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# What is Silica, and Why is it Dangerous?

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# Who is CPWR?

CPWR is dedicated to reducing occupational injuries, illnesses & fatalities in the construction industry through:


A recognized world leader in construction safety and health research


The training offered by CPWR builds on the existing infrastructure of the Building Trades Unions and the 2,000 joint apprenticeship and training programs in all 50 U.S. states and in Canada.


In order to prevent deaths, injuries and illnesses in construction, interventions must be evaluated in the workplace and communicated to employers and workers.

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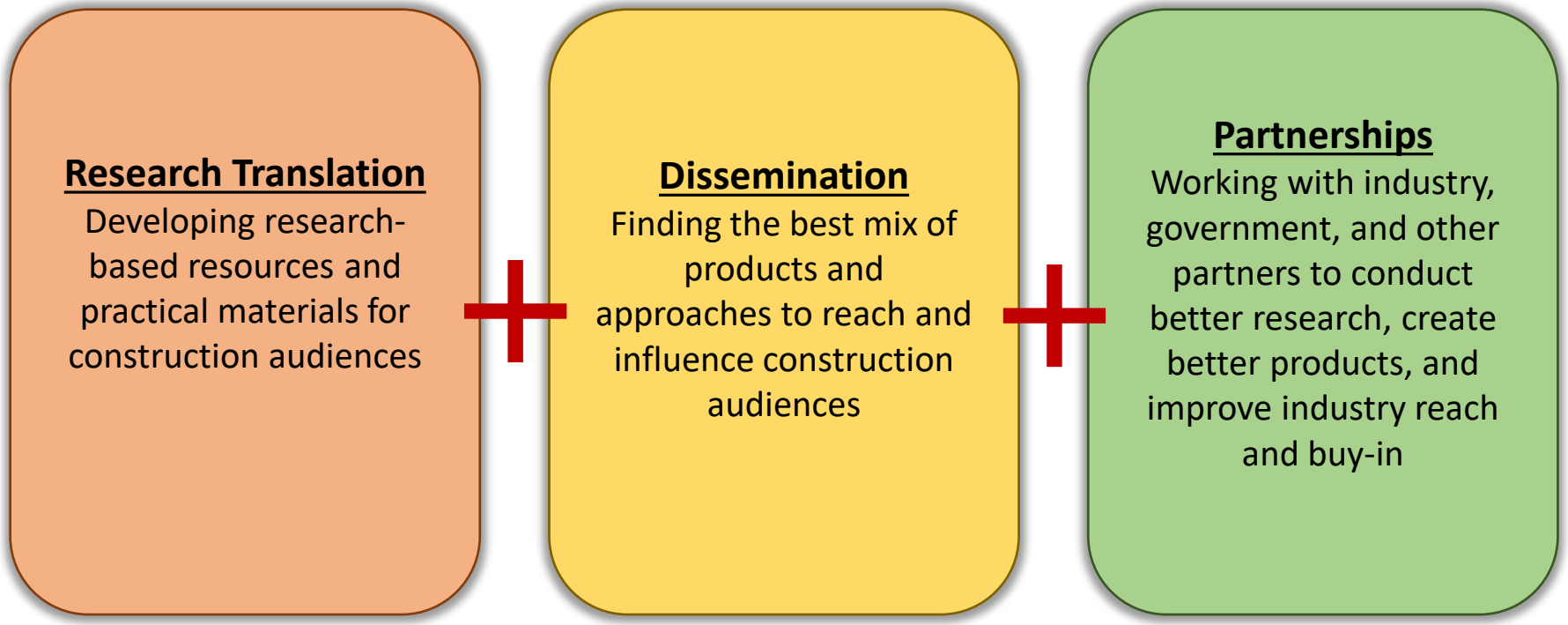
# Research to Practice (r2p) Program

**2008 National Academies Finding:** Significant research on effective interventions ***but*** slow adoption

- How can the program get vital information to the worker?
- How does the program persuade contractors and workers to effectively use the interventions developed through the research?

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https://www.silica-safe.org/know-the-hazard/why-is-silica-hazardous

# What is Silica?

- Silica, often referred to as quartz, is a very common mineral
- Found in many materials common on construction sites such as:
  - Soil
  - Sand
  - Concrete
  - Masonry
  - Rock
  - Granite
  - Landscaping materials

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https://www.silica-safe.org/know-the-hazard/why-is-silica-hazardous

# How Does Silica Get into the Air?

- Crystalline silica particles become airborne in the form of dust
- This dust is created by cutting, grinding, drilling or otherwise disturbing materials that contain silica particles
- Particles are very small and not visible to the human eye

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https://plan.silica-safe.org/

# Know the Hazard:
# Possible Materials Containing Silica for BAC Members

Brick
Cement
Concrete
Concrete Block
Fiber cement products
Grout
Gunite/Shotcrete
Mortar
Plaster
Refractory Mortar/
Castables
Refractory Units
Rock
Roof Tile (concrete)
Sand
Stone (including: granite, limestone, quarzite, sandstone, shale, cultured, etc.)
Stucco/EIFS
Terrazzo
Tile (clay and ceramic)

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https://www.silica-safe.org/know-the-hazard/whos-at-risk

# Know the Hazard:
# Tasks with Risk of Silica Exposure for BAC Members

Abrasive blasting
Bushhammering
Cutting/sawing
Demolishing/disturbing
Drilling
Grinding
Jackhammering
Mixing
Polishing
Sacking/patching
Sanding
Scabbling
Scraping
Sweeping/cleaning up
Well mixing/pumping

A worker cutting brick pavers using a masonry saw. Photo by NIOSH

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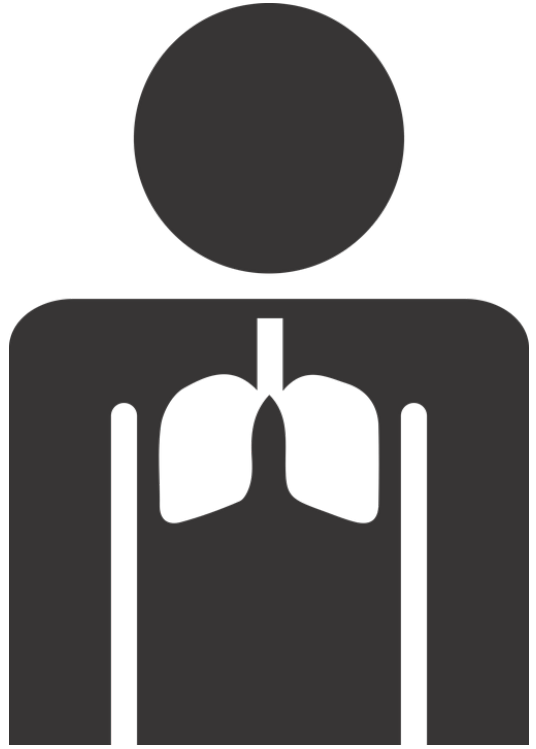
https://www.silica-safe.org/know-the-hazard/what-are-the-health-effects/signs-symptoms

