SAFETY PROCEDURES

CRYSTALLINE SILICA PROTECTION PROGRAM

SINCE 1963

LD DOCSA

ASSOCIATES, INC.
GENERAL CONTRACTORS

Building Sustainable Solutions

Contents

This safety is provided for L.D. Docsa team members, subcontractors and the public will be protected from the hazards associated with crystalline silica. This policy applies to all subcontractors and employees of L.D. Docsa Associates, Inc. All organizations are required to comply with the provisions of this policy and procedure. Any deviation, unless spelled out specifically in the policy, requires the permission of the Safety Committee and/or Safety Manager

Responsibilities

The top L.D. Docsa manager on all job sites is responsible for the implementation of this policy on the project. The corporate safety department is responsible for maintaining this document.

Scope

This safety policy and procedure covers all operations that have the potential of creating exposure for personnel (L.D. Docsa, subcontractor, client, or general public) to dusts containing crystalline silica.

Procedure

Identifying Silica Hazards

Crystalline silica is a natural constituent of the earth's crust and is a basic component of sand, concrete, brick, asphalt, granite, some blasting grit, and wall spackling materials. People may be exposed to crystalline silica hazards when around activities like:

- Abrasive blasting
- Jack hammering
- Concrete crushing
- Hoe ramming
- Rock drilling

- Mixing of concrete or grout
- Concrete drilling
- Sawing concrete, concrete blocks, or bricks
- Chipping or scarifying concrete
- Rock crushing
- Moving or dumping piles of concrete, rock, or sand Housekeeping activities (shoveling, sweeping, vacuuming, etc.)
- Demolition involving any of these materials
- Using coatings containing crystalline silica
- Removing coatings containing crystalline silica

Before any activity begins, project personnel must assess the work and identify possible exposures. Remember that concrete contains Portland Cement with silica and rock that contains silica. Quartz is the most common form of crystalline silica and is one of the most common minerals in the earth's crust. Also, whenever available consult the MSDS(s) for the materials with which you are dealing. Even materials containing small amounts of crystalline silica may be hazardous if they are used in ways that produce high dust concentrations.

Planning For Silica Exposure

In order to manage the silica hazard, project personnel must plan for potential team member health and environmental impacts before the work begins. Each activity with the potential for silica exposure must be addressed in a Silica Protection Plan (sample attached) that focuses on eliminating or minimizing silica exposure through substitution, engineering controls, work practices and methods, air monitoring, effective hygiene practices, PPE, training, environmental controls, and waste disposal.

Establishing a Job Specific Silica Protection Plan

Substitution, Engineering Controls, and Work Practices

In order to control the hazards of crystalline silica, you must first look at alternate methods of doing the work, substitution of less hazardous materials, engineering controls, and work practice controls to reduce the exposure to crystalline silica to below the OSHA Permissible Exposure Limit (PEL). The job specific plan will contain information on what methods, substitution, engineering and work controls were considered, why or why not they are feasible, and which controls the job is going to use. 29 CFR 1926.55 requires us to use feasible engineering or work practice controls to reduce team members' exposure to below the PEL.

Some possible substitution or engineering controls

- Substituting non-silica containing materials for use while abrasive blasting.
- Alternative methods (i.e. ordering grout from a concrete plant rather than mixing it onsite).
- Local exhaust (follow requirements of 1926.57).
- General ventilation (follow requirements of 1926.57).
- Vacuum methods with HEPA filters (vacuum shrouded tools like grinders, needle guns or saws).
- Distance (using a long handled grinder to allow standing up while grinding a floor or using a remote controlled unit like a scabbler, etc.).
- Dust control products for use on dusty roads or piles of material.
- Containment.
- Equipment with pressurized cabs and filter systems.
- Use of water hoses, spray booms, etc.

- Use of tools with dust control systems (water on saws or drill bits etc.).
- Diamond rope saw to cut concrete.
- “Chinese dynamite” e.g. slow expanding materials designed to break up concrete.

Some possible work practice (administrative) controls

- Working during hours other crews are not.
- Restricting access to the work areas.
- Good housekeeping practices (not allowing dust to build up, etc.).
- Specific standard operating procedures that minimizes dust produced by a task.
- Green cutting with a hydro blaster before concrete sets up.

