The National Ready Mixed Concrete Association’s Guide for Silica Regulations and the Ready Mixed Concrete Industry

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Welcome to the Silica in the Ready Mixed Concrete Industry Training Guide brought to you by the National Ready Mixed Concrete Association. This document, derived from the Occupational Health and Safety Administration’s (OSHA) Small Entity Compliance Guide for the Respirable Crystalline Silica Standard for General Industry and Maritime, is designed to provide information to ready mixed concrete producers who work with materials that may expose workers to crystalline silica. OSHA has new regulations concerning exposure to respirable crystalline silica. This guide was developed to help ready mixed concrete producers be in compliance with these new regulations.

This guidance provides an overview of OSHA’s Respirable Crystalline Silica Standard for General Industry and Maritime. It is advisory in nature and informational in content. It is not a standard or regulation, and it neither creates new legal obligations nor alters existing obligations created by the Occupational Safety and Health Administration (OSHA) standards or the Occupational Safety and Health Act of 1970 (OSH Act). Furthermore, the new standard and this guide do not direct ready mixed concrete producers to establish any of the new programs as
highlighted in this guide, but rather gives producers the tools to examine their facilities to determine if the standard or any of its provisions apply to them or are impacted in any fashion.

OSHA has created two new standards for silica exposure as of March 2016: One for General Industry (1910.1053) - which has a compliance date of **June 23, 2018**, and the other is for Construction (1926.1153) – it’s compliance date was **September 23, 2017**.

Ready Mixed Concrete production facilities are regulated under General Industry.

**What is in the new Respirable Crystalline Silica Standard?**

- Lowered Permissible Exposure Limit (PEL): 100 μg/m$^3$ to 50 μg/m$^3$
- A brand-new category called the Action Level: 25 μg/m$^3$
- Controls: Engineering, Work Practice, PPE, Access Limits
- Exposure Assessment
- Monitoring
- Training
- Written Exposure Plan
- Housekeeping
- Medical Surveillance
- Recordkeeping
- Demarcation

**What is Crystalline Silica?**

Crystalline silica is very jagged micro sized crystallized glass type shards (Quartz, Cristobalite, Tridymite). Silica is the most common element on the earth’s surface. It is extremely dangerous to lungs and eventually fatal to humans upon continued, extended, uncontrolled ingestion or inhalation.

- Sand + Heat = Glass = small micro bits = Crystalline Silica
- Micro silica glass shards = respiratory system tissue cutters
The cutting of lungs by shards then turns into small scars. The transformation of healthy lung tissue into scars by Crystalline Silica ingestion/inhalation can lead to early death, cancer, or other health ailments. Once lungs are damaged, they are always damaged. There is no reversal, there is no return to healthy lung tissue. Unlike the healing of the lung tissue from total withdrawal of cigarette smoking, you cannot heal Silica damaged lungs.

What Can Contain Crystalline Silica at Ready Mixed Concrete Production Facilities?

- Portland Cement ...may contain silica
- Slag Cement ...may contain silica
- Fly Ash... may contain silica
- Silica Fume ...may contain silica
- Coarse Aggregates... may contain silica
- Fine Aggregates ... may contain silica
- Other Materials ...may contain silica

Unfortunately, many of the ingredients of concrete which we find at all ready mixed concrete production facilities, may contain crystalline silica. The question becomes for ready mixed concrete producers is, is it present at your facility, and if so, are your employees exposed? If yes, then how exposed?

Exposures that will not exceed 25 μg/m³ averaged over an 8-hour day under any foreseeable conditions are excluded from the standard.

Ready mixed concrete producers must have objective data demonstrating employee exposure will remain below this level. When using the phrase “any foreseeable conditions” OSHA is referring to situations that can reasonably be anticipated.

The standard applies to ready mixed concrete production facilities even where exposures of below 25 μg/m³ as an 8-hour TWA are expected or achieved, but only because engineering controls are being used to limit.
Ready mixed concrete producers must ensure that their employees’ exposures to respirable crystalline silica do not exceed the PEL, which is 50 µg/m³ as an 8-hour TWA. This means that over the course of any 8-hour work shift, exposures can fluctuate, but the average exposure to respirable crystalline silica cannot exceed 50 µg/m³.

The PEL applies to the three forms of respirable crystalline silica that are covered by the standard: quartz, cristobalite, and trydimite.

Producers must assess the 8-hour TWA exposure for each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level of 25 µg/m³ as an 8-hour TWA.
The purpose of assessing employee exposures include:

- Identifying where exposures are occurring;
- Helping the employer select control methods and make sure those methods are effective;
- Preventing employees from being exposed above the PEL;
- Providing employees with information about their exposure levels; and
- Allowing the employer to give the PLHCP performing medical examinations information about employee exposures.

**What is An Exposure Assessment?**

Ready mixed concrete producers can choose between two options for assessing exposures:

- The performance option; or
- The scheduled monitoring option.

The Performance Option of the Exposure Assessment will generally offer Ready Mixed Concrete producers more flexibility.

This option includes a combination of air monitoring data or objective data that can accurately characterize employee exposures to respirable crystalline silica.

Air monitoring data are any results of air monitoring (analyzed according to the procedures and requirements in the standard) that the employer has done to meet the requirements of the standard.

Objective data is information that demonstrates employee exposure to respirable crystalline silica associated with a particular product or material or a specific process, task or activity. Examples of objective data are information such as:

- Air monitoring data from industry-wide surveys;
- Calculations based on the composition of a substance;
- Area sampling results and exposure mapping profile approaches; and
- Historical air monitoring data collected by the concrete producer.
Ready mixed producers choosing the performance option must:

■ Conduct the exposure assessment before work begins;

■ Reassess exposures whenever a change in production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or higher 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;

■ Be able to demonstrate that employee exposures have been accurately characterized; and

■ Make sure that the exposure assessment reflects the exposures of employees on each shift, for each job classification, in each work area.

The scheduled monitoring option

The scheduled monitoring option of Exposure assessment lets concrete producers know when and how often they must perform exposure monitoring to measure employee exposures. When following the scheduled monitoring option, employers must make sure that:

■ Results represent the employee’s TWA exposure to respirable crystalline silica over an eight-hour workday;

■ Samples are collected from the employee’s breathing zone; and

■ Samples are collected outside respirators so that they represent the exposure that would occur.

Under the scheduled monitoring option, just as under the performance option, employers must correctly characterize each employee’s exposure to respirable crystalline silica.

Exposure monitoring must include, at a minimum, one full-shift sample taken for each job function in each job classification, in each work area, and on each shift. Characterizing each employee’s exposure may involve monitoring all exposed employees or a smaller number of employees whose exposures can then represent those of other employees.

Representative sampling involves monitoring the employee or employees reasonably expected to have the highest exposure to respirable crystalline silica (for example, the employee closest to an exposure source). This exposure is then assigned to the other employees in the group who perform the same tasks on the same shift and in the same work area. Representative monitoring is allowed when several employees perform the same job on the same shift and under the same conditions.

Under the scheduled monitoring option, how often monitoring must be done depends on the results of initial monitoring and, thereafter, any required further monitoring, as follows:

■ If the initial monitoring indicates that employee exposures are below the action level, no further monitoring is required.

■ If the most recent exposure monitoring reveals employee exposures at or above the action level but at or below the PEL, the employer must repeat monitoring within six months of the most recent monitoring.
If the most recent exposure monitoring reveals employee exposures above the PEL, the employer must repeat monitoring within three months of the most recent monitoring.

When two non-initial monitoring results taken consecutively, at least 7 days apart but within 6 months of each other, are below the action level, employers may stop monitoring for employees represented by those results, as long as no changes occur that could reasonably be expected to result in new or additional exposures at or above the action level.

Reassessment of Exposures

Ready mixed concrete producers must reassess exposures whenever a change in production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures to respirable crystalline silica 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.

Producers do not have to conduct additional monitoring simply because a change has occurred, so long as the change is not reasonably expected to result in new or additional exposures to respirable crystalline silica at or above the action level.

Methods of Sample Analysis

Methods of Sample Analysis are found in Appendix A of the Standard. Appendix A of the silica standard lists laboratory procedures for measuring respirable crystalline silica in air samples. Ready mixed concrete producers must make sure that all air samples taken to meet the requirements of the silica standard are analyzed by a laboratory that follows the procedures in Appendix A. If concrete producers hire an outside laboratory to do the analyses for respirable crystalline silica, they can rely on a statement from that laboratory that it follows Appendix A. For example, the laboratory could indicate that it analyzes samples according to Appendix A of the standard in the laboratory report or on its website.

Employee Notification

Ready mixed concrete producers must notify each affected employee of the results of the exposure assessment within 15 working days of completing it. “Affected” means all employees whose exposures
were assessed, including employees whose exposures were represented by other employees’ exposure measurements, and those whose exposure assessments were based on objective data.

The 15-day period for notification starts when:

- An employer following the performance option finishes the exposure assessment; or
- An employer following the scheduled monitoring approach receives the laboratory results.