# How Does Silica Affect Our Lungs?

- Silica causes **permanent lung damage**
  - When workers inhale crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped silica particles
  - If the nodules grow too large, breathing becomes difficult
- Exposure to silica can result in conditions that are **disabling and potentially lead to death**



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https://www.silica-safe.org/know-the-hazard/body/PhysiciansAlert-Silica.2018.pdf
https://www.cpwr.com/wp-content/uploads/HA-Silica.pdf

# Silicosis

- Potentially **disabling and/or fatal**
- **No cure**
- Development varies based on exposure levels, time, and other factors:
  - Typically occurs after 10 or more years of exposure, but **can form in your lungs in as little as a few weeks** of very high dust exposure
  - **Repeated exposures add up** to a total dose that can cause serious lung disease
- By the time it gets hard to breathe, you are already sick

An x-ray of a lung with silicosis and progressive massive fibrosis (PMF). Photo by NIOSH.

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https://www.silica-safe.org/know-the-hazard/what-are-the-health-effects/signs-symptoms

# Types of Silicosis

- **Chronic Silicosis:** Usually occurs after 10 or more years of exposure to crystalline silica at relatively low concentrations
- **Accelerated Silicosis:** Results from exposure to high concentrations of crystalline silica and develops 5 to 10 years after the initial exposure
- **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

Healthy Lung (OSHA)

Silicotic Lung (OSHA)

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https://www.silica-safe.org/know-the-hazard/body/PhysiciansAlert-Silica.2018.pdf
https://www.silica-safe.org/know-the-hazard/what-are-the-health-effects/signs-symptoms

# Additional Silica-Related Illnesses

- Can activate latent tuberculosis
- Increases the risk of developing other serious illnesses such as:
  - Lung cancer
  - Chronic obstructive pulmonary disease (includes chronic bronchitis, emphysema, bronchiectasis, and chronic airway obstruction)
  - Renal disease
  - Autoimmune diseases like rheumatoid arthritis and scleroderma

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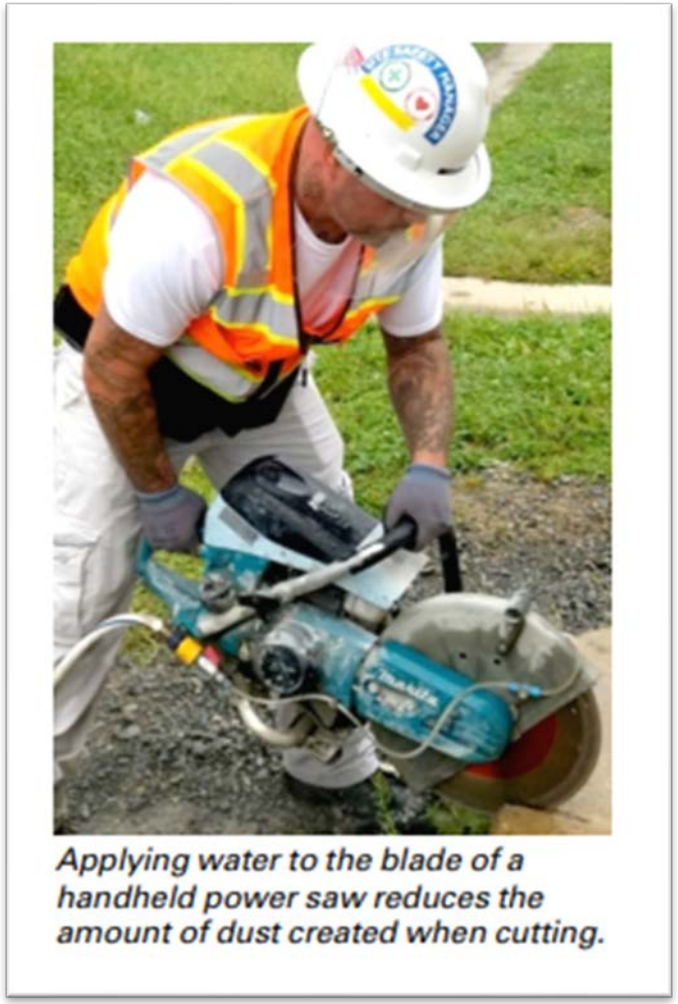
https://www.osha.gov/sites/default/files/publications/OSHA3681.pdf

# OSHA Silica Standard

- New Silica Standard for Construction issued in 2016
- Requires employers to **limit worker exposures to respirable crystalline silica** and to take other steps to protect workers
- Employers can:
  - Use a control method laid out in Table 1 of the construction standard, or
  - Measure workers' exposure to silica and independently decide which dust controls work best to limit exposures in their workplaces to the permissible exposure limit (PEL).



*Applying water to the blade of a handheld power saw reduces the amount of dust created when cutting.*

Photo via OSHA

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https://www.osha.gov/sites/default/files/publications/OSHA3681.pdf

# OSHA Silica Standard: Table 1

- Identifies 18 common construction tasks with effective dust control methods
- Required respiratory protection and minimum assigned protection factor (APF) is determined based on:
  - Equipment/Task
  - Engineering and work practice control methods
  - Shift length


CPWR Table 1 Tipsheet: https://www.silica-safe.org/plan/body/Silica_Table-1_Equipment-Names_Best-Practices_Sept242018-1.pdf

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https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1153

# OSHA Silica Standard: Table 1 Tasks

- Stationary masonry saws
- Handheld power saws (any blade diameter)
- Handheld power saws for fiber cement board (with blade diameter of 8 inches or less)
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld and stand-mounted drills (including impact and rotary hammer drills)
- Dowel drilling rigs for concrete
- Vehicle-mounted drilling rigs for rock and concrete
- Jackhammers and handheld powered chipping tools
- Handheld grinders for mortar removal (i.e., tuckpointing)
- Handheld grinders for uses other than mortar removal
- Walk-behind milling machines and floor grinders
- Small drivable milling machines (less than half-lane)
- Large drivable milling machines (half-lane and larger)
- Crushing machines
- Heavy equipment and utility vehicles used to abrade or fracture silica materials or used during demolition activities involving silica-containing materials
- Heavy equipment and utility vehicles for tasks such as grading and excavating

https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1153

# OSHA Silica Standard: Example of Table 1 Entry

| Equipment/Task | Engineering and Work Practice Control Methods | Required Respiratory Protection and Minimum APF | |
|---|---|---|---|
| | | ≤4 hrs/shift | >4 hrs/shift |
| Handheld power saws (any blade diameter) | Use saw equipped with integrated water delivery system that continuously feeds water to the blade.<br><br>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: | | |
| | -When used outdoors | None | APF 10 |
| | -When used indoors or in an enclosed area | APF 10 | APF 10 |