These are only some suggestions; there are other controls we can use. Some combination of these or other controls will allow us to reduce the exposure to below the PEL. The object is to keep the dust out of the air. Be creative and share what you learn. Remember that you must use feasible controls even if they do not completely reduce the exposure to below the PEL.

Initial Assessment and Exposure Monitoring

Once all feasible engineering and administrative controls have been decided, you must determine what PPE is needed to supplement the controls. An initial assessment must be made to determine what the expected exposures will be. For respiratory protection this initial assessment will be based on either current L.D. Docsa representative data (within the last twelve months and involving similar conditions: tools, engineering or administrative controls, area characteristics, work methods, etc.) or the following table of silica dust

generating work activities that has been compiled from representative data. Either of these methods will provide a starting point for respiratory protection until you verify the exposure through ongoing air monitoring.

Cianbro Task Assessment Guide

Respirator	Protection Factor	Typical Silica Activity
Half face with HEPA filters Full face with HEPA filters PAPR with HEPA filters Supplied air respirator SCBA	Up to 0.5 mg/m^3 for quartz cristobalite or tridymite	Housekeeping (wet method) Sawcutting (wet method) Drilling concrete (wet method) Power tools with dust collection Equipment operating (open cab) Other activities not creating visible dust
Full face (quantitatively fit) PAPR with HEPA filters Supplied air respirator SCBA	Up to 2.5 mg/m^3 for quartz cristobalite or tridymite	Chipping concrete Jack hammering
PAPR with HEPA filters Supplied air respirator SCBA	Up to 5 mg/m^3 quartz cristobalite or tridymite	Power tools without dust collection Mixing grout (bulk) Vacuum abrasive blasting
Supplied air respirator SCBA Abrasive blasting hood respirator	Over 5 mg/m^3 quartz cristobalite or tridymite	Abrasive blasting

You must perform air monitoring for each activity and for each job classification (e.g. both the hoe ram operator and the person spraying water to keep the dust down) that provides a potential exposure to crystalline silica. If methods or controls used change, further air monitoring must be done. You can use one or more persons to represent a group as long as you sample the person(s) likely to have the highest exposure. Reference the L.D. Docsa IH manual for sampling methods and calculations or contact the manager of health and environmental hazards. Copies of field sampling data sheets must be sent to the manager of health and environmental hazards in Corporate Safety. Based on the results obtained, adjust the level of respiratory protection up or down as appropriate. For each activity, air monitoring frequency may be reduced to every six months if two consecutive tests taken at least seven days apart show results below 50% of the PEL. However if conditions, methods, activities, or controls used change then you must start air monitoring again.

Personal Protective Equipment

PPE for work around silica containing dust includes:

Disposable or reusable work clothing to keep from spreading the dust or bringing the dust home.

- Leather gloves.
- Safety glasses (goggles may be appropriate).
- Face shield.
- Respiratory protection.
- Boot covers or way to remove silica dust from boots (water hose for rubber boots, HEPA vac for leather boots).

Until the level of team member exposure to crystalline silica is known to be below the PEL or if the use of feasible engineering and work practice controls is not sufficient to reduce the exposure to below the PEL, respiratory protection is required in accordance with 29 CFR 1910.134 and L.D. Docsa's respiratory protection program. See the bullet point titled Initial Assessment and Exposure Monitoring section 7.3.3.

When selecting respirators, use the following guidelines:

Exposure Level	Minimum Required Respirator
< PEL	Voluntary use of any approved respirator if determined by the competent person to not create any other hazard
PEL to 10xPEL	Half respirator with 100 efficiency (HEPA) filters Full face respirator with 100 efficiency (HEPA) filters (qualitatively fit)
10xPEL to 25xPEL	Loose fitting PAPR with 100 efficiency (HEPA) filters
10xPEL to 50xPEL	Full face respirator with 100 efficiency (HEPA) filters (quantitatively fit)
50xPEL to 100xPEL	Full face tight fitting PAPR with 100 efficiency (HEPA) filters
> 100xPEL	Supplied air respirator SCBA

Notes:

1. Any respirator on the list may be used for a lesser exposure.

2. A respirator may only be used if all feasible engineering and administrative controls cannot reduce the exposure below the PEL; while verifying engineering and administrative controls are effective in keeping the exposure to below the PEL; or when the exposure is proven to be below the PEL but the team member wants to use a respirator anyway (the team member must be current in L.D. Docsa's respiratory protection program policy and procedure, and be using a NIOSH approved respirator and filters).