Employers must either notify each employee in writing or post the results in a location that all affected employees can access. In cases where an employee might have moved onto another job or jobsite, the assessment results could be included with the employees’ final paycheck.

Exposures can be characterized and reported as a range (for example, between the action level and the PEL), but must reflect exposures that would occur if the employee were not using a respirator. When an exposure assessment reveals exposures above the PEL, the written notification must also describe the corrective action the employer is taking to reduce employee exposures to or below the PEL. Corrective actions include engineering controls. However, if engineering controls are not feasible or the employer needs more than 15 days to identify the right engineering controls, respiratory protection is the corrective action that would be described in the written notification.

**Observation of Monitoring**

Ready mixed concrete producers must let affected employees or their designated representatives observe any air monitoring of employee exposure to respirable crystalline silica. When observation of monitoring requires entry into an area where use of protective clothing or equipment, such as a respirator, is required, the employer must provide the observer with that protective clothing or equipment. The employer must provide the protective clothing and equipment at no cost, and make sure that the observer uses such clothing or equipment. However, if the observer does not need to enter an area requiring the use of protective clothing or equipment in order to effectively observe monitoring (for example, if monitoring can be viewed from outside the hazardous areas), no protective clothing or equipment would be needed.
What Are Regulated Areas?

Regulated areas are workplace areas where exposures to respirable crystalline silica are, or can reasonably be expected to be, above the PEL. The standard for general industry requires employers to establish, demarcate, and limit access to regulated areas. The employer must also provide respirators and make sure they are used by those who must enter regulated areas.

The purpose of a regulated area is to:

■ Ensure that employees know that silica levels are likely to exceed the PEL within the regulated area;

■ Restrict the number of employees who could be exposed above the PEL by requiring the employer to mark areas where exposures are or are likely to be higher than the PEL; and

■ Ensure that all who enter are properly protected with an appropriate respirator.

Establishing Regulated Areas

Employers must establish regulated areas where exposures to airborne concentrations of respirable crystalline silica are, or can reasonably be expected to be, greater than the PEL. Information used to measure employees’ exposures can be used to determine where regulated areas are required and identify the boundaries of these areas. For example, employers can use any combination of personal samples (air samples collected near the employee’s breathing zone), or objective data such as exposure mapping and real-time measurements to establish regulated areas.

Demarcation

Ready mixed concrete producers must demarcate (mark off) regulated areas from the rest of the workplace in a manner that decreases the number of employees exposed to respirable crystalline silica within the regulated area. Cones, stanchions, tape, barricades, lines, or textured flooring are some of the ways of marking the boundaries of regulated areas.

Employers must post a sign at each entrance to regulated areas that reads:

![DANGER RESPIRABLE CRYSTALLINE SILICA MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY]
The signs show employees that they are entering a regulated area, and the content of the sign ensures the employee will know the hazards associated with the area, as well as the need for respiratory protection.

**Access to Regulated Areas**

Ready mixed concrete producers must limit access to regulated areas to:

- Persons authorized by the employer and required by work duties to be present in the regulated area. This includes persons whose work is with or near the respirable crystalline silica-producing materials, but may also include maintenance and repair personnel, management, quality control engineers, or other employees if their job duties require them to be in the regulated area;

- Any person entering the area as a designated representative of employees to observe silica exposure monitoring; or

- Any person authorized by the Occupational Safety and Health Act or regulations issued under it to be in a regulated area (e.g., OSHA enforcement personnel).

Access restrictions limit the number of persons who may enter into, walk or drive vehicles through areas where exposures exceed the PEL. Therefore, it protects employees who would otherwise be exposed when needlessly spending time in or passing through the regulated area.

**Providing Respirators to those Entering Regulated Areas**

A ready mixed concrete producer must:

- Provide each employee and the employee’s designated representative entering a regulated area with an appropriate respirator that meets the requirements for respiratory protection under the Respiratory Protection standard; and,

- Require the employee and representative to use the respirator while in the regulated area. Persons must put on respirators before entering, and take off respirators after exiting the regulated area. The employer must provide and ensure the use of the appropriate respirator to any employees or representatives who enter these areas, regardless of their work activities or the amount of time they spend inside. Requiring all employees and representatives to wear respirators in a regulated area ensures that they are protected.

**What are Methods of Compliance?**

The next section in the standard addresses Methods of Compliance. Ready mixed concrete producers must use engineering and work practice controls to reduce and keep employee exposure to respirable crystalline silica to or below the PEL of 50 µg/m³, unless the employer can demonstrate that such controls are not feasible. If feasible engineering and work practice controls are not able to reduce employee exposures to or below the PEL, employers must still use feasible controls to reduce exposures to the lowest possible level and then use respiratory protection along with those controls.
Engineering Controls

The main types of engineering controls for silica are wet methods, local exhaust ventilation and Isolation.

Wet methods involve applying water or foam at the point of dust generation to keep dust from getting into the air. An example is a pneumatic hammer that delivers water spray at the point of contact while chipping out a mixer truck.

Local exhaust ventilation removes dust by capturing it at or near the point where it is created. Again, mixer drum chipping procedures can be an example where a vector fan is used at the drum hopper to provide exhaust dust with positive ventilation.

Another engineering control is isolation. Isolation separates employees from the dust source by containing the dust or isolating employees. An example is a properly ventilated bag house which isolates employees from cement dust.

Work Practice Controls

Work practice controls involve performing a task in a way that reduces the likelihood or levels of exposure. Work practice controls are often used with engineering controls to protect employees. Employees must know the appropriate work practices for maximizing the effectiveness of controls and minimizing exposures.

Examples of work practice controls include:

► Inspecting and maintaining controls to prevent or fix malfunctions that would result in increased exposures;

► Ensuring that tools with wet controls spray water at the point of dust generation;

► Positioning local exhaust hoods directly over the exposure source and not opening windows near the local exhaust source;

► Wetting down silica dust before sweeping it up; and

► Scheduling work so that tasks that involve high exposures are performed when no other employees are in the area. Reducing exposures through the primary use of engineering and work practice controls is known as the hierarchy of controls, and it is a long-standing OSHA policy.

Under the hierarchy of controls, respirators can be another effective way to protect employees. However, respirators may be less practical or effective than engineering controls for the following reasons:

► They must be selected for each worker, fitted, occasionally refitted, and regularly maintained (including replacing filters and other parts as necessary).
Employees have to consistently and correctly use properly fitted respirators but may resist wearing them because respirators can be uncomfortable, especially in hot weather.

Respirators may put a physical strain on employees’ bodies, as a result of the respirator’s weight and because they increase breathing resistance. Employees with some health conditions cannot wear respirators because the physical strain of wearing the respirator increases their risk of illness, injury, and even death.

Respirators can create safety concerns because they interfere with workers’ ability to hear, see, smell, and communicate.

Respirators only protect the employees wearing them.

**Written Exposure Control Plans**

All employers covered by the standard must develop and implement a written exposure control plan. Written exposure control plans describe workplace exposures and ways to reduce those exposures, such as engineering controls, work practices, and housekeeping methods. The plans improve employee protections by making sure that employers identify all exposures and controls to prevent overexposures. Such plans are also useful for letting employees know what kind of protections they should expect to see on the job.

The plan must include a description of workplace tasks involving exposures to respirable crystalline silica. Employers must list all tasks that employees perform that could expose them to respirable crystalline silica dust.

The plan must include a description of engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task.

The plan must include a description of the housekeeping methods used to limit employee exposure to respirable crystalline silica. While employees are cleaning, dust can become airborne and expose them to silica. In this part of the written exposure control plan, employers must list acceptable cleaning methods that will be used to prevent employees from being exposed and any protections that are needed if certain cleaning methods have to be used.

The Housekeeping section of the standard requires that, when cleaning up dust that can contribute to employee exposures to respirable crystalline silica, employers must:

- Not allow cleaning by dry brushing and sweeping, unless methods such as wet sweeping and HEPA-filtered vacuuming are not feasible;
Not allow cleaning of surfaces or clothing with compressed air, unless the compressed air is used together with a ventilation system that effectively captures the dust cloud or no other cleaning method is feasible. This section of the written plan would include cleaning methods that are acceptable (e.g., wet sweeping), cleaning methods that are unacceptable because acceptable cleaning methods are feasible (e.g., dry sweeping), and special instructions (e.g., use local exhaust ventilation if compressed air must be used). Hygiene-related subjects, such as not using compressed air to clean clothing, could also be addressed in this section of the written exposure control plan.

The Respirable Crystalline Silica standard requires employers to review and evaluate the effectiveness of the written exposure control plan at least once a year and update it as necessary. A yearly review is needed to make sure that all information in the plan is up-to-date. For example, the employer might have bought a new type of equipment or asked employees to conduct a new task involving exposure, and that information needs to be described in the written plan.