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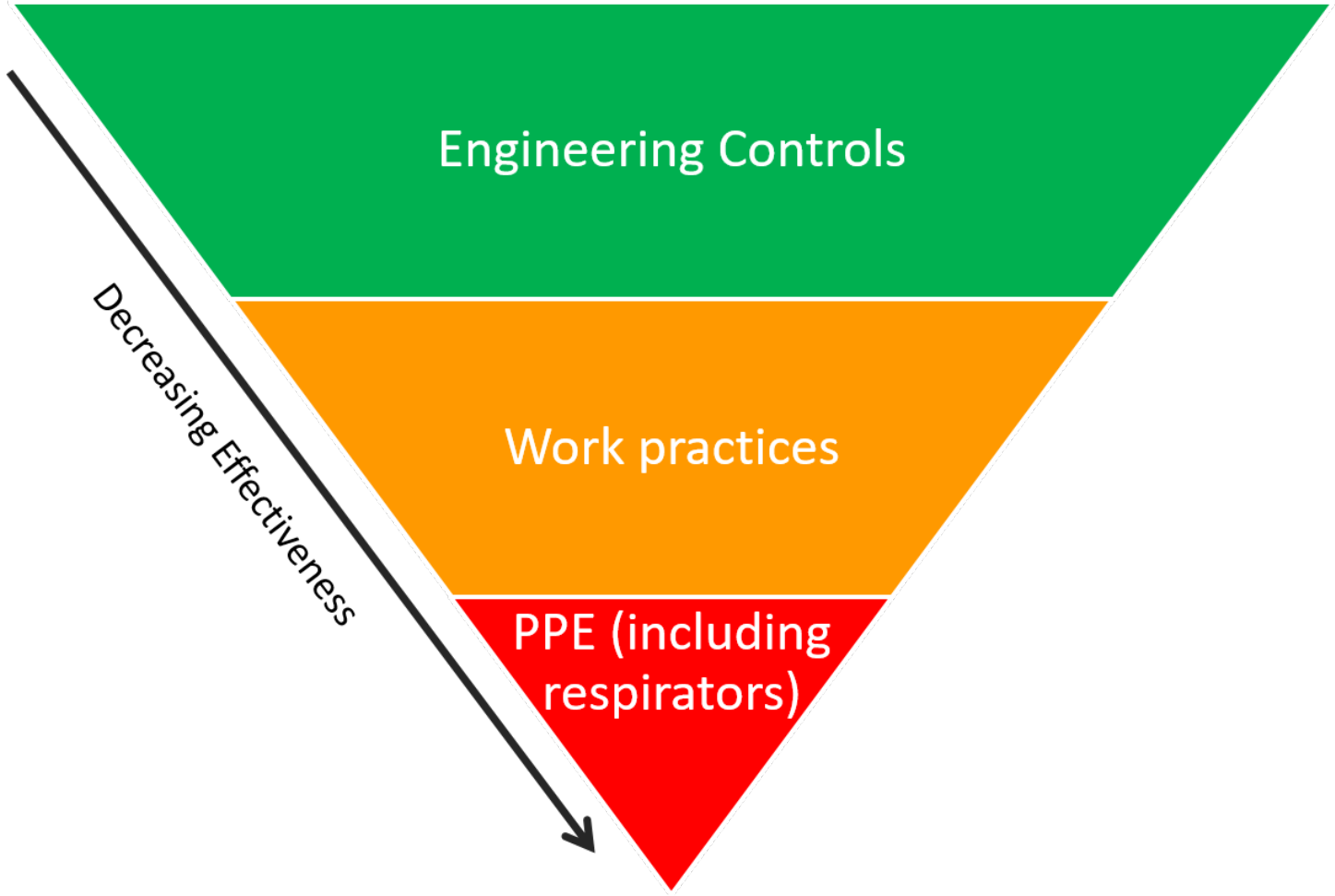
https://www.osha.gov/sites/default/files/silica_sample_employee_training_powerpoint_osha.pptx

# Work Practices to Prevent Silica Exposure

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https://www.cpwr.com/wp-content/uploads/HA-Silica.pdf

# Engineering Control: Water

- Water can keep silica dust out of the air – and out of your lungs
- Use tools with water attachments to control dust at the source
- Water can also keep dust down during activities like sweeping and demolition

PHOTO COURTESY OF THE INTERNATIONAL MASONRY INSTITUTE

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https://www.cpwr.com/wp-content/uploads/HA-Silica.pdf

# Engineering Control: Use a Vacuum

- Use tools with vacuum attachments to capture the dust right where it starts
- Dust is drawn into a hood or cover attached to the tool, through a hose, and into a HEPA-filter vacuum
- This keeps dust out of the air – and your lungs

PHOTO COURTESY OF THE INTERNATIONAL MASONRY INSTITUTE

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https://www.osha.gov/sites/default/files/publications/OSHA3681.pdf

