Silica Protection Plan

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APPENDIX A

Sample site-specific exposure control plan forms
I. INTRODUCTION
   a. Silica is the second most common mineral on earth and makes up nearly all of what we call “sand” and “rock.” Silica exists in many forms—one of these, “crystalline” silica (including quartz), is the most abundant and poses the greatest concern for human health.
   b. Some common materials that contain silica include:
      i. Rock and sand
      ii. Topsoil and fill
      iii. Concrete, cement, and mortar
      iv. Masonry, brick, and tile
      v. Granite, sandstone, and slate
      vi. Asphalt (containing rock and stone)
      vii. Fibrous-cement board containing silica
   c. Silica is so common that many workplace activities that create dust can expose workers to airborne silica.
   d. The crystalline silica permissible exposure limit (PEL) for the construction industry at 29 CFR 1926.55(a) is expressed in terms of millions of particles per cubic foot (mppcf).
   e. The Occupational Safety and Health Administration has established occupational exposure limits (OELs) for silica.
      i. OSHA uses a benchmark 8-hour time-weighted average exposure of 0.1 mg/m3 of respirable silica dust as a point of reference in describing control measures utilized by the construction trades.
   f. The form most likely to cause serious problems for worker health is quartz.

II. SILICA EXPOSURE
   a. Silica is a primary component of many common construction materials, and silica-containing dust can be generated during many construction activities, including
      i. Abrasive blasting (e.g., of concrete structures)
      ii. Jackhammering, chipping, or drilling rock or concrete
      iii. Cutting brick or tiles
      iv. Sawing or grinding concrete
      v. Tuck point grinding
      vi. Road construction
      vii. Loading, hauling, and dumping gravel
      viii. Demolition of structures containing concrete
      ix. Sweeping concrete dust
   b. Unprotected workers performing these activities, or working in the vicinity, can be exposed to harmful levels of airborne silica. Workers in other industries can also be exposed to silica, for example in the manufacture of toothpaste or pottery, or when loading coal (which can contain quartz) into the hold of a ship.

III. HEALTH HAZARDS
   a. Crystalline silica dust can cause a disabling, sometimes fatal disease called silicosis. The fine particles are deposited in the lungs, causing thickening and scarring of the lung tissue. The scar tissue restricts the lungs’ ability to extract oxygen from the air. This damage is permanent, but symptoms of the disease may not appear for many years.
   b. A worker may develop any of three types of silicosis, depending on the concentrations of silica dust and the duration of exposure:
      i. Chronic silicosis—develops after 10 or more years of exposure to crystalline silica at relatively low concentrations
ii. Accelerated silicosis—develops 5 to 10 years after initial exposure to crystalline silica at high concentrations

iii. Acute silicosis—develops within a few weeks, or 4 to 5 years, after exposure to very high concentrations of crystalline silica

c. Initially, workers with silicosis may have no symptoms; however, as the disease progresses, a worker may experience:
   i. Shortness of breath
   ii. Severe cough
   iii. Weakness

d. These symptoms can worsen over time and lead to death.

e. Exposure to silica has also been linked to other diseases, including bronchitis, tuberculosis, and lung cancer.

f. Due to the significant risk posed by respirable silica, it is critical that all personnel involved in operations that could potentially create silica dust take specific action to ensure that, as much as possible, a hazard is not created.

IV. RESPONSIBILITIES

a. The employer is responsible for:
   i. Ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this exposure control plan (ECP) are readily available where and when they are required.
   ii. Providing a job-specific ECP for each project, which outlines in detail the work methods and practices that will be followed on each site. Considerations will include
      1. Availability and delivery of all required tools/equipment
      2. Scope and nature of grinding work to be conducted
      3. Control methods to be used
      4. Level of respiratory protection required
      5. Coordination plan
   iii. Conducting a periodic review of the effectiveness of the ECP. This would include a review of the available dust-control technologies to ensure these are selected and used when practical.
   iv. Initiating sampling of worker exposure to concrete dust when there are non-standard work practices for which the control methods to be used have not been proven to be adequately protective.
   v. Ensuring that all required tools, equipment, and personal protective equipment are readily available and used as required by the ECP.
   vi. Ensuring supervisors and workers are educated and trained to an acceptable level of competency.
   vii. Maintaining records of training, fit-test results, crew talks, and inspections (equipment, PPE, work methods/practices).
   viii. Coordinating the work with the prime contractor and other employers to ensure a safe work environment.