Employers must allow the written exposure control plan to be viewed or copied by each employee covered by the standard, their designated representative, and representatives from OSHA or NIOSH, upon request. Making the written exposure control plan available to employees and their designated representatives empowers and protects employees by letting them and their representatives know the silica hazards the employer identified and controls for those hazards. This allows employees and representatives to question employers if controls are not fully and properly implemented or maintained. Likewise, making written exposure control plans readily available to OSHA or NIOSH allows them to verify that employee protections are effective. If OSHA inspects a workplace, the OSHA Compliance Safety and Health Officer will ask to see the employer’s written exposure control plan.

**Respiratory Protection**

Employers must provide employees with appropriate respirators where required by the silica standard.

Where respirator use is required, employers must implement a respiratory protection program in accordance with the Respiratory Protection standard. The respiratory protection program ensures that respirators are properly used in the workplace and are effective in protecting employees.
Employers may provide respirators at the request of employees or let employees use their own respirators when respirators are not required under the silica standard.

**Housekeeping**

The housekeeping requirements in the silica standard apply only where cleaning “could contribute to employee exposure to respirable crystalline silica”. This phrase clarifies that employers have to follow the housekeeping requirements of the silica standard only where employees could be exposed to the very small (respirable) crystalline silica particles as are found in industrial sand or are created by high-energy tasks such as grinding stone countertops.

The Respirable Crystalline Silica standard requires all employers covered by the standard to avoid certain housekeeping practices. When cleaning up dust that could contribute to employee exposure to respirable crystalline silica, employers must:

- Not allow dry brushing or dry sweeping, unless methods such as wet sweeping and HEPA-filtered vacuuming are not feasible;
- Not allow cleaning of surfaces or clothing with compressed air, unless the compressed air is used together with a ventilation system that effectively captures the dust cloud or no other cleaning method is feasible.

Cleaning methods such as dry sweeping, dry brushing, and use of compressed air can cause respirable crystalline silica dust to get into the air and be inhaled by employees. Therefore, the silica standard limits the use of these cleaning methods to prevent unnecessary exposures to employees. Employers are required to use other cleaning methods such as wet sweeping and HEPA-filtered vacuums, whenever feasible, because such methods reduce employee exposures by preventing silica-containing dust from getting into the air.

In those rare cases where the employer needs to use cleaning methods such as dry sweeping, dry brushing, or compressed air, the employer must be able to show why cleaning methods that decrease employee exposures are not feasible.

**What About Medical Surveillance?**

Medical surveillance is intended to:

1. Identify respirable crystalline silica-related diseases so that employees with those diseases can take actions to protect their health;
2. Determine if an employee has any condition, such as a lung disease, that might make him or her more sensitive to respirable crystalline silica exposure; and
3. Determine the employee’s fitness to use respirators.
The standard specifies which employees must be offered medical surveillance, when and how often the examinations must be offered, and the tests that make up medical examinations. The standard also specifies the information that the employer must give to the physician or other licensed health care professional (PLHCP) who conducts the examinations and the information that the employer must ensure that the PLHCP provides to the employee and employer. All medical examinations and procedures required by the standard must be performed by a PLHCP. Medical surveillance must be provided at no cost to employees, and at a reasonable time and place. If getting the medical examination requires the employee to travel away from the worksite, the employer is required to cover the cost of travel. The employer must also pay employees for time spent traveling and taking medical examinations.

Ready mixed concrete producers must make an initial or periodic medical examination available to employees who meet the exposure trigger. The triggers for medical surveillance are:

1. Exposures above the PEL for 30 or more days a year from June 23, 2018 through June 22, 2020;
2. Exposures at or above the action level for 30 or more days from June 23, 2020 and beyond.

**Medical Exam Frequency Rate**

Employers must offer medical examinations:

- Within 30 days of initial assignment (the day the employee starts working in a job/task in which he or she will be exposed at the trigger point for 30 or more days per year), unless the employee has had an examination that meets the requirements of the silica standard within the last three years;

- Every three years from the employee’s last examination that met the requirements of the silica standard, or more frequently if recommended by the PLHCP, if the employee will continue to perform tasks that result in exposures at the trigger for 30 or more days per year.

A PLHCP might recommend more frequent medical examinations based on factors such as high exposure levels or a medical finding, such as an X-ray suggesting silicosis. Employers must make sure that employees receive a dated copy of the PLHCP’s written medical opinion for the employer, and the employee can present that opinion to a new employer as proof of a current medical examination. Employers can determine when they must offer an employee the next periodic medical examination based on the examination date on the written medical opinion.
Employees who must be offered medical surveillance are at risk of developing respirable crystalline silica-related diseases, and the required tests are the minimum tests needed to look for those diseases. More tests may also be needed to address an employee’s medical complaint or a finding related to respirable crystalline silica exposure, such as abnormal lung function. The standard gives the PLHCP the flexibility to order additional tests he or she deems appropriate. Employers must make those tests ordered by the PLHCP available to the employee.

**Information Concrete Producers Must Provide to PLHCP**

Ready Mixed Concrete Producers must ensure that the examining PLHCP has a copy of the standard and must provide the PLHCP with:

- A description of the employee’s past, current, and future duties as they relate to respirable crystalline silica exposure;
- The employee’s past, current, and future levels of exposure to respirable crystalline silica;
- 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
- Information from records of employment related medical examinations previously provided to the employee and currently within the control of the concrete producer.

The PLHCP needs this information to evaluate the employee’s health in relation to assigned duties and fitness to use personal protective equipment, such as respirators. The information provided to the PLHCP includes only that within the control of the employer; the employer is not required to obtain information from past employers.

**PLHCP’s Written Report to Employee**

Ready mixed concrete producers must ensure that the PLHCP explains the results of the medical examination to the employee and gives the employee a written medical report within 30 days of each medical examination performed. Only the employee receives the written medical report, and the employer does not receive a copy of this report. The report must contain:

- A description of the medical examination results, including any medical condition(s) that would place the employee at increased risk of material impairment of health from exposure to respirable crystalline silica (any health condition that might make the employee more sensitive to exposure). The report must also describe any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee’s use of respirators;
- Any recommended limitations on respirable crystalline silica exposure; and
A statement that the employee should be examined by a specialist if the B-reader classifies the chest X-ray provided under the silica standard as 1/0 or higher (X-ray evidence of silicosis in employees exposed to respirable crystalline silica), or if the PLHCP otherwise recommends referral to a specialist.

PLHCP’s Written Report to Concrete Producer

The employer must get a written medical opinion from the PLHCP within 30 days of the medical examination. The written opinion must contain only the following information:

- The date of the examination;
- A statement that the examination has met the requirements of the silica standard; and
- Any recommended limitations on the employee’s use of respirators.

If the employee gives written authorization, the written medical opinion to the employer must also contain one or both of the following:

- Any recommended limitations on the employee’s exposure to respirable crystalline silica;
- A statement that the employee should be examined by a specialist if the B reader classifies the chest X-ray provided under the silica standard as 1/0 or higher (X-ray evidence of silicosis in employees exposed to respirable crystalline silica), or if the PLHCP otherwise recommends referral to a specialist.

The purpose of the employee written authorization requirement is to enhance employee privacy and encourage employees to participate in medical surveillance by minimizing fears about retaliation or discrimination based on medical findings. Employers must make sure that each employee receives a copy of the written medical opinion within 30 days of each medical examination. The PLHCP can give a copy of the opinion directly to the employee, so long as the time deadline is met. As indicated above, employees can show this opinion to future employers as proof that medical surveillance requirements under the silica standard are current.

Medical Surveillance

**PLHCP’s Written Medical Opinion for the Concrete Producer**

- Received by employer within 30 days
- Statement that exam meets the standard
- Recommended limitations on respirator use
- With employee authorization:
  - Recommended limitations on exposure
  - Statement on needing a specialist exam
Appendix B contains guidelines for PLHCPs and blank sample forms for the medical report for the employee, the medical opinion for the employer, and an authorization form to allow limitations on respirable crystalline silica exposure or recommendations for a specialist examination to be reported to the employer. Employers must make sure that PLHCPs who will conduct medical examinations required by the silica standard have a copy of the standard, including Appendix B. The purpose of Appendix B is to give PLHCPs medical information and guidance to help them conduct medical examinations that meet the requirements of the silica standard. Examples of completed forms are included in this guide. Sample Form 1 is a sample of the written medical report that the PLHCP provides to the employee. The employer does not receive a copy of the written medical report. Sample Form 2 is a sample of the written medical opinion that the PLHCP provides to the employer. The PLHCP indicates the type of examination and recommendations on use of a respirator. If the employee signs the written authorization (Sample Form 3) allowing the PLHCP to release further information to the employer, the PLHCP must include any recommend limitations on exposure to respirable crystalline silica and/or any referral to a specialist.

Additional Exams by Specialists

The concrete producer must make the specialist examination available within 30 days of receiving the written medical opinion that includes the PLHCP’s recommendation for a specialist examination. The specialist must be either an American Board-Certified Specialist in Pulmonary Disease or an American Board-Certified Specialist in Occupational Medicine. The employer must ensure the specialist:

- Receives the same information that the employer is required to provide the PLHCP (see above);
- Explains the results of the medical examination to the employee and provides each employee with a written medical report within 30 days of the examination; and
- Provides the employer a written medical opinion within 30 days of the examination.