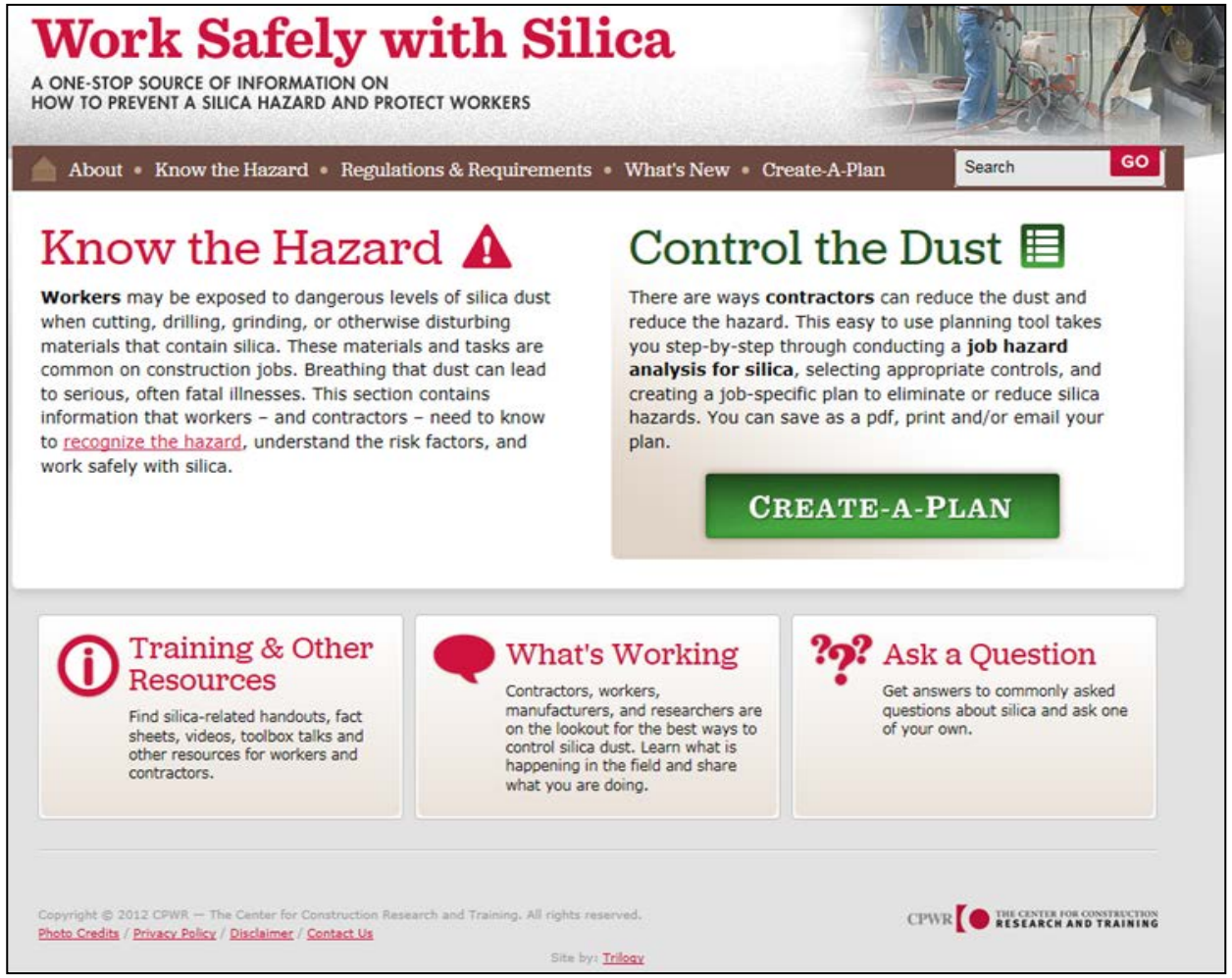
# OSHA Silica Standard: Other Key Provisions

- Establish and implement a **written exposure control plan** that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur
- Designate a **competent person** to implement the written exposure control plan
- Restrict **housekeeping practices** that expose workers to silica, such as use of compressed air without a ventilation system to capture the dust and dry sweeping, where effective, safe alternatives are available
- Offer **medical exams** – including chest x-rays and lung function tests – every three years to workers who are required by the standard to wear a respirator for 30 or more days per year
- **Train workers** on the health effects of silica exposure, workplace tasks that can expose them to silica, and ways to limit exposure
- **Keep records** of workers' silica exposure and medical exams

# Work Safely with Silica

www.silica-safe.org

- **About**
  - Regulations & Requirements
  - What's New
- **Know the Hazard**
- **Training & Other Resources**
- **What's Working**
- **Ask a Question**
- **Control the Dust: Create-A-Plan tool**

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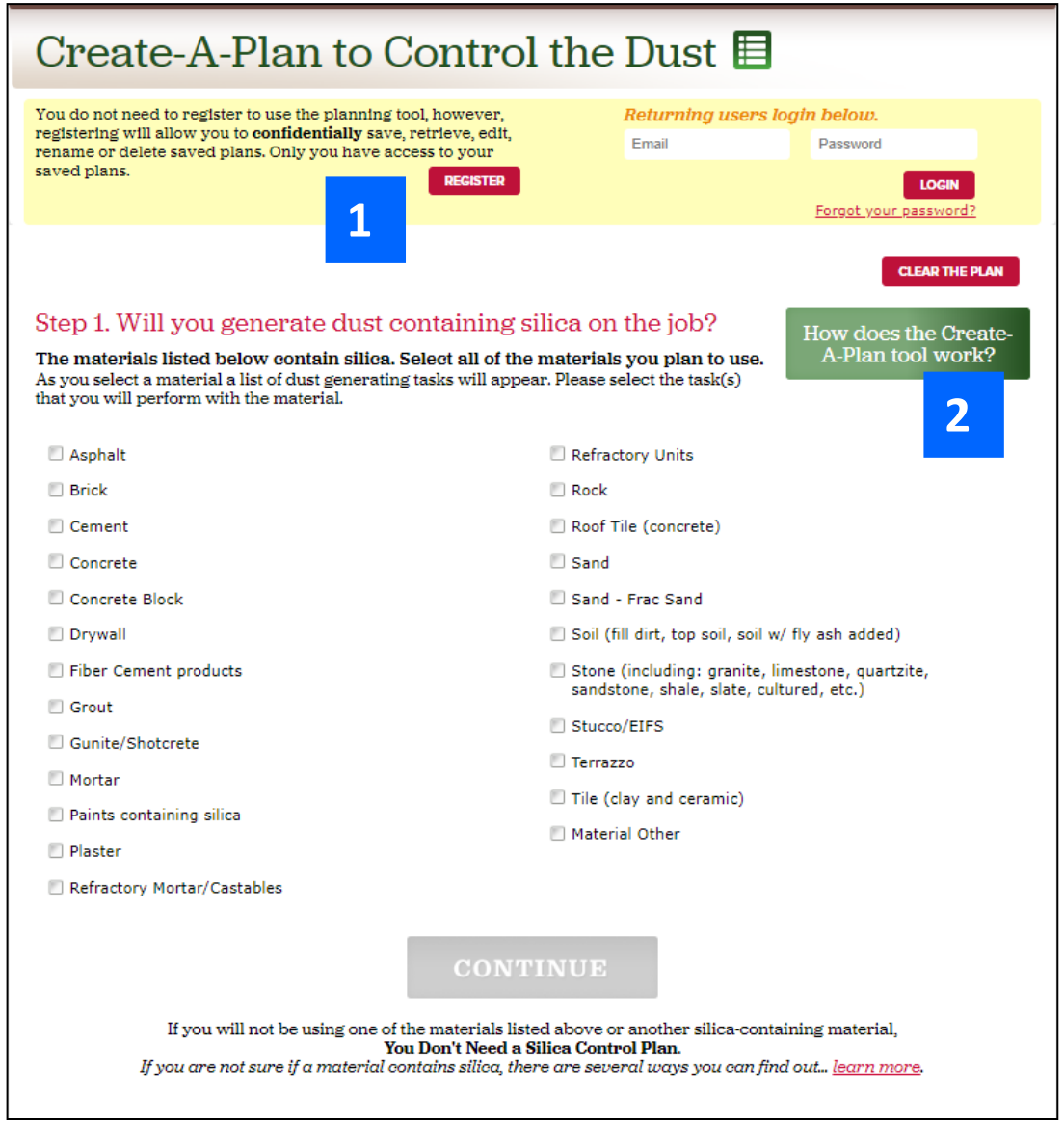
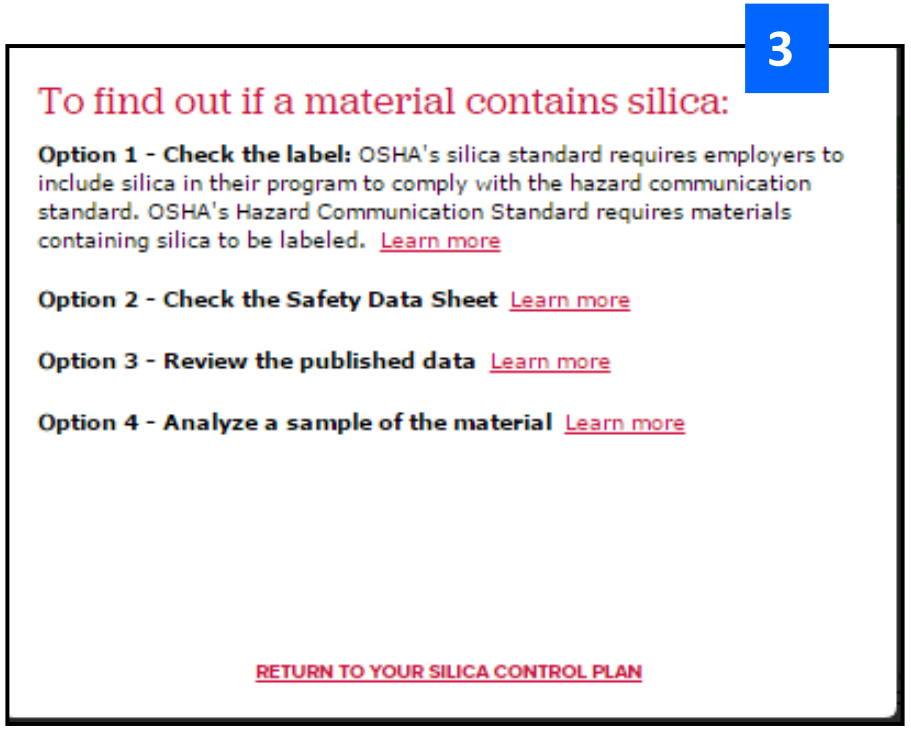
# Create-A-Plan: Step 1