3. Abrasive blasting (except vacuum blasting) requires type CE pressure demand supplied air blasting hood.

Hygiene

Good hygiene is as important as PPE in protecting team members from toxic materials. To ensure team members protect themselves and their families, the following practices are required:

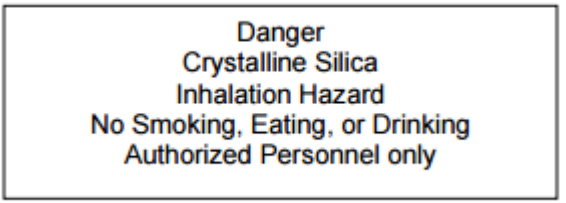
- Do not eat, drink, or use tobacco products in work areas where silica containing dust is present.
- Wash your hands and face before eating, drinking, or smoking.
- Use disposable or washable work clothing at the work site.
- Shower if available or change into clean clothing before going home. If work clothing is to be washed, make sure to handle it in such a manner as to not put the dust back into the air. Place it into plastic bags labeled "Caution-clothing contaminated with silica dust".
- Provide hand-washing facilities at a minimum.
- Park personal vehicles away from sources of silica dust.

Regulated Areas

In operations producing dust containing or suspected of containing crystalline silica, care must be taken to also protect people and places not involved with the work. This may mean blocking off the area (with tape or plastic fencing, etc.) and posting signs or in some cases using containment with ventilation and HEPA exhaust depending on location and type of work. People without the proper PPE

are not allowed in the regulated area. The size of the area should be determined by the competent person based on visible emissions, wind direction, and available sampling data.

Signs should be posted at all possible access points:



Housekeeping

Areas shall be kept as free from accumulated dust as possible. Use methods that do not reintroduce dust into the air (wet methods, hepavacs, etc.).

Waste Storage and Disposal

By itself, dust containing crystalline silica is not regulated as a hazardous waste unless it is mixed with or contains something else that makes it a hazardous waste. Make sure that you do not create an additional airborne crystalline silica hazard when collecting, emptying, or disposing of the material.

Medical Surveillance

All team members with potential exposure to crystalline silica must be current with L.D. Docsa's respirator medical surveillance. They must have had the pre-placement physical including the respirator questionnaire (with the silicosis portion) and a baseline PFT. The respirator and silicosis questionnaires must be completed annually. The standard PFT must be performed every three years. Follow-up examinations are ordered by L.D. Docsa's Medical Director after review of the above information and may be triggered by the following:

Signs and symptoms of silicosis not explained by any non-silica related, currently existing medical condition, and/or clinically significant PFT results:

- FVC < 70% of predicted.
- FEV1/FVC and FVC < 70% of predicted.
- Other change deemed clinically significant by medical review.

The initial follow up will consist of a silica medical exam and a specialized PFT (DLCO, and /or radiographic TLC). It may include a chest x-ray if clinically indicated and not done as part of specific respiratory function testing. Please contact L.D. Docsa's medical director with any questions.

In the event that silica induced pulmonary disease is suspected, the team member must be removed from potential exposure to silica containing dusts until a final medical determination is made.

Recordkeeping

In accordance with 29 CFR 1910.20, medical records shall be maintained for at least thirty years after a team member's termination of employment. All exposure monitoring (air sampling, when required, etc.) results shall be kept for thirty years. The results of exposure monitoring shall be reported in writing to the team members it represents or posted in a location available to the team members. If the results are above the PEL, include the actions that will be taken to reduce the exposure. All exposure monitoring worksheets, results, and other pertinent information should be kept on site and a copy sent to the manager of health and environmental hazards.

Subcontractors

All subcontractors of L.D. Docsa Associates, Inc. are required to meet or exceed the requirements of this safety policy and procedure when performing work that has the potential for crystalline silica exposure above the PEL. All L.D. Docsa subcontractors shall notify L.D. Docsa of any activity with the potential for

crystalline silica exposure and the methods they will employ to control the exposure.