What About Communication of Hazards?

Ready mixed concrete producers must train and inform employees covered by the silica standard about respirable crystalline silica hazards and the methods the employer uses to limit their exposures to those hazards. Producers must cover the cost of training and must pay employees for the time spent in training.

As mentioned earlier, all regulated areas must post a sign at the entrance. The sign communicates the hazard with the following: DANGER, RESPIRABLE CRYSTALLINE SILICA, MAY CAUSE CANCER, CAUSES DAMAGE TO LUNGS WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY
Concrete producers must ensure that employees trained under the silica standard can demonstrate knowledge and understanding of at least:

1. Health hazards associated with respirable crystalline silica exposure. For respirable crystalline silica, the health hazards include: cancer, lung effects, immune system effects, and kidney effects.

2. Specific workplace tasks that could expose employees to respirable crystalline silica.

3. Specific measures the employer is implementing to protect employees from respirable crystalline silica exposure, including engineering controls, work practices, and respirators to be used. This training must be specific for the workplace and task that each employee performs. In general industry and maritime, training subjects would commonly include:
   - Signs that the controls may not be working effectively (e.g., visible dust emission).
   - Work practices needed for the controls to function effectively (e.g., not opening windows near local exhaust sources, positioning the local exhaust hood directly over the exposure source). If employees covered by the general industry and maritime standard operate equipment with built-in controls that are under their control, those employees are required to demonstrate knowledge and understanding of the full and proper implementation of those controls.

4. The contents of the Respirable Crystalline Silica standard. This would involve a description of the standard’s requirements.

5. The purpose and a description of the medical surveillance program required under the standard.

The employer is not required to provide all required training if an employee is already able to demonstrate knowledge and understanding of training topics such as health hazards, the contents of the silica standard, or medical surveillance requirements. However, some site-specific or employer-specific training is always necessary, such as training on specific tasks that could result in exposures in that workplace and specific controls or work practices that the employer is using.

**Training Schedule**

Employees must be trained at the time they are assigned to a position involving exposure to respirable crystalline silica. Additional training must be provided as often as necessary to ensure that employees know and understand respirable crystalline silica hazards and the protections available in their workplace. Examples of when additional training would be required include:

- When the employer asks an employee to perform a task that is new to that employee;
- When the employer introduces new protections;
■ When an employee is working in a manner that suggests he or she has forgotten what was learned in training.

**Training Methods**

The silica standard does not require ready mixed concrete producer to use any particular method for training employees. Employers could use hands-on training, videotapes, slide presentations, classroom instruction, informal discussions during safety meetings, written materials, or any combination of these methods to train employees. In order for employees to demonstrate knowledge and understanding of the training subjects, training must be done in a manner and language that employees understand. This may mean, for example, providing materials, instruction, or assistance in Spanish rather than English for Spanish-speaking employees who do not understand English, and using methods other than printed reading materials if the employee is not able to read. To ensure that employees understand the material presented during training, it is critical that trainees have the opportunity to ask questions and receive answers if they do not fully understand the material that is presented to them. When videotape presentations or computer-based programs are used, this requirement may be met by having a qualified trainer available to address questions after the presentation, or providing a telephone hotline so that trainees will have direct access to a qualified trainer. Employers can determine if employees know and understand the training topics through discussion of the required training subjects, written tests, or oral quizzes.

**Availability of Silica Standard**

Exposure and medical records must be kept and made available to employees, their representatives, and OSHA in accordance with OSHA’s access to employee exposure and medical records regulation.

**What about Recordkeeping?**

Records can demonstrate employer compliance with the standard, and can assist in diagnosing and identifying workplace related illnesses. Therefore, concrete producers are required to make and keep accurate records of air monitoring data and objective data used to assess employee exposures to respirable crystalline silica under the standard, as well as records of medical surveillance provided under the standard.

Concrete producers must make and keep an accurate record of all air monitoring performed to comply with the standard. The record must indicate:

■ The date of the measurement for each sample taken;
■ The task monitored;
■ Sampling and analytical methods used;
■ The number, duration, and results of samples taken;
■ The identity of the laboratory that performed the analysis;
■ The type of personal protective equipment used (e.g., type of respirators worn); and
■ The name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

Objective Data Records
When an employer relies on objective data to comply with the silica standard, the employer must make and keep an accurate record of the objective data. The record must include at least:
■ The crystalline silica-containing material in question;
■ The source of the objective data;
■ The testing protocol and results of testing;
■ A description of the process, task, or activity on which the objective data were based; and
■ Any other data relevant to the process, task, activity, material, or exposures on which the objective data are based.

Medical Surveillance Records
The employer must make and keep an accurate record for each employee provided medical surveillance under the standard. The record must include the following information about the employee:
■ Name and social security number;
■ A copy of the PLHCPs’ and specialists’ written opinions; and
■ A copy of the information that the employer is required to provide to the PLHCPs and specialists (i.e., a description of the employee’s former, current, and anticipated duties as they relate to crystalline silica exposure; a description of the employee’s former, current, and anticipated respirable crystalline silica exposure levels; a description of the personal protective equipment used by the employee; and information from previous employment-related medical examinations that is currently within the control of the employer).

Exposure and Medical Records
Exposure and medical records must be kept and made available to employees, their representatives, and OSHA in accordance with OSHA’s access to employee exposure and medical records regulation.
OSHA’s Access to Employee Exposure and Medical Records Regulation

A separate OSHA regulation (29 CFR 1910.1020, Access to Employee Exposure and Medical Records) addresses requirements for maintaining exposure and medical records. In general, exposure records (including air monitoring and objective data) must be kept for at least 30 years, and medical records must be kept for at least the duration of employment plus 30 years. It is necessary to keep these records for extended periods because silica-related diseases such as cancer often cannot be detected until several decades after exposure. However, if an employee works for an employer for less than one year, the employer does not have to keep the medical records after employment ends, as long as the employer gives those records to the employee.

Dates to Remember for Ready Mixed Concrete Producers

Compliance Date:

General Industry (1910.1053) - **June 23, 2018**

Medical Surveillance:

1) Exposures **above PEL** for 30 or more days a year from June 23, 2018 to June 22, 2020;

2) Exposures at or above the **action level** for 30 or more days a year beginning June 23, 2020.

For more information please visit OSHA’s website at [www.osha.gov](http://www.osha.gov), NRMCA at website [www.nrmca.org](http://www.nrmca.org), or attend NRMCA committee meetings, webinars and classroom courses.
§ 1910.1053 Respirable crystalline silica

(a) Scope and application. (1) This section applies to all occupational exposures to respirable crystalline silica, except:

(i) Construction work as defined in 29 CFR 1910.12(b) (occupational exposures to respirable crystalline silica in construction work are covered under 29 CFR 1926.1153);

(ii) Agricultural operations covered under 29 CFR part 1928; and

(iii) Exposures that result from the processing of sorptive clays.

(2) This section does not apply where the employer has objective data demonstrating that employee exposure to respirable crystalline silica will remain below 25 micrograms per cubic meter of air (25 μg/m³) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

(3) This section does not apply if the employer complies with 29 CFR 1926.1153 and:

(i) The task performed is indistinguishable from a construction task listed on Table 1 in paragraph (c) of 29 CFR 1926.1153; and

(ii) The task will not be performed regularly in the same environment and 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 μg/m³, 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.

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 (i) of this section.

Regulated area means an area, demarcated by the employer, where an employee’s exposure to airborne concentrations of respirable crystalline silica exceeds, or can reasonably be expected to exceed, the PEL.

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

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

This section means this respirable crystalline silica standard, 29 CFR 1910.1053.

(c) 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 μg/m³, calculated as an 8-hour TWA.

(d) Exposure assessment—(1) 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) or the scheduled monitoring option in paragraph (d)(3) of this section.

(2) 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.

(3) Scheduled monitoring option. (i) 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.

(ii) 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.

(iii) Where the most recent exposure monitoring indicates that employee exposures are below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring.

(iv) 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.

(v) 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 7 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)(4) of this section.

(4) 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.

(5) Methods of sample analysis. The employer shall ensure that all samples taken to satisfy the monitoring requirements of paragraph (d) 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.

(6) Employee notification of assessment results. (i) Within 15 working days after completing an exposure assessment in accordance with paragraph (d) 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.

(ii) 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.

(7) Observation of monitoring. (i) 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.

(ii) 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.
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(e) Regulated areas—(1) Establishment. The employer shall establish a regulated area wherever an employee’s exposure to airborne concentrations of respirable crystalline silica is, or can reasonably be expected to be, in excess of the PEL.

(2) Demarcation. (i) The employer shall demarcate regulated areas from the rest of the workplace in a manner that minimizes the number of employees exposed to respirable crystalline silica within the regulated area.

(ii) The employer shall post signs at all entrances to regulated areas that bear the legend specified in paragraph (f)(2) of this section.