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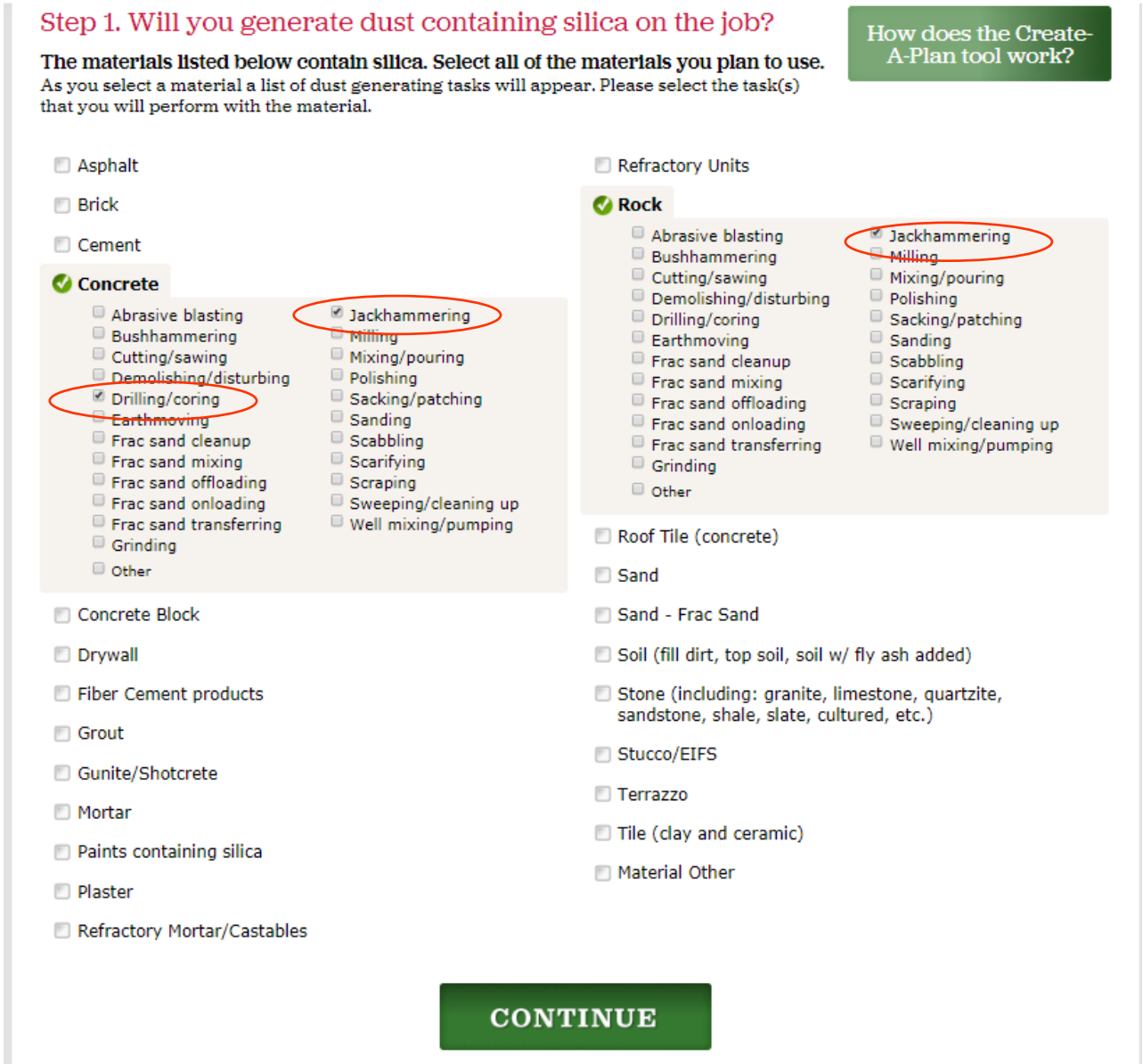
# Create-A-Plan: Step 1 (g)(1)(i)

**Materials & tasks involving exposure to silica**

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# Create-A-Plan: Step 2

CLEAR THE PLAN

Step One

## Step 2. How do you plan to control the dust?

**Select the type of equipment and dust control you plan to use for each material and task you selected in Step 1.**

*Not Sure - Perform Air Monitoring.*

*To find the exposure control methods in OSHA's silica standard, learn about air monitoring, or to find studies and data on the use of controls click here. To give users the greatest flexibility, any material-task combination may be*

*For uncommon combinations or those not typically performed, the default control is respiratory prote*

**1** Concrete – Drilling/coring

**Select the Equipment/Control:**

Click here for examples of commercially available equipment and controls.

