

SILICA



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1. PURPOSE AND SCOPE

- a. It is the policy of **H2 Enterprises, LLC (H2)** to provide a safe workplace, adequate training regarding precautions and proper work practices to reduce the risk of employee exposure to silica dust in the workplace.
- b. The Silica Control Plan (SCP) is prepared to accomplish this policy in compliance with OSHA regulations. The corporate HS&E Manager will have the overall responsibility for the effectiveness of this Plan.

2. PREPLANNING AND HAZARD IDENTIFICATION

- a. Preplanning:
 - i. To avoid exposure to silica, prior to the start of the project, the supervisor and the HS&E Department shall:
 1. Meet and identify potential silica exposures;
 2. Develop an action plan to ensure our employees, other contractors and the general public will not be exposed to silica dust from construction operations. The action plan should include:
 - a. Specific tasks that could release significant amounts of silica;
 - b. Anticipated location, starting and ending dates for each task;
 - c. Specific controls that will be used to reduce or eliminate silica release.
 - b. The SCP will be updated and reviewed at project meetings with employees and subcontractors.
 - i. Hazard Identification
 1. Most crystalline silica comes in the form of quartz. Sand, a common ingredient in concrete and masonry products, can be as much as 100% quartz. Since concrete and masonry products are primary materials for construction, there are many ways employees are exposed at construction sites, such as the following:
 - a. Chipping, hammering, and drilling of rock.
 - b. Crushing, loading, hauling, and dumping of rock.
 - c. Abrasive blasting using silica sand as the abrasive.
 - d. Abrasive blasting of concrete (regardless of abrasive used).
 - e. Sawing, hammering, drilling, grinding, and chipping of concrete or masonry.

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- f. Demolition of concrete and masonry structures.
- g. Dry sweeping or pressurized air blowing of concrete, rock or sand dust.
- c. The most severe employee exposures to crystalline silica result from sandblasting. Other exposures to dust from sand may occur in cement manufacturing, asphalt pavement manufacturing, and the foundry industry.

3. HEALTH AFFECTS

a. **Silicosis:** A disease of the lungs caused by breathing dust containing crystalline silica particles. When employees inhale crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped silica particles. This condition, known as silicosis, makes breathing difficult, can be totally disabling and may lead to death. There is no cure for this disease.

i. Types of Silicosis

1. Chronic silicosis, occurs after 10 or more years of exposure at relatively low concentrations.
2. Accelerated silicosis, results from exposure to high concentrations and develops 5 to 10 years after the initial exposure.
3. Acute silicosis, occurs where exposure concentrations are the highest and can cause symptoms to develop within a few weeks to 4 or 5 years after the initial exposure.

ii. Symptoms

1. Initially there may be no symptoms of silicosis.
2. Continued exposure may result in a shortness of breath on exercising, possible fever and occasionally bluish skin at the ear lobes or lips.
3. Progression of silicosis leads to fatigue, extreme shortness of breath, loss of appetite, pain in the chest and respiratory failure, which may cause death.
4. Silicosis makes a person more susceptible to infectious diseases of the lungs such as tuberculosis.

4. METHODS TO PREVENT EXPOSURE

a. Engineering Controls

- i. The key to preventing silicosis is to prevent silica dust from being released into the air. The following controls shall be implemented:

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1. Implement controls such as water sprays, blasting cabinets, and ventilation of containment structures. (For example, a water hose to wet dust down at the point of generation.)
2. Always use the dust control system and keep it in good maintenance.
3. Use abrasives containing no silica whenever possible or less than 1% crystalline silica during abrasive blasting to prevent harmful quartz dust from being released into the air.

b. Administrative Controls

- i. Administrative controls can be used in conjunction with engineering controls to further reduce the likelihood of employee exposure.
 1. When you anticipate doing silica dust-creating work, notify all others on site as far in advance as possible as to: location, date, start time, duration.
 2. To the extent feasible, limit silica generating work to off-hours or coordinate times when others can vacate the immediate work area.
 3. To the extent feasible, leave the immediate work area while others are conducting silica generating operations.
 4. When conducting silica generating activities, notify others of the potential for silica exposure by:
 - a. Posting warning signs that specify silica hazards and PPE required.
 - b. Having the area flagged off, if necessary and feasible, to prevent unauthorized employees from entering during silica generating operations.

c. Personal Protective Equipment (PPE)

- i. If it is determined that engineering controls and administrative controls may not adequately protect the employees, personal protective equipment must be used. The need for all of the following PPE should be evaluated for each project:
- ii. Basic PPE
 1. Eye protection
 2. Face protection (face shield)
 3. Hearing protection (ear plugs or muffs)
 4. Coveralls (either disposable or reusable) – If possible, change into disposable or washable work clothes at the work site; shower (where available) and change into clean clothing before leaving the work site. For additional PPE specifications, refer to Section 11.