b. The supervisor is responsible for:
   i. Obtaining a copy of the ECP from the employer, and making it available at the worksite
   ii. Selecting, implementing, and documenting the appropriate site-specific control measures
   iii. Providing adequate instruction to workers on the hazards of working with silica-containing materials (e.g., concrete) and on the precautions specified in the job-specific plan covering hazards at the location
iv. Ensuring that workers are using the proper respirators and have been fit-tested, and that the results are recorded
v. Directing the work in a manner that ensures the risk to workers is minimized and adequately controlled
vi. Communicating with the prime contractor and other sub-contractors to ensure a safe work environment
c. The worker is responsible for:
   i. Knowing the hazards of silica dust exposure
   ii. Using the assigned protective equipment in an effective and safe manner
   iii. Setting up the operation in accordance with the site-specific plan
   iv. Following established work procedures as directed by the supervisor
   v. Reporting any unsafe conditions or acts to the supervisor
   vi. Knowing how and when to report exposure incidents

V. RISK IDENTIFICATION, ASSESSMENT and CONTROL
   a. The Hillis Group, LLC is committed to developing knowledge and expertise about these controls, and to establishing policies/procedures to protect workers from harmful exposure and to minimize reliance on respirators.
   b. Effective engineering controls such as HEPA vacuum attachments and wetting methods, which control silica dust at its source, are readily available. These controls have been proven to reduce airborne dust levels significantly when selected and operated in accordance with best practices.
   c. We know that engineering controls alone do not reduce airborne silica to safe levels; so in most cases other control measures, including respiratory protection, will be necessary.
   d. OSHA directs employers to use the best control technology available for the task and circumstance. If we take on a job that could release an unusually high amount of dust, and we are unsure of the adequacy of our control measures, we will conduct air sampling in order to ensure that control methods are protective.
   e. The Hillis Group, LLC will reduce or eliminate worker exposure to silica dust by selecting a combination of the following controls listed in order of preference:
      i. Elimination and substitution
      ii. Engineering
      iii. Administrative
      iv. Personal Protective Equipment
   f. Elimination and substitution
      i. The Hillis group, LLC recognizes the importance of planning the work in order to minimize the amount of silica dust generated.
      ii. During the project planning phase, we will advocate for the use of methods that reduce the need for cutting, grinding, or drilling of concrete surfaces (e.g., formwork planning).
      iii. Whenever possible, we will schedule work when concrete is still wet, because we know that much less dust is released at that time.
   g. Engineering control of dust
      i. Our dust control systems may employ three well-established techniques:
         1. Local exhaust ventilation (LEV)
            a. When LEV is used in our work, we will employ the following systems and safe work practices:
            b. Vacuum attachment systems to capture and control the dust at its source whenever possible.
            c. Dust control systems (used regularly and well maintained).
d. Grinding wheels operated at the manufacturers’ recommended rpm (operating in excess of this can generate significantly higher airborne dust levels).

e. Retrofit shrouds or exhaust cowlings for corner grinding; use manufacturer-specified rpm speeds and a well-maintained HEPA vacuum.

f. Diamond stone grinders, which allow for the use of a more efficient suction casing on the grinder, whenever practicable.

g. HEPA or good quality, multi-stage vacuum units approved for use with silica dust. [The vacuum units should be capable of creating a target airflow of at least 70 cfm. This should achieve a face velocity at the shroud of about 1.3 m/s (260 fpm)—the higher the face velocity, the more dust captured at source.]

h. Work planning, so that concrete grinding can be completed when wet (dust release can be significantly reduced).

i. Good housekeeping work practices (for example, use vacuums with high-efficiency particulate air (HEPA) filters, or use wet sweeping).

j. Train workers and supervisors on how to properly use and maintain the equipment.