(3) Access. The employer shall limit access to regulated areas to:

(A) Persons authorized by the employer and required by work duties to be present in the regulated area;

(B) Any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures under paragraph (d) of this section; and

(C) Any person authorized by the Occupational Safety and Health Act or regulations issued under it to be in a regulated area.

(4) Provision of respirators. The employer shall provide each employee and the employee’s designated representative entering a regulated area with an appropriate respirator in accordance with paragraph (g) of this section and shall require each employee and the employee’s designated representative to use the respirator while in a regulated area.

(f) Methods of compliance—(1) 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 (g) of this section.

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

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

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

(C) A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica.

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

(iii) 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.

(3) Abrasive blasting. In addition to the requirements of paragraph (f)(1) of this section, the employer shall comply with other OSHA standards, when applicable, such as 29 CFR 1910.94 (Ventilation), 29 CFR 1915.34 (Mechanical paint removers), and 29 CFR 1915 Subpart I (Personal Protective Equipment), where abrasive blasting is conducted using crystalline silica-containing blasting agents, or where abrasive blasting is conducted on substrates that contain crystalline silica.

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

(ii) Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible;
(iii) 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; and
(iv) During periods when the employee is in a regulated area.

(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.

(b) 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.

(i) 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 occupationally exposed to respirable crystalline silica at or above the action level for 30 or more days per year.

(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 (i)(2) of this section (except paragraph (i)(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

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(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 (i)(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 (i)(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 (i)(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 (i)(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 (i)(5) (except paragraph (i)(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 (i)(6) (except paragraph (i)(6)(i)(B) and (i)(6)(ii)(B)) of this section.

(j) 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 (j)(3) 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) Signs. The employer shall post signs at all entrances to regulated areas that bear the following legend:
DANGER
RESPIRABLE CRYSTALLINE SILICA
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(3) 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; and
(E) The purpose and a description of the medical surveillance program required by paragraph (i) of this section.
(ii) The employer shall make a copy of this section readily available without cost to each employee covered by this section.
(k) 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) 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 (i) 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.
(l) Dates. (1) This section is effective June 23, 2016.
(2) Except as provided for in paragraphs (l)(3) and (4) of this section, all obligations of this section commence June 23, 2018.
(3) For hydraulic fracturing operations in the oil and gas industry:
(i) All obligations of this section, except obligations for medical surveillance in paragraph (l)(1)(i) and engineering controls in paragraph (f)(1) of this section, commence June 23, 2018.
(ii) Obligations for engineering controls in paragraph (f)(1) of this section commence June 23, 2021; and
(iii) Obligations for medical surveillance in paragraph (i)(1)(i) commence in accordance with paragraph (i)(4) of this section.

(4) The medical surveillance obligations in paragraph (i)(1)(i) commence on June 23, 2018, for employees who will be occupationally exposed to respirable crystalline silica above the PEL for 30 or more days per year. Those obligations commence June 23, 2020, for employees who will be occupationally exposed to respirable crystalline silica at or above the action level for 30 or more days per year.

APPENDIX A TO §1910.1053—METHODS OF SAMPLE ANALYSIS

This appendix specifies the procedures for analyzing air samples for respirable crystalline silica, as well as the quality control procedures that employers must ensure that laboratories use when performing an analysis required under 29 CFR 1910.1053 (d)(5). Employers must ensure that such a laboratory:

1. Evaluates all samples using the procedures specified in one of the following analytical methods: OSHA ID–142; NMAM 7500; NMAM 7602; NMAM 7603; MSHA P–2; or MSHA P–7.


3. Uses the most current National Institute of Standards and Technology (NIST) or NIST traceable standards for instrument calibration or instrument calibration verification.

4. Implements an internal quality control (QC) program that evaluates analytical uncertainty and provides employers with estimates of sampling and analytical error.

5. Characterizes the sample material by identifying polymorphs of respirable crystalline silica present, identifies the presence of any interfering compounds that might affect the analysis, and makes any corrections necessary in order to obtain accurate sample analysis; and

6. Analyzes quantitatively for crystalline silica only after confirming that the sample matrix is free of uncorrectable analytical interferences, corrects for analytical interferences, and uses a method that meets the following performance specifications:

6.1 Each day that samples are analyzed, performs instrument calibration checks with standards that bracket the sample concentrations.

6.2 Uses five or more calibration standard levels to prepare calibration curves and ensures that standards are distributed through the calibration range in a manner that accurately reflects the underlying calibration curve; and

6.3 Optimizes methods and instruments to obtain a quantitative limit of detection that represents a value no higher than 25 percent of the PEL based on sample air volume.

APPENDIX B TO §1910.1053—MEDICAL SURVEILLANCE GUIDELINES

INTRODUCTION

The purpose of this Appendix is to provide medical information and recommendations to aid physicians and other licensed health care professionals (PLHCPs) regarding compliance with the medical surveillance provisions of the respirable crystalline silica standard (29 CFR 1910.1053). Appendix B is for informational and guidance purposes only and none of the statements in Appendix B should be construed as imposing a mandatory requirement on employers that is not otherwise imposed by the standard.

Medical screening and surveillance allow for early identification of exposure-related health effects in individual employee and groups of employees, so that actions can be taken to both avoid further exposure and prevent or address adverse health outcomes. Silica-related diseases can be fatal, encompass a variety of target organs, and may have public health consequences when considering the increased risk of a latent tuberculosis (TB) infection becoming active. Thus, medical surveillance of silica-exposed employees requires that PLHCPs have a thorough knowledge of silica-related health effects.

This Appendix is divided into seven sections. Section 1 reviews silica-related diseases, medical responses, and public health responses. Section 2 outlines the components of the medical surveillance program for employees exposed to silica. Section 3 describes the roles and responsibilities of the PLHCP implementing the program and of other medical specialists and public health professionals. Section 4 provides a discussion of considerations, including confidentiality. Section 5 provides a list of additional resources and Section 6 lists references. Section 7 provides sample forms for the written medical report for the employee, the written medical opinion for the employer and the written authorization.

1. RECOGNITION OF SILICA-RELATED DISEASES

1.1 Overview. The term “silica” refers specifically to the compound silicon dioxide (SiO2). Silica is a major component of sand, rock, and mineral ores. Exposure to fine (respirable size) particles of crystalline forms of silica is associated with adverse health effects, such as silicosis, lung cancer, chronic obstructive pulmonary disease (COPD), and activation of latent TB infections. Exposure to respirable crystalline silica can occur in
industry settings such as foundries, abrasive blasting operations, paint manufacturing, glass and concrete product manufacturing, brick making, china and pottery manufacturing, manufacturing of plumbing fixtures, and many construction activities including highway repair, masonry, concrete work, rock drilling, and tuck-pointing. New uses of silica continue to emerge. These include countertop manufacturing, finishing, and installation (Kramer et al. 2012; OSHA 2015) and hydraulic fracturing in the oil and gas industry (OSHA 2012).

Silicosis is an irreversible, often disabling, and sometimes fatal fibrotic lung disease. Progression of silicosis can occur despite removal from further exposure. Diagnosis of silicosis requires a history of exposure to silica and radiologic findings characteristic of silica exposure. Three different presentations of silicosis (chronic, accelerated, and acute) have been defined. Accelerated and acute silicosis are much less common than chronic silicosis because these are life-threatening illnesses and because they are caused by substantial overexposures to respirable crystalline silica. Although any case of silicosis indicates a breakdown in prevention, a case of acute or accelerated silicosis implies current high exposure and a very marked breakdown in prevention.

In addition to silicosis, employees exposed to respirable crystalline silica, especially those with accelerated or acute silicosis, are at increased risks of occurring active TB and other infections (ATS 1997; Rees and Murray 2007). Exposure to respirable crystalline silica also increases an employee's risk of developing lung cancer, and the higher the cumulative exposure, the higher the risk (Steenland et al. 2001; Steenland and Ward 2014). Symptoms for these diseases and other respirable crystalline silica-related diseases are discussed below.

1.2. Chronic Silicosis. Chronic silicosis is the most common presentation of silicosis and usually occurs after at least 10 years of exposure to respirable crystalline silica. The clinical presentation of chronic silicosis is:

1.2.1. Symptoms—shortness of breath and cough, although employees may not notice any symptoms early in the disease. Constitutional symptoms, such as fever, loss of appetite and fatigue, may indicate other diseases associated with silica exposure, such as TB infection or lung cancer. Employees with these symptoms should immediately receive further evaluation and treatment.

1.2.2. Physical Examination—may be normal or disclose dry rales or rhonchi on lung auscultation.

1.2.3. Spirometry—may be normal or may show only a mild restrictive or obstructive pattern.

1.2.4. Chest X-ray—classic findings are small, rounded opacities in the upper lung fields bilaterally. However, small irregular opacities and opacities in other lung areas can also occur. Rarely, “eggshell calcifications” in the hilar and mediastinal lymph nodes are seen.

1.2.5. Clinical Course—chronic silicosis in most cases is a slowly progressive disease. Under the respirable crystalline silica standard, the PLHCP is to recommend that employees with a 1/0 category X-ray be referred to an American Board Certified Specialist in Pulmonary Disease or Occupational Medicine. The PLHCP and/or Specialist should counsel employees regarding work practices and personal habits that could affect employees’ respiratory health.