- Anchor System
- Core Drill with Dust Extraction
- Core Drill with Water (Table 1 Entry)
- Dowel Drilling with Dust Collection (Table 1 Entry)
- Drill Press with Hand-Held Drill and Vacuum (Table 1 Entry)
- Hand-Held Drill with Dust Extraction (Table 1 Entry)
- Hand-Held Drill with Hollow Drill Bit Extraction
- Hand-Held Drill with Vacuum (Table 1 Entry)
- Other

**2** Concrete – Jackhammering

**Select the Equipment/Control:**

Click here for examples of commercially available equipment and controls.

- Hand-Held Breaker with Dust Extraction (Table 1 Entry)
- Jackhammer with Vacuum (Table 1 Entry)
- Jackhammer with Water (Table 1 Entry)
- Mounted Chipping Tool with Water
- Other

**3** Rock – Jackhammering

**Select the Equipment/Control:**

Click here for examples of commercially available equipment and controls.

- Jackhammer with Vacuum (Table 1 Entry)
- Jackhammer with Water (Table 1 Entry)
- Other

## More information to help you decide how to control the dust:

**Option 1 - OSHA Exposure Control Methods:** The exposure control methods and respiratory requirements specified in the OSHA silica standard. Learn More

**Option 2 - Perform Air Monitoring:** Information on how to find an industrial hygienist to conduct air monitoring, questions to ask, and what's involved. Learn More

**Option 3 - Studies and Data on the Use of Dust Controls:** Summaries of research findings, reports, and data. Learn more

**Option 4 – OSHA's On-site Consultation Program:** Learn More

RETURN TO YOUR SILICA CONTROL PLAN

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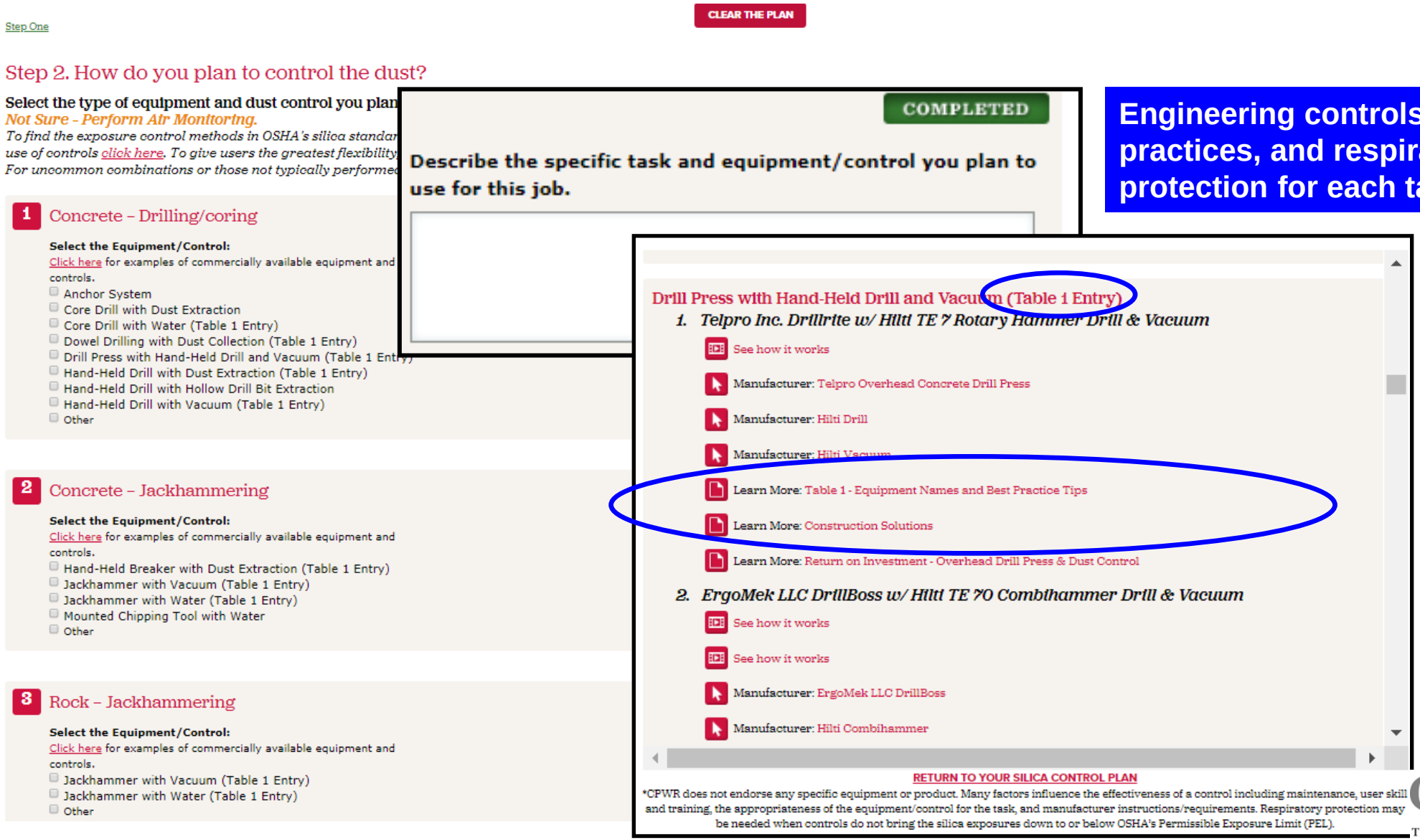
# Create-A-Plan: Step 2 (g)(1)(ii)