2. Wet dust suppression (WDS)

a. Water Spray Systems are designed to apply water to the cutting or grinding surface to wet the surface and prevent the resulting dust from becoming airborne.

b. When water spray systems are used in our work, we will follow these safe work practices:
   i. Pneumatic grinders will be used instead of electric-powered grinders if water is the method of control.
   ii. Pressure and flow rate of water will be controlled in accordance with tool manufacturers’ specifications (for cutting saws, a minimum of 0.5 litres of water per minute [0.13 gallons/minute] should be used).
   iii. When sawing concrete or masonry, we will use only saws that provide water to the blade.
   iv. Wet slurry will be cleaned from work surfaces when the work is completed, using a wet vacuum or wet sweeping.

3. Restricting or isolating the work activity with barriers or full enclosures (this may be the only option where LEV or WDS is not practical or effective)

a. Barriers are used to isolate the work area from the rest of the project and to prevent entry by unauthorized workers. They do not prevent dust drift and should only be used where natural ventilation is sufficient and dust release is controlled.

b. Enclosures can contain a dusty atmosphere. They can consist of a partial structure (poly draping or partial plywood hoarding) or a full enclosure equipped with some capacity for maintaining a lower than ambient pressure inside (negative pressure).

c. When barriers or enclosures are used in our work, we will follow these safe work practices:
   i. The site foreman will determine the type and design of barrier or enclosure (based on the work activity and the work
area) and ensure it is constructed in accordance with the workplan.
ii. Barriers may be simple hazard-flags or more restrictive hoarding.
iii. We will use commercially available negative air units when constructing a full enclosure.

h. Administrative controls
i. Administrative controls involve activities that are not directly related to the actual physical work, but are important strategies to support the exposure control plan and ensure that all workers are protected from exposure to silica dust. Examples of administrative controls include
   1. Posting warning signs
   2. Rescheduling grinding at different times than other work
   3. Relocating unprotected workers away from dusty work

VI. SAFE WORK PRACTICE
a. The Hillis Group, LLC will follow these safe work practices:
   i. Exposure control plans and the site risk assessment/work plan will be submitted to the general contractor/client prior to the start of work.
   ii. We will establish procedures for housekeeping, restricting work areas, personal hygiene, worker training, and supervision.
   iii. As part of our project planning, we will assess when silica dust may be generated and plan ahead to eliminate or control the dust at the source. We recognize that awareness and planning are key factors in the prevention of silicosis.
   iv. Warning signs will be posted to warn workers about the hazards of silica and to specify any protective equipment required (for example, respirators).
   v. Work schedules will be posted at the boundaries of work areas contaminated with silica dust.
   vi. Work that generates silica dust will be conducted after hours, when access to other unprotected workers cannot be restricted.
   vii. Site-specific exposure control plan
       1. A site-specific exposure plan may be required for some work-sites. This plan would be based upon the standard ECP and would include the following:
          a. Contractor name, address, and contact information (names and phone numbers)
          b. Worksite information (project name, location, and site contacts)
          c. Scope of work and list of tasks
          d. Site-specific hazards and risk assessment
          e. Dust (and other) control procedures and equipment
          f. Safe work procedures
          g. Worker training checklist
       2. When required, The Hillis Group, LLC will develop a site-specific exposure control plan to cover project-specific issues (e.g., scope of work, project location and site-specific hazards) and to be kept available at the worksite.

VII. PERSONAL PROTECTIVE EQUIPMENT
a. Respiratory protection
i. All workers who wear respirators will do so in adherence with The Hillis Group, LLC respirator program. (See Procedure THG_0042 Respirators)

ii. Respiratory protection will be selected based upon the site-specific risk assessment.

iii. Only NIOSH-approved respirators will be used.

iv. Workers who wear respirators will be clean-shaven. Filtering facepiece respirators give little or no protection to workers with beards, and even a minor growth of stubble can severely reduce the effectiveness of respiratory protection.

v. All workers who wear respirators will be fit-tested.

vi. Workers will be properly trained in the use of respirators, and a high standard of supervision, inspection, and maintenance will be followed.

b. Protective clothing

i. Workers will wear protective clothing (i.e. gloves, hats, coveralls, etc.) as specified in our task-specific safe work procedures to prevent contamination of worker clothing.

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i. Workers will wear protective clothing (i.e. gloves, hats, coveralls, etc.) as specified in our task-specific safe work procedures to prevent contamination of worker clothing.

c. Workers will not use compressed air to clean themselves, their clothing, or their equipment.