1.3. Accelerated Silicosis. Accelerated silicosis generally occurs within 5–10 years of exposure and results from high levels of exposure to respirable crystalline silica. The clinical presentation of accelerated silicosis is:

1.3.1. Symptoms—shortness of breath, cough, and sometimes sputum production. Employees with exposure to respirable crystalline silica, and especially those with accelerated silicosis, are at high risk for activation of TB infections, atypical mycobacterial infections, and fungal super-infections. Constitutional symptoms, such as fever, weight loss, hemoptysis (coughing up blood), and fatigue may herald one of these infections or the onset of lung cancer.

1.3.2. Physical Examination—rales, rhonchi, or other abnormal lung findings in relation to illnesses present. Clubbing of the digits, signs of heart failure, and cor pulmonale may be present in severe lung disease.

1.3.3. Spirometry—restrictive or mixed restrictive/obstructive pattern.

1.3.4. Chest X-ray—small rounded and/or irregular opacities bilaterally. Large opacities and lung abscesses may indicate infections, lung cancer, or progression to complicated silicosis, also termed progressive massive fibrosis.

1.3.5. Clinical Course—accelerated silicosis has a rapid, severe course. Under the respirable crystalline silica standard, the PLHCP can recommend referral to a Board Certified Specialist in either Pulmonary Disease or Occupational Medicine, as deemed appropriate, and referral to a Specialist is recommended whenever the diagnosis of accelerated silicosis is being considered.

1.4. Acute Silicosis. Acute silicosis is a rare disease caused by inhalation of extremely high levels of respirable crystalline silica particles. The pathology is similar to alveolar proteinosis with lipoproteinaceous material accumulating in the alveoli. Acute silicosis develops rapidly, often, within a few months to less than 2 years of exposure, and
is almost always fatal. The clinical presentation of acute silicaosis is as follows:

1.4.1. Symptoms—sudden, progressive, and severe shortness of breath. Constitutional symptoms may precede or accompany the respiratory findings. These symptoms include fever, weight loss, fatigue, productive cough, hemoptysis (coughing up blood), and pleuritic chest pain.

1.4.2. Physical Examination—dyspnea at rest, cyanosis, decreased breath sounds, inspiratory rales, clubbing of the digits, and fever.

1.4.3. Spirometry—restrictive or mixed restrictive/obstructive pattern.

1.4.4. Chest X-ray—diffuse haziness of the lungs bilaterally early in the disease. As the disease progresses, the “ground glass” appearance of interstitial fibrosis will appear.

1.4.5. Clinical Course—employees with acute silicosis are at especially high risk of TB activation, nontuberculous mycobacterial infections, and fungal superinfections. Acute silicosis is immediately life-threatening. The employee should be urgently referred to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine for evaluation and treatment. Although any case of silicosis indicates a breakdown in prevention, a case of acute or accelerated silicosis implies a profoundly high level of silica exposure and may mean that other employees are currently exposed to dangerous levels of silica.

1.5. COPD. COPD, including chronic bronchitis and emphysema, has been documented in silica-exposed employees, including those who do not develop silicosis. Periodic spirometry tests are performed to evaluate each employee for progressive changes consistent with the development of COPD. In addition to evaluating spirometry results of individual employees over time, PLHCPs may want to be aware of general trends in spirometry results for groups of employees from the same workplace to identify possible problems that might exist at that workplace. (See Section 2 of this Appendix on Medical Surveillance for further discussion.) Heart disease may develop secondary to lung diseases such as COPD. A recent study by Liu et al. 2014 noted a significant exposure-response trend between cumulative silica exposure and heart disease deaths, primarily due to pulmonary heart disease, such as cor pulmonale.

1.6. Renal and Immune System. Silica exposure has been associated with several types of kidney disease, including glomerulonephritis, nephrotic syndrome, and end-stage renal disease requiring dialysis. Silica exposure has also been associated with other autoimmune conditions, including progressive systemic sclerosis, systemic lupus erythematosus, and rheumatoid arthritis. Studies note an association between employees with silicosis and serologic markers for autoimmune diseases, including antinuclear antibodies, rheumatoid factor, and immune complexes (Jalloul and Banks 2007; Shtraichman et al. 2015).

1.7. TB and Other Infections. Silica-exposed employees with latent TB are 3 to 30 times more likely to develop active pulmonary TB infection (ATS 1997; Rees and Murray 2007). Although respirable crystalline silica exposure does not cause TB infection, individuals with latent TB infection are at increased risk for activation of disease if they have higher levels of respirable crystalline silica exposure, greater profusion of radiographic abnormalities, or a diagnosis of silicosis. Demographic characteristics, such as immigration from some countries, are associated with increased rates of latent TB infection. PLHCPs can review the latest Centers for Disease Control and Prevention (CDC) information on TB incidence rates and high risk populations online (See Section 5 of this Appendix). Additionally, silica-exposed employees are at increased risk for contracting nontuberculous mycobacterial infections, including Mycobacterium avium-intracellulare and Mycobacterium kansaii.

1.8. Lung Cancer. The National Toxicology Program has listed respirable crystalline silica as a known human carcinogen since 2000 (NTP 2014). The International Agency for Research on Cancer (2012) has also classified silica as Group 1 (carcinogenic to humans). Several studies have indicated that the risk of lung cancer from exposure to respirable crystalline silica and smoking is greater than additive (Brown 2009; Liu et al. 2013). Employees should be counseled on smoking cessation.

2. MEDICAL SURVEILLANCE

PLHCPs who manage silica medical surveillance programs should have a thorough understanding of the many silica-related diseases and health effects outlined in Section 1 of this Appendix. At each clinical encounter, the PLHCP should consider silica-related health outcomes, with particular vigilance for acute and accelerated silicosis. In this Section, the required components of medical surveillance under the respirable crystalline silica standard are reviewed, along with additional guidance and recommendations for PLHCPs performing medical surveillance examinations for silica-exposed employees.

2.1. History

2.1.1. The respirable crystalline silica standard requires the following: 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 TB; and smoking status and history.

2.1.2. Further, the employer must provide the PLHCP with the following information:

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

2.1.2.2. The employee's former, current, and anticipated levels of occupational exposure to respirable crystalline silica;

2.1.2.3. 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

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

2.1.3. Additional guidance and recommendations: A history is particularly important both in the initial evaluation and in periodic examinations. Information on past and current medical conditions (particularly a history of kidney disease, cardiac disease, connective tissue disease, and other immune diseases), medications, hospitalizations and surgeries may uncover health risks, such as immune suppression, that could put an employee at increased health risk from exposure to silica. This information is important when counseling the employee on risks and safe work practices related to silica exposure.

2.2. Physical Examination

2.2.1. The respirable crystalline silica standard requires the following: A physical examination, with special emphasis on the respiratory system. The physical examination must be performed at the initial examination and every three years thereafter. The required pulmonary function test is spirometry and must include forced vital capacity (FVC), forced expiratory volume in one second (FEV₁), and FEV₁/FVC ratio. Testing must be administered by a spirometry technician with a current certificate from a National Institute for Occupational Health and Safety (NIOSH)-approved spirometry course.

2.3.1. The respirable crystalline silica standard requires the following: Baseline testing for TB on initial examination.

2.3.2. Additional guidance and recommendations:

2.3.2.1. Current CDC guidelines (See Section 5 of this Appendix) should be followed for the application and interpretation of Tuberculin skin tests (TST). The interpretation and documentation of TST reactions should be performed within 48 to 72 hours of administration by trained PLHCPs.

2.3.2.2. PLHCPs may use alternative TB tests, such as interferon-γ release assays (IGRAs), if sensitivity and specificity are comparable to TST (Mazurek et al. 2010; Slater et al. 2015). PLHCPs can consult the current CDC guidelines for acceptable tests for latent TB infection.

2.3.2.3. The silica standard allows the PLHCP to order additional tests or test at a greater frequency than required by the standard, if deemed appropriate. Therefore, PLHCPs might perform periodic (e.g., annual) TB testing as appropriate, based on employees' risk factors. For example, according to the American Thoracic Society (ATS), the diagnosis of silicosis or exposure to silica for 25 years or more are indications for annual TB testing (ATS 1997). PLHCPs should consult the current CDC guidance on the use of TB tests.

2.3.2.4. Employees with positive TB tests and those with indeterminate test results should be referred to a provider that can be contacted for further information. (See Section 5 of this Appendix for links to CDC’s TB resources and State TB Control Offices.)

2.3.2.5. The following public health principles are key to TB control in the U.S. (ATS–CDC–IDSA 2005):

1. Prompt detection and reporting of persons who have contracted active TB;

2. Prevention of TB spread to close contacts of active TB cases;

3. Prevention of active TB in people with latent TB through targeted testing and treatment; and

4. Identification of settings at high risk for TB transmission so that appropriate infection-control measures can be implemented.