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- 5. Foot protection (sturdy work shoes required, safety shoes recommended)
- 6. Head protection (hard hat, blast helmet)
- 7. Respiratory protection – Respirators should not be the primary method of protection. If controls cannot keep dust levels below permissible exposure levels, then respirators must be used. (When respirators are used, refer to Respirator Program)

d. Personal Hygiene

- i. All employees exposed to silica dust should wash face and hands prior to smoking, drinking, eating and at the end of the shift.
- ii. Eating, drinking, smoking, use of chewing gum or tobacco is prohibited in all areas contaminated with silica dust, at or above the OSHA permissible limit.
- iii. To the extent feasible, all vehicles and equipment should be parked away from any anticipated silica dust generating operation.
- iv. Employees with exposures at or above the OSHA permissible limit should wear employee protective clothing (e.g., disposable or washable work clothing) that stays on site.
- v. Be aware of the health effects of crystalline silica and that smoking adds to the damage.

5. MONITORING

a. Exposure Monitoring

- i. Exposure monitoring shall be performed to measure employee exposure to airborne crystalline silica and to provide a basis for engineering controls.
 - 1. Exposure Monitoring Sequence
 - a. Employees with the highest dust exposure shall be sampled first. Sampling should then progress toward those workers with lower exposures.
 - 2. Sampling Plan
 - a. Respirable Silica Sampling Plan

Condition	Action
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Initial sampling	Sample each representative task starting with assumed highest dust exposure levels. Results are used to establish plan.
Sampling results are below ½ the PEL	No periodic sampling necessary but additional samples may be required due to process changes.
No PEL over-exposures were found, but exposures exceed ½ the PEL.	These noted locations are to be included in a sampling plan. Noted job functions should be sampled at least annually with a goal of sampling each employee with that job function. These employees should be included in a respirator program.

PEL was exceeded and engineering, work practice and administrative controls are being applied to the work area to reduce exposure to below the PEL exposure control plan.	Sampling to be conducted before and after the remedy to assess the results of silica reduction efforts. If high levels persist, institute workplace controls and include in sampling plan until levels are below ½ the PEL.
Process materials, equipment, engineering controls or any other changes that occur which would tend to increase employee exposures.	Sampling to be conducted as soon as feasible to assess the effects of workplace changes on employee exposures.
Condition	Action
Ventilated enclosures are used because work area exposures are presumed or known to exceed the PEL.	Sample at least annually to assure that employee exposures do not exceed ½ the PEL.
Short duration (hours or less) silica dust generation operations such as drilling and cutting.	Depend on workplace controls to reduce exposures. Sampling provides historical data.
Employee(s) or supervisors express concerns that silica exposures have increased or are present.	Sample as soon as feasible.

b. Medical Monitoring:

- i. Medical examinations will be conducted for all employees who may be exposed to respirable crystalline silica. Such examinations should occur before job

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placement and at least every three years thereafter. Examinations should include at least the following:

1. A medical and occupational history to collect data on crystalline silica exposure, smoking history and signs and symptoms of respiratory disease.
 2. A chest X-ray.
 3. Pulmonary function testing (also known as Spirometry test).
 4. An annual evaluation for tuberculosis.
- ii. The following information shall be provided to the physician:
1. A description of the affected employee's duties as they relate to the employee's exposure.
 2. The employee's representative exposure level or anticipated exposure level to respirable crystalline silica.
 3. A description of any personal protective and respiratory protective equipment to be used by the employee.
 4. Information from previous medical examinations of the affected employee that is not otherwise available to the physician.
- iii. **H2** will obtain a written signed opinion from the physician. This written opinion should contain the results of the medical examination and include:
1. The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to respirable crystalline silica.
 2. Any recommended limitations on the employee.
 3. A statement that the employee has been informed by the physician of the results of the medical findings and of any medical conditions resulting from respirable crystalline silica exposure that require further examination or treatment.
 4. A statement that they have not revealed any unrelated diagnosis.