L.D. Docsa team members performing work that has the potential for crystalline silica exposure to non-L.D. Docsa employees shall, prior to beginning the activity, notify all potentially affected parties of the expected exposure, health hazards of crystalline silica, and the methods they can use to protect themselves against overexposure.

Each subcontractor is responsible for the safety of their own workers, whether they create the hazard or not. A subcontractor is also responsible for its subcontractors/suppliers. Therefore, control of silica dust must be coordinated effort.

Related Documents

National Emphasis Program – Crystalline Silica – Directive CPL 03-00-007 Special Emphasis Program for Silicosis in Construction - 1996 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists NIOSH alert “Preventing Silicosis and Death in Construction Workers” See 9.1 Appendix A for other standards that may apply.

Table of Applicable Standards

The following table contains OSHA standards that impact the way we handle hazards related to silica and that may be cited under the right circumstances.

OSHA Requirement	General Industry Standard	Construction Standard	Maritime Standard
Respiratory Protection	1910.134	1910.134	1910.134
Permissible Exposure Limit and Controls	1910.1000	1926.55 & .57	1915.1000
Accident Prevention and Warning Signs	1910.145	1926.200	--
Access To Team member Exposure and Medical Records	1910.20	1926.33	1915.1120
OSHA 200 Forms	1904	1904, 1926.22	1904
Abrasive Blasting, Breathing Air, Enclosures, Controls	1910.94	1926.28, .55, .95, .100, .101, .102, .103, and .300	1915.131, .133, .151, .152, .153, and .1000
Hygiene	1910.141	1926.27 and .51	1915.97
General PPE	1910.132	1926.28, .95, .100 to .105	1915.151 to .154
Hazard Communication	1910.1200	1926.59	1915.1200
Safety and Health Program	--	1926.20	--
General Training	--	1926.21	--

Health Effects of Crystalline Silica

Inhaling fine particles of crystalline silica containing dusts has been associated with respiratory disease, most commonly silicosis. Additionally, there is evidence that exposure to crystalline silica-containing dusts causes or is associated with the following conditions: lung cancer, tuberculosis, chronic obstructive pulmonary disease (including emphysema and bronchitis), autoimmune diseases or immunologic disorders, chronic renal disease, and sub clinical renal changes [NIOSH, 2002]. The International Agency for Research on Cancer (IARC) has classified silica as a known human carcinogen (group 1).

When fine particles of crystalline silica enter the lungs and are trapped, the lung tissue reacts by developing fibro tic nodules and scarring around the particles. As exposure continues and the condition worsens, the nodules become progressively larger and breathing becomes increasingly difficult. This fibro tic condition of the lungs is called silicosis and it reduces the lungs ability to extract oxygen from the air. Eventually the worker may even die of respiratory failure. The body's natural defenses (mucous membranes of the nose and throat, etc.) filter out most of the particles above 5-10 microns in size from the air we

breathe. Yet there is no mechanism to remove particles small enough to get deep into the lungs; these particles, such as silica, cannot be broken down by the body.

The construction industry has a high risk of exposure to crystalline silica containing dusts due to the materials like concrete that we work with and the activities that are typical to the work like demolition. Many of these activities create freshly fractured crystalline silica particles and studies have shown that a worker's lung may react more severely to silica that is freshly fractured.

Symptoms of silicosis may not develop for many years but as the exposure continues symptoms appear such as shortness of breath with exertion (the most common symptom), coughing, and fever due to infectious disease of the lung (such as tuberculosis). Because these symptoms can be caused by a lot of things, silicosis is often misdiagnosed as bronchitis, emphysema, and tuberculosis. It is important however, to accurately identify silicosis, as the disease can only be stopped, not cured!

NIOSH has classified three types of silicosis:

- Chronic Silicosis, which occurs after ten or usually more years of exposure to crystalline silica at relatively low concentrations.
- Accelerated Silicosis, which results from exposure to high concentrations of crystalline silica and develops five to ten years after the initial exposure.
- Acute Silicosis, which occurs where exposure concentrations are the highest and can cause symptoms to develop within a few weeks to four or five years after the initial exposure.

Not everyone will contract silicosis at the same rate if at all. The development of silicosis will depend on the following factors:

- Particle size: when the silica crystals are broken down into dust sized or respirable particles (smaller than 10 microns) they are small enough to be inhaled deep into the lungs and become deadly.

