examined by a specialist (pursuant to paragraph (h)(7) of this section) if the chest X-ray provided in accordance with this section is classified as 1/0 or higher by the B Reader, or if referral to a specialist is otherwise deemed appropriate by the PLHCP.

(6) PLHCP's written medical opinion for the employer. (i) The employer shall obtain a written medical opinion from the PLHCP within 30 days of the medical examination. The written opinion shall contain only the following:

(A) The date of the examination;

(B) A statement that the examination has met the requirements of this section; and

(C) Any recommended limitations on the employee's use of respirators.

(ii) If the employee provides written authorization, the written opinion shall also contain either or both of the following:

(A) Any recommended limitations on the employee's exposure to respirable crystalline silica;

(B) A statement that the employee should be examined by a specialist (pursuant to paragraph (h)(7) of this section) if the chest X-ray provided in accordance with this section is classified as 1/0 or higher by the B Reader, or if referral to a specialist is otherwise deemed appropriate by the PLHCP.

(iii) The employer shall ensure that each employee receives a copy of the written medical opinion described in paragraph (h)(6)(i) and (ii) of this section within 30 days of each medical examination performed.

(7) Additional examinations. (i) If the PLHCP's written medical opinion indicates that an employee should be examined by a specialist, the employer shall make available a medical examination by a specialist within 30 days after receiving the PLHCP's written opinion.

(ii) The employer shall ensure that the examining specialist is provided with all of the information that the employer is obligated to provide to the PLHCP in accordance with paragraph (h)(4) of this section.

(iii) The employer shall ensure that the specialist explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of the examination. The written report shall meet the requirements of paragraph (h)(5) (except paragraph (h)(5)(iv)) of this section.

(iv) The employer shall obtain a written opinion from the specialist within 30 days of the medical examination. The written opinion shall meet the requirements of paragraph (h)(6) (except paragraph (h)(6)(i)(B) and (ii)(B)) of this section.

(i) Communication of respirable crystalline silica hazards to employees—(1) Hazard communication. The employer shall include respirable crystalline silica in the program established to comply with the hazard communication standard (HCS) (29 CFR 1910.1200). The employer shall ensure that each employee has access to labels on containers of crystalline silica and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (i)(2) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer, lung effects, immune system effects, and kidney effects.

(2) Employee information and training. (i) The employer shall ensure that each employee covered by this section can demonstrate knowledge and understanding of at least the following:

(A) The health hazards associated with exposure to respirable crystalline silica;

(B) Specific tasks in the workplace that could result in exposure to respirable crystalline silica;

(C) Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;

(D) The contents of this section;

(E) The identity of the competent person designated by the employer in accordance with paragraph (g)(4) of this section; and

(F) The purpose and a description of the medical surveillance program required by paragraph (h) of this section.

(ii) The employer shall make a copy of this section readily available without cost to each employee covered by this section.

(j) Recordkeeping—(1) Air monitoring data. (i) The employer shall make and maintain an accurate record of all exposure measurements taken to assess employee exposure to respirable crystalline silica, as prescribed in paragraph (d)(2) of this section.

(ii) This record shall include at least the following information:

(A) The date of measurement for each sample taken;

(B) The task monitored;

(C) Sampling and analytical methods used;

(D) Number, duration, and results of samples taken;

(E) Identity of the laboratory that performed the analysis;

(F) Type of personal protective equipment, such as respirators, worn by the employees monitored; and

(G) Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

(iii) The employer shall ensure that exposure records are maintained and made available in accordance with 29 CFR 1910.1020.

(2) Objective data. (i) The employer shall make and maintain an accurate record of all objective data relied upon to comply with the requirements of this section.

(ii) This record shall include at least the following information:

(A) The crystalline silica-containing material in question;

(B) The source of the objective data;

(C) The testing protocol and results of testing;

(D) A description of the process, task, or activity on which the objective data were based;

and

(E) Other data relevant to the process, task, activity, material, or exposures on which the objective data were based.

(iii) The employer shall ensure that objective data are maintained and made available in accordance with 29 CFR 1910.1020.

(3) Medical surveillance. (i) The employer shall make and maintain an accurate record for each employee covered by medical surveillance under paragraph (h) of this section.

(ii) The record shall include the following information about the employee:

(A) Name and social security number;

(B) A copy of the PLHCPs' and specialists' written medical opinions; and

(C) A copy of the information provided to the PLHCPs and specialists.

(iii) The employer shall ensure that medical records are maintained and made available in accordance with 29 CFR 1910.1020.

(k) Dates. (1) This section shall become effective June 23, 2016.

(2) All obligations of this section, except requirements for methods of sample analysis in paragraph (d)(2)(v), shall commence June 23, 2017.

(3) Requirements for methods of sample analysis in paragraph (d)(2)(v) of this section commence June 23, 2018.