VIII. EDUCATION and TRAINING

a. Prior to working in an environment where silica is present, The Hillis Group, LLC will train all workers who could potentially be exposed to airborne silica dust in the following:

i. Hazards associated with exposure to silica dust

ii. The risks of exposure to silica

iii. Signs and symptoms of silica disease

iv. Safe work procedures to be followed (e.g., setup of enclosures, disposal of silica waste, personal decontamination)

v. Use of respirators and other personal protective equipment (e.g., donning and doffing of personal protective equipment, and cleaning and maintenance of respirators)

vi. Use of control systems (e.g., LEV and wet methods)

vii. How to seek first aid (for example, the location and use of eyewash stations)

viii. How to report an exposure to silica dust

b. Annual refresher training will be required by all employees.

c. Records of training will be kept, as specified in the Occupational Health and Safety Regulation.

IX. SAFE WORK PROCEDURES

a. The Hillis Group, LLC will develop site-specific, written work procedures for controlling the risk of exposure to silica. These procedures will be readily available on the worksites.

b. These Safe work procedures will include task specific instructions, such as

i. Safe operation of all equipment, including dust control attachments and related equipment

ii. Setting up enclosures

iii. Vacuum maintenance

iv. Cleanup procedures

v. Worker decontamination procedures (hygiene facilities to permit proper hand washing are a basic expectation under all ECPs)

X. HEALTH MONITORING

a. Workers who are exposed to silica dust on an ongoing basis will be enrolled in a medical monitoring program, which might include physical examinations, chest x-rays, and lung function testing.
XI. DOCUMENTATION
   a. Records will be kept of the following:
      i. All workers who are exposed to respirable silica dust while on the job
      ii. Worker education and training sessions
      iii. Respirator fit-testing
      iv. Equipment maintenance and repair
      v. Worksite inspections
   b. Records will be kept in the Corporation Health and Safety Department.

XII. REVIEW
   a. This exposure control plan will be reviewed at least annually and updated as necessary by the employer, in consultation with the workplace health and safety committee or the worker health and safety representative.
**SILICA DUST EXPOSURE CONTROL PLAN**

Date control plan completed: 

Prime contractor: 
Superintendent: 
Project manager: 
CSO/First aid attendant: 
Project: 
Address: 
Company completing work: 
Address: 
Contact: 
Contact phone: 
Contact fax: 
On-site supervisor(s): 
Worker(s): 

Scope of work to be completed: 

Work start date: 
Duration: 
☐ Days ☐ Months ☐ Years 
Employer responsible for: 

Supervisor responsible for: 

Worker responsible for: 

<table>
<thead>
<tr>
<th>HAZARDS IDENTIFIED (other than)</th>
<th>CONTROL MEASURE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Falls</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Slipping</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Confined space</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Workers above</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Workers below</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Noise</td>
<td>☐ Y ☐ N</td>
</tr>
<tr>
<td>☐ Electrical</td>
<td>☐ Y ☐ N</td>
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</tbody>
</table>

Overview of work procedure (How are you going to work safely?): 

Workers trained in (training records must be available for review): 

<table>
<thead>
<tr>
<th>Proper use of grinding equipment</th>
<th>☐ Y ☐ N ☐</th>
<th>Proper use of admin controls</th>
<th>☐ Y ☐ N ☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper use of engineering controls</td>
<td>☐ Y ☐ N ☐</td>
<td>Proper use of PPE</td>
<td>☐ Y ☐ N ☐</td>
</tr>
<tr>
<td>Proper disposal methods</td>
<td>☐ Y ☐ N ☐</td>
<td>Other (fall protection, swing stages, etc)</td>
<td>☐ Y ☐ N ☐</td>
</tr>
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</table>
### Respirators (Refer to ECP for respirator requirements)

<table>
<thead>
<tr>
<th>Required: Y ☐ N ☐</th>
<th>Available: Y ☐ N ☐</th>
<th>Fit-tested: Y ☐ N ☐</th>
</tr>
</thead>
</table>

**PPE required for scope of work (other than respirator)**

- ☐ Coveralls
- ☐ Gloves
- ☐ Rubber boots
- ☐ Eye protection
- ☐ Reflective vest
- ☐ Hearing protection