**Engineering controls, work practices, and respiratory protection for each task**

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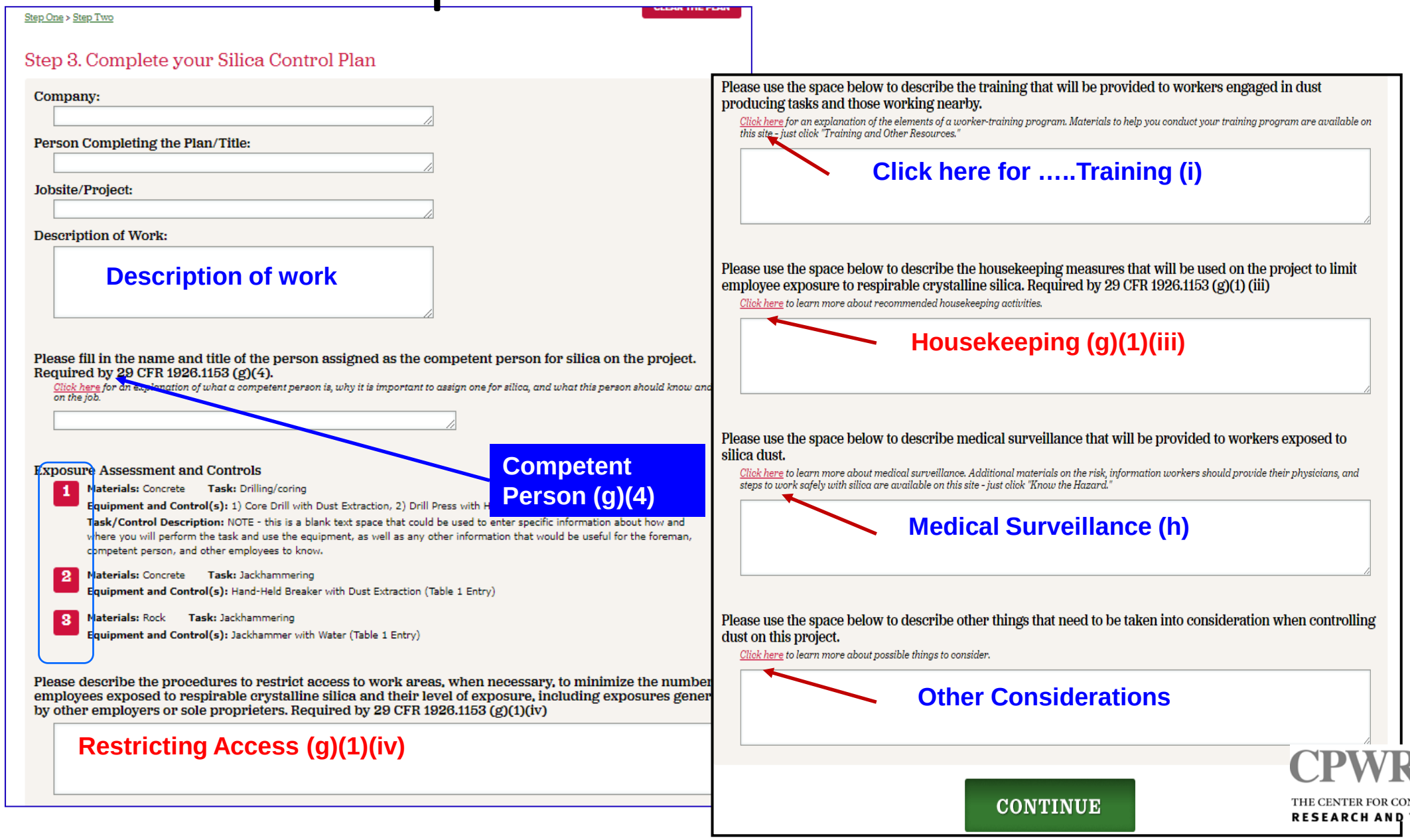
# Create-A-Plan: Step 3

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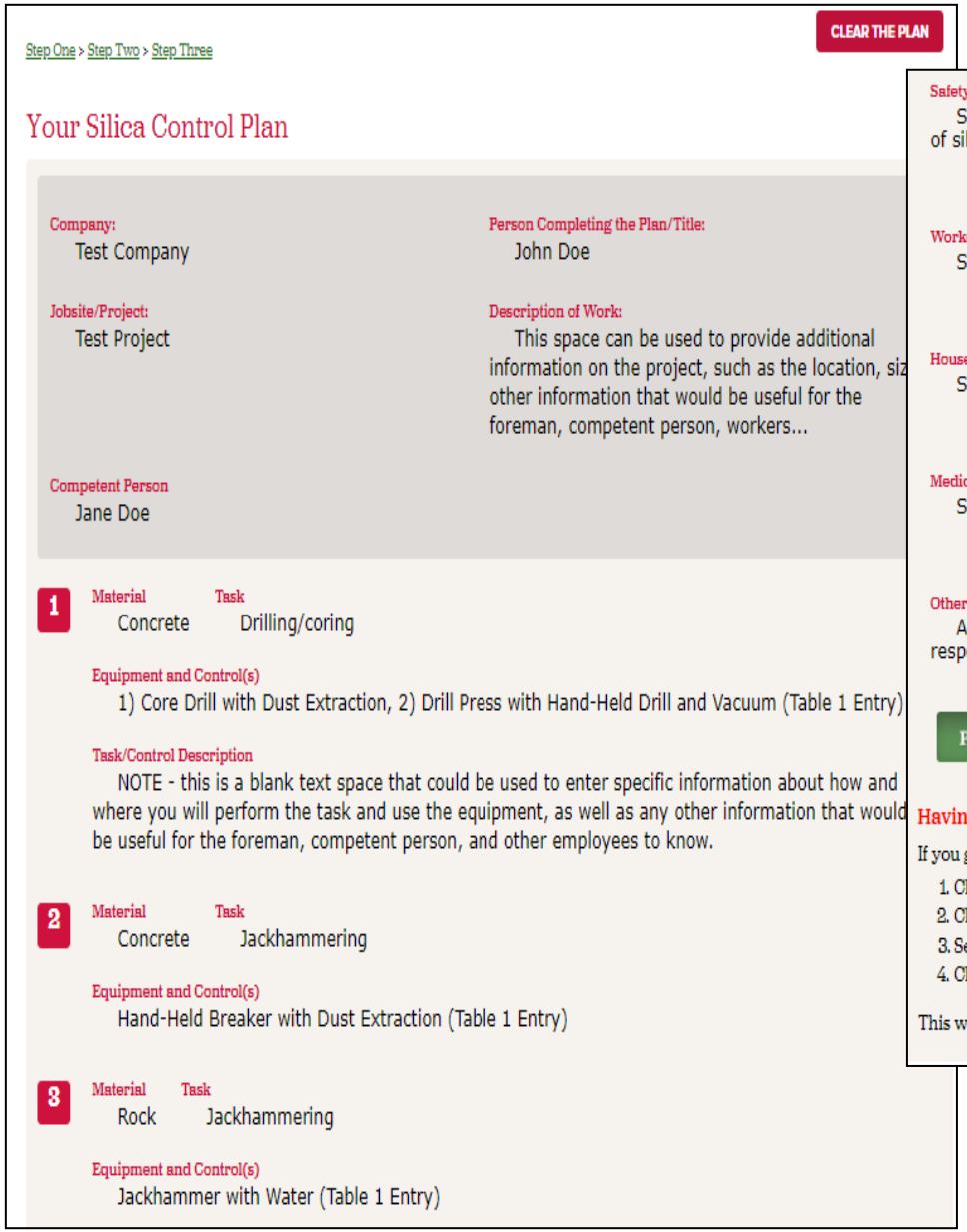
# Final Plan

**Print/ Email/Download/ Save Your Plan (g)(2) & (3)**



Step One > Step Two > Step Three

CLEAR THE PLAN

## Your Silica Control Plan

Company:
Test Company

Person Completing the Plan/Title:
John Doe

Jobsite/Project:
Test Project

Description of Work:
This space can be used to provide additional information on the project, such as the location, siz other information that would be useful for the foreman, competent person, workers...