2.4. Pulmonary Function Testing

2.4.1. The respirable crystalline silica standard requires the following: Pulmonary function testing must be performed on the initial examination and every three years thereafter. The required pulmonary function test is spirometry and must include forced vital capacity (FVC), forced expiratory volume in one second (FEV₁), and FEV₁/FVC ratio. Testing must be administered by a spirometry technician with a current certificate from a National Institute for Occupational Health and Safety (NIOSH)-approved spirometry course.
2.4.2. Additional guidance and recommendations: Spirometry provides information about individual respiratory status and can be used to track an employee’s respiratory status over time as a surveillance tool to follow individual and group respiratory function. For quality results, the ATS and the American College of Occupational and Environmental Medicine (ACOEM) recommend use of the third National Health and Nutrition Examination Survey (NHANES III) values, and ATS publishes recommendations for spirometry equipment (Miller et al. 2005; Townsend 2011; Redlich et al. 2014). OSHA’s publication, Spirometry Testing in Occupational Health Programs for Healthcare Professionals, provides helpful guidance (See Section 5 of this Appendix). Abnormal spirometry results may warrant further clinical evaluation and possible recommendations for limitations on the employee’s exposure to respirable crystalline silica.

2.5. Chest X-ray

2.5.1. The respirable crystalline silica standard requires the following: A single posteroanterior (PA) 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. A chest X-ray must be performed on the initial examination and every three years thereafter. The chest X-ray must be interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader.

Chest radiography is necessary to diagnose silicosis, monitor the progression of silicosis, and identify associated conditions such as TB. If the B reading indicates small opacities in a profusion of 1/0 or higher, the employee is to receive a recommendation for referral to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine.

2.5.2. Additional guidance and recommendations: Medical imaging has largely transitioned from conventional film-based radiography to digital radiography systems. The ILO Guidelines for the Classification of Pneumoconioses has historically provided film-based chest radiography as a referent standard for comparison to individual exams. However, in 2011, the ILO revised the guidelines to include a digital set of referent standards that were derived from the prior film-based standards. To assist in assuring that digitally-acquired radiographs are at least as safe and effective as film radiographs, NIOSH has prepared guidelines based upon accepted contemporary professional recommendations (See Section 5 of this Appendix). Current research from Laney et al. 2011 and Halldin et al. 2014 validate the use of the ILO digital referent images. Both studies conclude that the results of pneumoconiosis classification using digital references are comparable to film-based ILO classifications. Current ILO guidance on radiography for pneumoconioses and B-reading should be reviewed by the PLHCP periodically, as needed, on the ILO or NIOSH Web sites (See Section 5 of this Appendix).

2.6. Other Testing. Under the respirable crystalline silica standards, the PLHCP has the option of ordering additional testing he or she deems appropriate. Additional tests can be ordered on a case-by-case basis depending on individual signs and symptoms and clinical judgment. For example, if an employee reports a history of abnormal kidney function tests, the PLHCP may want to order a baseline renal function test (e.g., serum creatinine and urinalysis). As indicated above, the PLHCP may order annual TB testing for silica-exposed employees who are at high risk of developing active TB infections. Additional tests that PLHCPs may order based on findings of medical examinations include, but is not limited to, chest computerized tomography (CT) scan for lung cancer or COPD, testing for immunologic diseases, and cardiac testing for pulmonary-related heart disease, such as cor pulmonale.

3. ROLES AND RESPONSIBILITIES

3.1. PLHCP. The PLHCP designation refers to “an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required” by the respirable crystalline silica standard. The legally permitted scope of practice for the PLHCP is determined by each State. PLHCPs who perform clinical services for a silica medical surveillance program should have a thorough knowledge of respirable crystalline silica-related diseases and symptoms. Suspected cases of silicosis, advanced COPD, or other respiratory conditions causing impairment should be promptly referred to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine.

Once the medical surveillance examination is completed, the employer must ensure that the PLHCP explains to the employee the results of the medical examination and provides the employee with a written medical report within 30 days of the examination. The written medical report must contain 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. In addition, the PLHCP’s written medical report must include any recommended limitations on the employee’s use of respirators, any recommended limitations on the employee’s exposure to respirable crystalline silica, and a statement that the employee should be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.

The PLHCP should discuss all findings and test results and any recommendations regarding the employee’s health, workplace safety and health practices, and medical referrals for further evaluation, if indicated. In addition, it is suggested that the PLHCP offer to provide the employee with a complete copy of their examination and test results, as some employees may want this information for their own records or to provide to their personal physician or a future PLHCP. Employees are entitled to access their medical records.

Under the respirable crystalline silica standard, the employer must ensure that the PLHCP provides the employer with a written medical opinion within 30 days of the employee examination, and that the employee also gets a copy of the written medical opinion for the employer within 30 days. The PLHCP may choose to directly provide the employee a copy of the written medical opinion. This can be particularly helpful to employees, such as construction employees, who may change employers frequently. The written medical opinion can be used by the employee as proof of up-to-date medical surveillance. The following lists the elements of the written medical report for the employee and written medical opinion for the employer. (Sample forms for the written medical report for the employee, the written medical opinion for the employer, and the written authorization are provided in Section 7 of this Appendix.)

3.1.1. The written medical report for the employee must include the following information:

3.1.1.1. 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;

3.1.1.2. Any recommended limitations upon the employee’s use of a respirator;

3.1.1.3. Any recommended limitations on the employee’s exposure to respirable crystalline silica; and

3.1.1.4. A statement that the employee should be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine, where the standard requires or where the PLHCP has determined such a referral is necessary. The standard requires referral to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine for a chest X-ray B reading indicating small opacities in a profusion of 1/0 or higher, or if the PLHCP determines that referral to a Specialist is necessary for other silica-related findings.

3.1.2. The PLHCP’s written medical opinion for the employer must include only the following information:

3.1.2.1. The date of the examination;

3.1.2.2. A statement that the examination has met the requirements of this section; and

3.1.2.3. Any recommended limitations on the employee’s use of respirators.

3.1.2.4. If the employee provides the PLHCP with written authorization, the written opinion for the employer shall also contain either or both of the following:

1. Any recommended limitations on the employee’s exposure to respirable crystalline silica; and

2. A statement that the employee should be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine 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.

3.1.2.5. In addition to the above referral for abnormal chest X-ray, the PLHCP may refer an employee to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine for other findings of concern during the medical surveillance examination. If these findings are potentially related to silica exposure.

3.1.2.6. Although the respirable crystalline silica standard requires the employer to ensure that the PLHCP explains the results of the medical examination to the employee, the standard does not mandate how this should be done. The written medical opinion for the employer could contain a statement that the PLHCP has explained the results of the medical examination to the employee.

3.2. Medical Specialists. The silica standard requires that all employees with chest X-ray B readings of 1/0 or higher be referred to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine. If the employee has given written authorization for the employee to be informed, then the employer shall make available a medical examination by a Specialist within 30 days after receiving the PLHCP’s written medical opinion.

3.2.1. The employer must provide the following information to the Board Certified Specialist in Pulmonary Disease or Occupational Medicine:

3.2.1.1. A description of the employee’s former, current, and anticipated duties as
they relate to the employee's occupational exposure to respirable crystalline silica;

3.2.1.2. The employee’s former, current, and anticipated levels of occupational exposure to respirable crystalline silica;

3.2.1.3. 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

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

3.2.2. The PLHCP should make certain that, with written authorization from the employee, the Board Certified Specialist in Pulmonary Disease or Occupational Medicine has any other pertinent medical and occupational information necessary for the specialist’s evaluation of the employee’s condition.

3.2.3. Once the Board Certified Specialist in Pulmonary Disease or Occupational Medicine has evaluated the employee, the employer must ensure that the Specialist explains to the employee the results of the medical examination and provides the employee with a written medical report within 30 days of the examination. The employer must also ensure that the Specialist provides the employer with a written medical opinion within 30 days of the employee examination. (Sample forms for the written medical report for the employer, the written medical opinion for the employer and the written authorization are provided in Section 7 of this Appendix.)

3.2.4. The Specialist’s written medical report for the employee must include the following information:

3.2.4.1. 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;

3.2.4.2. Any recommended limitations upon the employee’s use of a respirator; and

3.2.4.3. Any recommended limitations on the employee’s exposure to respirable crystalline silica.

3.2.5. Although the respirable crystalline silica standard requires the employer to ensure that the Board Certified Specialist in Pulmonary Disease or Occupational Medicine explains the results of the medical examination to the employee, the standard does not mandate how this should be done. The written medical opinion for the employer could contain a statement that the Specialist has explained the results of the medical examination to the employee.

3.2.5.1. The date of the examination; and

3.2.5.2. Any recommended limitations on the employee’s exposure to respirable crystalline silica.

3.2.5.3. If the employee provides the Board Certified Specialist in Pulmonary Disease or Occupational Medicine with written authorization, the written medical opinion for the employer shall also contain any recommended limitations on the employee’s exposure to respirable crystalline silica.