### Documents to be attached to control plan (☑ if present)

- ☐ Exposure control program
- ☐ Respiratory protection program
- ☐ Training records
- ☐ SWP (tools and equipment)

### Task/risk management matrix (relating to silica dust) use table 1 for codes, separate with a comma (,)

<table>
<thead>
<tr>
<th>Date/Duration</th>
<th>Task</th>
<th>Controls</th>
<th>PPE</th>
<th>Supplies/Equipment</th>
</tr>
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<tbody>
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</table>

**Notes (For task/risk management matrix above. Use # to indicate which task the note relates to.)**
### SITE INSPECTION CHECKLIST (complete pre-work & periodically during project)

<table>
<thead>
<tr>
<th>Engineering controls</th>
<th>Problem noted</th>
<th>Problem corrected</th>
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</thead>
<tbody>
<tr>
<td>Available at site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating correctly</td>
<td></td>
<td></td>
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<tr>
<td>Used appropriately</td>
<td></td>
<td></td>
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<tr>
<td>Effective in dust control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative controls</td>
<td></td>
<td></td>
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<tr>
<td>Available at site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used appropriately</td>
<td></td>
<td></td>
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<tr>
<td>In place before work start</td>
<td></td>
<td></td>
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<tr>
<td>Effective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleanup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum used properly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large pieces picked up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum capacity maintained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-filters in place</td>
<td></td>
<td></td>
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<tr>
<td>Vacuum attachments used</td>
<td></td>
<td></td>
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<tr>
<td>Collection bags in place</td>
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<tr>
<td>Waste properly disposed of</td>
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</tbody>
</table>

### Site-specific silica exposure control plan

**Location:** ___________________________  **Date:** ____________

**Work description:** ______________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

**Primary silica control options** (check those options used and explain use if needed)

**Substitution controls (using procedures or products that do not create silica; must review MSDSs)**

Other means of demo: ______________________________________________________________

Different products: ______________________________________________________________

Other substitutions: ______________________________________________________________

**Engineering controls (when using ventilation, draw air out and don’t expose others to exhaust dusts)**

Vacuuming: ______________________________________________________________

Wetting: ______________________________________________________________

Ventilation: ______________________________________________________________

Isolation: ______________________________________________________________

Other means: ______________________________________________________________
Administration controls (reducing exposure by work schedules, timing, or planning options)

Control points: ________________________________________________________________

Work schedule: ________________________________________________________________

Other means: __________________________________________________________________

Secondary silica control options (check those options used and explain use if needed)

Personal protective equipment

Half-mask respirators: _______ Cartridge type: ______________    Fit tests confirmed:_________

Full-face respirators: _______ Cartridge type:______________     Fit tests confirmed:_________

Supplied air units:  ______________________________________________________________

Coveralls required: _____________________________________________________________

Hygiene and decontamination options (reducing exposures after work has stopped or during breaks)

Water or washing facilities on site: __________________________________________________

Vacuuming clothing/self: _________________________________________________________

Safe work procedures and other details: _____________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________
Ventilation plan (sketch)

Show direction of airflow including makeup air locations and discharge air outlets

Area or location in building of ventilation plan (e.g., floor #, wing)

Date plan was reviewed by workers and posted for workers to see

Types of neg. air fans & no.'s *

* Indicate on plan by number the location of the negative air fans

Ventilation safety checklist

☐ Makeup air free of possible contaminants

☐ Workers not placed between contaminants created and exhaust inlet ports

☐ Exhaust fan operation has failure warning

☐ Discharge air not affecting others

☐ Dilution fans not stirring up dust

☐ All workers equipped with approved respirators

☐ Wetting of materials used to keep dust down

Note: Attach additional sheets if needed or other documents if required due to hazards or work conditions.

Print supervisor's name

Supervisor's signature

Controlled Document

Review and Approval
Procedure Number THG_0043  Revision 1          Effective Date: 12/1/2014

Originator: S.C. Brockman

<table>
<thead>
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<th>Revision Number</th>
<th>Effective Date</th>
<th>Pages Revised</th>
<th>Reason for Revision</th>
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<tr>
<td>1</td>
<td>10/23/15</td>
<td>All</td>
<td>Revised Procedure Format</td>
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</table>

Safety Committee Review  Date:_______________________
Chairman: __________________________________________

History