6. TRAINING

- a. To ensure that everybody understands fully the hazards of silica and the procedures of working with silica-containing materials, the following is an outline of the training that shall be provided:
 - i. The specific nature of operations which could result in exposures to respirable crystalline silica dusts above the PEL.

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- ii. An explanation of engineering, work practice, hygiene, administrative and personal protective equipment controls used in each of the above operations to eliminate or reduce silica exposures.
- iii. The purpose and description of the medical surveillance program and the medical protection program, including information concerning:
 - 1. The purpose of silicosis diagnostic exam elements such as work histories, chest x-rays, lung function tests and tuberculosis screening.
 - 2. The adverse health effects associated with excessive exposures to respirable silica dusts, including silicosis, tuberculosis, and the association with lung cancer.
 - 3. The purpose, proper selection, fitting, use and limitations of respirators if they are used to supplement engineering, administrative and work practice controls to reduce silica exposures.
 - 4. Availability of medical records and air monitoring results.

b. Frequency of Training

- i. The training should be provided once a year, prior to the initial job assignment and whenever an employee is assigned to a new or unfamiliar task or operation involving silica exposure.

c. Certification of Training

- i. **H2** shall verify that training has been completed by preparing a written certification record. The written certification record should contain:
 - 1. The name or other identity of the employee trained,
 - 2. The date(s) of the training, and
 - 3. The signature of the trainer and trainee(s).

7. RECORDKEEPING AND REPORTING

- a. **H2** shall establish and maintain an accurate record of all medical and exposure monitoring required by this practice. These records will include:
 - i. Name, identification number, and job title of each employee monitored for dust exposure. For each employee monitored: the exposure monitoring results, work location and the monitoring date.
 - ii. A description of the sampling procedure used for each employee monitored to include sampling pump calibration data.
 - iii. A description of the analytical methods used.

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- iv. The type of respiratory protection worn by each employee monitored, if any, and fit testing records.
 - v. Each employee or their representative shall have access to records of their occupational exposure and medical examination in accordance with regulatory provisions.
 - vi. Written exposure control plan will be evaluated at least once per year and as necessary. In situations where reevaluation may be necessary include regulatory updates, changes in equipment, and exposure incidents. Any changes will be communicated to affected employees.
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- b. Periodic review and evaluation of sampling and medical records shall be performed by the HS&E Department to determine the effectiveness of control measures.
 - c. Written exposure control plan will be available for examination and copying by each employee. Copies will be available electronically or physically, depending on location needs and requirements.
 - d. Employees will be informed as to the results of medical and sampling results within 30 days of receipt of this data. An acknowledgment record, signed by the employee, attesting to being informed, will be maintained along with medical records for 30 years past employment of each individual.
 - e. All cases of Silicosis will be reported to the State and Federal Health agencies per NIOSH Publication 92.102.

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SILICA SELF-COMPLIANCE CHECKLIST

YES NO

- A. Has personal or area air monitoring been conducted
In areas or for activities that may result in exposure
to silica dusts?
- A. Have records of exposure monitoring been retained?
- B. Are engineering or administrative controls in place
where feasible, to control employee exposures to silica?
- Is there a written, site specific respiratory protection program?
 - Is there a suitably trained program administrator?
 - Have medical evaluations of employees been conducted, prior to issuing respirators?
- C. Has the physician performing the medical examinations been provided:
- A description of the employee's duties related to exposure?
 - The employee's silica exposure level?
 - The type of personal protection equipment used by the employee?
 - The information required by the respiratory protection standard?
- D. Have affected employees been trained in:
- Adverse health effects of silica?
 - Jobs that generate silica?
 - Procedures to minimize silica dust exposure?
 - The availability of medical and exposure records?

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- A. Have employee training records been documented and retained?
- B. Have employee medical records been preserved and maintained?

APPENDIX II ALTERNATIVES TO SILICA FOR ABRASIVE BLASTING

There are many alternatives to silica for use as an abrasive blasting agent. They include:

- Coal slag
- Copper slag
- Nickel slag
- Garnet
- Starlite
- Specular Hematite
- Aluminum oxide
- Crushed glass
- Olivine
- Steel grit and shot

Garnet and Specular Hematite appear to be less toxic than silica in toxicity tests by NIOSH. Steel grit and shot can be less expensive than silica when it is recycled. Contact NIOSH at (800) 35-NIOSH for the most recent recommendations on choosing alternatives to silica.