- Percentage of crystalline silica: the higher the percentage of crystalline silica present that is small enough to get deep into the lungs, the more damage that will occur.
- Length of exposure: the longer a person is exposed to respirable crystalline silica, the more likely they are to develop silicosis.
- Severity of exposure: the higher the concentration a person is exposed to the more likely they are to develop silicosis.
- Individual susceptibility: certain individuals will be more prone to develop silicosis and its associated complications due to the person's health.

Smoking: smoking increases a person's chance to contract silicosis by inhibiting the ability to filter particles out of the air before they reach the lungs.

Steps to Protect Yourself from Crystalline Silica

- Know the health effects of crystalline silica and that smoking adds to the damage.
- Participate in any medical surveillance, air monitoring, or training programs offered.
- Substitute less hazardous materials and/or methods.
- If substitution is not possible, use engineering controls such as dust collectors, wet methods, and local exhaust ventilation to minimize exposures to silica containing dust.
- Always use dust control systems when available and keep them well maintained.
- Use wet methods whenever possible.
- Be aware that the highest silica concentrations may occur inside enclosed areas during concrete or masonry sawing or abrasive blasting.
- Change into disposable or washable work clothes at the jobsite.
- Do not eat, drink, use tobacco, or apply cosmetics in dusty areas.
- Wash hands and face before eating, drinking, or smoking outside dusty areas.
- Shower, if possible, and change into clean clothes before leaving the jobsite.

- Park in a location away from dusty operations, preferably upwind.
- Use type CE pressure demand abrasive blasting respirators when abrasive blasting.
- When cleaning up or disposing of silica containing materials, use a method that does not reintroduce dust into the air.

Glossary

Carcinogen: A substance that causes the development of cancerous growths in living tissue. One of the groups that rates cancer risk is the International Agency for Research on Cancer (IARC). The IARC lists materials as:

- Group 1 - known carcinogenic to humans
- Group 2A - probably carcinogenic to humans
- Group 2B - possibly carcinogenic to humans

Crystalline Silica: The crystalline forms of silicon dioxide (SiO2). Quartz is the most common form. Cristobalite and Tridymite are two other crystalline forms that might be encountered. These crystalline forms are the dangerous ones.

Permissible Exposure Limit (PEL): This is the OSHA allowable concentration limit in air that a team member can be exposed to for an eight-hour day.

Pulmonary Function Test (PFT): Pulmonary function test. This test is designed to determine how well your lungs are working. There are several pieces that can be part of the PFT: • FVC - forced vital capacity • FEV1 - forced expiratory volume in one second, • DLCO - diffusion capacity for carbon monoxide, radiographic • TLC - total lung capacity.

Respirable: Particles small enough to be drawn deep into the lungs and that are below 10 microns in size (too small to be seen by the naked eye).

Silicosis: A progressive disease of the lungs that reduces the ability of the lungs to extract oxygen from the air. It is caused by exposure to respirable crystalline silica dust particles. The damage con not be reversed.

Form Example

Lead/Silica Protection Plan

LP DOCSA ASSOCIATES, INC. GENERAL CONTRACTORS SINCE 1963
Celebrating Our Past. Building Your Future.

Notify all site workers of potential lead/silica exposure to related work
Project: _____ Date: _____
Superintendent: _____ Hazard: ☐ Lead ☐ Silica
Describe each activity emitting lead or silica including the hazardous material(s) and the tools, equipment, and process that create the hazard:
List the specific controls and studies reviewed. What controls will be used? What controls are not feasible and why?
Ventillation (local/general, positioning, aif flow):
Shrouded/exhausted tools or local exhaust:
Containment (describe):
Wet methods (describe how water is used):
Other (long handled torches, paint remover, etc.):
Administrative controls (team member exposure time log kept for worker rotation, SOP's):
Air monitoring history
Work practice program:
Hygiene plans (hand wash at a minimum, showers if needed, decon procedure):
Protective clothing/equipment:
Housekeeping plans (wet methods or hepavac):
Specific team member responsibilities:
Equipment operating procedures:
Equipment maintenance practices:
Competent person must do frequent and regular checks of the work area.