3.2.5.4. The information that is provided from the PLHCP to the employee and employer under the medical surveillance section of OSHA’s respirable crystalline silica standard differs from that of medical surveillance requirements in previous OSHA standards. The standard requires two separate written communications, a written medical report for the employee and a written medical opinion for the employer. The confidentiality requirements for the written medical opinion are more stringent than in past standards.
For example, the information the PLHCP can (and must) include in his or her written medical opinion for the employer is limited to: The date of the examination, a statement that the examination has met the requirements of this section, and any recommended limitations on the employee’s use of respirators. If the employee provides written authorization for the disclosure of any limitations on the employee’s exposure to respirable crystalline silica, then the PLHCP can (and must) include that information in the written medical opinion for the employer as well. Likewise, with the employee’s written authorization, the PLHCP can (and must) disclose the PLHCP’s referral recommendation (if any) as part of the written medical opinion for the employer. However, the opinion to the employer must not include information regarding recommended limitations on the employee’s exposure to respirable crystalline silica or any referral recommendations without the employee’s written authorization.

The standard also places limitations on the information that the Board Certified Specialist in Pulmonary Disease or Occupational Medicine can provide to the employer without the employee’s written authorization. The Specialist’s written medical opinion for the employer, like the PLHCP’s opinion, is limited to (and must contain): The date of the examination and any recommended limitations on the employee’s use of respirators. If the employee provides written authorization, the written medical opinion can (and must) also contain any limitations on the employee’s exposure to respirable crystalline silica.

The PLHCP should discuss the implication of signing or not signing the authorization with the employee (in a manner and language that he or she understands) so that the employee can make an informed decision regarding the written authorization and its consequences. The discussion should include the risk of ongoing silica exposure, personal risk factors, risk of disease progression, and possible health and economic consequences. For instance, written authorization is required for a PLHCP to advise an employer that an employee should be referred to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine for evaluation of an abnormal chest X-ray (B-reading 1/0 or greater). If an employee does not sign an authorization, then the employer will not know and cannot facilitate the referral to a Specialist and is not required to pay for the Specialist’s examination. In the rare case where an employee is diagnosed with acute or accelerated silicosis, co-workers are likely to be at significant risk of developing those diseases as a result of inadequate controls in the workplace. In this case, the PLHCP and/or Specialist should explain this concern to the affected employee and make a determined effort to obtain written authorization from the employee so that the PLHCP and/or Specialist can contact the employer.

Finally, without written authorization from the employee, the PLHCP and/or Board Certified Specialist in Pulmonary Disease or Occupational Medicine cannot provide feedback to an employer regarding control of workplace silica exposure, at least in relation to an individual employee. However, the regulation does not prohibit a PLHCP and/or Specialist from providing an employer with general recommendations regarding exposure controls and prevention programs in relation to silica exposure and silica-related illnesses, based on the information that the PLHCP receives from the employer such as employees’ duties and exposure levels. Recommendations may include increased frequency of medical surveillance examinations, additional medical surveillance components, engineering and work practice controls, exposure monitoring and personal protective equipment. For instance, more frequent medical surveillance examinations may be a recommendation to employers for employees who do abrasive blasting with silica because of the high exposures associated with that operation.

ACOEM’s Code of Ethics and discussion is a good resource to guide PLHCPs regarding the issues discussed in this section (See Section 5 of this Appendix).

5. RESOURCES


5.4. National Institute of Occupational Safety and Health (NIOSH)


5.5. National Industrial Sand Association:

5.6. Occupational Safety and Health Administration (OSHA)
Contacting OSHA: http://www.osha.gov/html/Feed_Back.html
OSHA’s Clinicians Web page. (OSHA resources, regulations and links to help clinicians navigate OSHA’s Web site and aid clinicians in caring for workers.) Accessed at: http://www.osha.gov/dts/oom/clinicians/index.html


5.7. Other
Steenland, K. and Ward E. (2014). Silica: A lung carcinogen. CA Cancer J Clin, 64, 63–69. (This article reviews not only silica and lung cancer but also all the known silica-related health effects. Further, the authors provide guidance to clinicians on medical surveillance of silica-exposed workers and worker counselling on safety practices to minimize silica exposure.)

6. REFERENCES


Occupational Safety and Health Administration/National Institute for Occupational Safety and Health (OSHA/NIOSH) (2012). Hazard Alert. Worker exposure to silica during hydraulic fracturing.


7. SAMPLE FORMS

Three sample forms are provided. The first is a sample written medical report for the employee. The second is a sample written medical opinion for the employer. And the third is a sample written authorization form that employees sign to clarify what information the employee is authorizing to be released to the employer.
§ 1910.1053  
29 CFR Ch. XVII (7–1–16 Edition)

WRITTEN MEDICAL REPORT FOR EMPLOYEE

<table>
<thead>
<tr>
<th>EMPLOYEE NAME:</th>
<th>DATE OF EXAMINATION:</th>
</tr>
</thead>
</table>

TYPE OF EXAMINATION:

- [ ] Initial examination
- [ ] Periodic examination
- [ ] Specialist examination
- [ ] Other:

RESULTS OF MEDICAL EXAMINATION:

<table>
<thead>
<tr>
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<th>Normal</th>
<th>Abnormal (see below)</th>
<th>Not performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Examination</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Chest X-Ray</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Breathing Test</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Test for Tuberculosis</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Other</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

Results reported as abnormal:

[ ] Your health may be at increased risk from exposure to respirable crystalline silica due to the following:

RECOMMENDATIONS:

- [ ] No limitations on respirator use
- [ ] Recommended limitations on use of respirator:
- [ ] Recommended limitations on exposure to respirable crystalline silica:

Dates for recommended limitations, if applicable:

- [ ] from MM/DD/YYYY to MM/DD/YYYY

[ ] I recommend that you be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine

[ ] Other recommendations*:

Your next periodic examination for silica exposure should be in: [ ] 3 years

Examining Provider: ____________________________

Provider Name: ____________________________

Office Address: ____________________________

Office Phone: ____________________________

Date: ____________________________

*These findings may not be related to respirable crystalline silica exposure or may not be work-related, and therefore may not be covered by the employer. These findings may necessitate follow-up and treatment by your personal physician.

Respirable Crystalline Silica standard (§ 1910.1053 or 1926.1153)
Occupational Safety and Health Admin., Labor § 1910.1053

WRITTEN MEDICAL OPINION FOR EMPLOYER

EMPLOYER: ________________________________

EMPLOYEE NAME: ___________________________ DATE OF EXAMINATION: ________________

TYPE OF EXAMINATION:
[ ] Initial examination  [ ] Periodic examination  [ ] Specialist examination
[ ] Other: ________________________________

USE OF RESPIRATOR:
[ ] No limitations on respirator use
[ ] Recommended limitations on use of respirator: ________________________________

Dates for recommended limitations, if applicable: ________________ to ________________

MM/DD/YYYY MM/DD/YYYY

The employee has provided written authorization for disclosure of the following to the employer (if applicable):

[ ] This employee should be examined by an American Board Certified Specialist in Pulmonary Disease or Occupational Medicine

[ ] Recommended limitations on exposure to respirable crystalline silica: ________________________________

Dates for exposure limitations noted above: ________________ to ________________

MM/DD/YYYY MM/DD/YYYY

NEXT PERIODIC EVALUATION:  [ ] 3 years  [ ] Other: ________________________________

MM/DD/YYYY

Examining Provider: ________________________________ Date: ________________

Provider Name: ________________________________ Provider's specialty: ________________________________

Office Address: ________________________________ Office Phone: ________________________________

[ ] I attest that the results have been explained to the employee.

The following is required to be checked by the Physician or other Licensed Health Care Professional (PLHCP):

[ ] I attest that this medical examination has met the requirements of the medical surveillance section of the OSHA Respirable Crystalline Silica standard (§ 1910.1053(h) or 1926.1153(h)).
§ 1910.1096

AUTHORIZATION FOR CRYSTALLINE SILICA OPINION TO EMPLOYER

This medical examination for exposure to crystalline silica could reveal a medical condition that results in recommendations for (1) limitations on respirator use, (2) limitations on exposure to crystalline silica, or (3) examination by a specialist in pulmonary disease or occupational medicine. Recommended limitations on respirator use will be included in the written opinion to the employer. If you want your employer to know about limitations on crystalline silica exposure or recommendations for a specialist examination, you will need to give authorization for the written opinion to the employer to include one or both of those recommendations.

I hereby authorize the opinion to the employer to contain the following information, if relevant (please check all that apply):

☐ Recommendations for limitations on crystalline silica exposure

☐ Recommendation for a specialist examination

OR

☐ I do not authorize the opinion to the employer to contain anything other than recommended limitations on respirator use.

Please read and initial:

I understand that if I do not authorize my employer to receive the recommendation for specialist examination, the employer will not be responsible for arranging and covering costs of a specialist examination.

______________________________
Name (printed)

______________________________
Signature

______________________________
Date

§ 1910.1096 Ionizing radiation.

(a) Definitions applicable to this section—(1) Radiation includes alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other atomic particles; but such term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

(2) Radioactive material means any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.