Competent Person
Jane Doe

1 Material: Concrete — Task: Drilling/coring

Equipment and Control(s)
1) Core Drill with Dust Extraction, 2) Drill Press with Hand-Held Drill and Vacuum (Table 1 Entry)

Task/Control Description
NOTE - this is a blank text space that could be used to enter specific information about how and where you will perform the task and use the equipment, as well as any other information that would be useful for the foreman, competent person, and other employees to know.

2 Material: Concrete — Task: Jackhammering

Equipment and Control(s)
Hand-Held Breaker with Dust Extraction (Table 1 Entry)

3 Material: Rock — Task: Jackhammering

Equipment and Control(s)
Jackhammer with Water (Table 1 Entry)

Safety of Others:
Space to describe steps that will be taken to ensure other workers are not exposed to hazardous levels of silica dust.

Worker Training:
Space to describe how the requirements under section (i) Communicating the hazard will be addressed.

Housekeeping:
Space to describe how the project will comply with the housekeeping requirements in the standard.

Medical Surveillance:
Space to describe the medical surveillance program section (h)

Other Considerations:
Additional space to include other information that and employer may want to convey to those responsible for implementing the silica control plan.

PRINT | EMAIL | DOWNLOAD as PDF | SAVE YOUR PLAN | CLEAR THE PLAN

Having Trouble Downloading?

If you get a "Network Error" or have another issue when downloading in **Chrome**, try the following:

1. Click on Print;
2. Click on the "Change" button under "Destination";
3. Select "Save as PDF";
4. Click "Save".

This will save a PDF version of your plan to your computer. Alternately, you can use another browser (such as Firefox).

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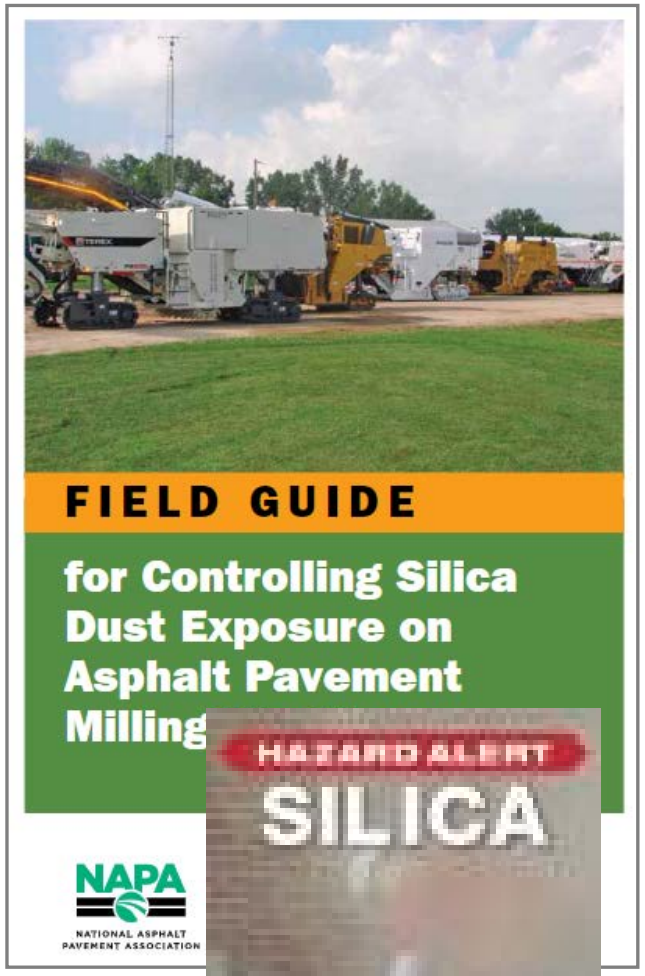
# Work Safely with Silica

**Table 1 – Equipment Names and Best Practice Tips – Update September 2018**

- Includes equipment terms commonly used by different trades and in different geographic areas
- 'Best practice' tips are intended to help employers and their employees operate the equipment-control options effectively and are based on 1) OSHA's Small Entity Compliance Guide for the Respirable Crystalline Silica Standard for Construction; 2) OSHA's Frequently Asked Questions ("FAQs") for the Construction Industry; 3) silica standard's Table 1; 4) manufacturer specifications; and 5) craft worker/contractor input based on experience in the field.

| Equipment/ Control | Photo & Video | Engineering, Work Practice Control Methods & Required Respiratory Protection | Best Practice Tips |
|---|---|---|---|
| **(i) Stationary masonry saws**<br><br>Other Names:<br><br>Table saw<br><br>Brick/block saw<br><br>Tile saw[4] |  <br>*Photo courtesy of the International Masonry Institute & OSHA*<br><br>  <br>*Video courtesy of OSHA (https://www.youtube.com/watch?v=WtoBc34EbBo)* English & Spanish subtitle options included. | **CONTROL: water**<br>• Use saw equipped with integrated water delivery system that continuously feeds water to the blade.<br>• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.<br><br>**Required Respiratory Protection:**<br>• ≤4 hours/shift: NONE<br>• >4 hours/shift: NONE | OSHA[1] requires the employer to ensure that:<br>• The saw is equipped with an integrated water delivery system (commercially developed specifically for the type of tool in use)<br>• An adequate supply of water for dust suppression is used<br>• The spray nozzle is working properly to apply water at the point of dust generation<br>• The spray nozzle is not clogged or damaged<br>• All hoses and connections are intact<br>• Water is applied at least at the flow rate specified by the manufacturer<br>• Additional exhaust is provided as needed to minimize the accumulation of visible airborne dust when operating indoors or in an enclosed space (area where airborne dust can build up)<br>• Additional means of exhaust could include: portable fans (e.g. box fans, floor fans, axial fans, oscillating fans), portable ventilation systems, or other systems that increase air movement and assist in the removal and dispersion of airborne dust[4]<br>• "Indoors or in enclosed areas" refer to any areas where, without the assistance of forced ventilation, the dispersal of airborne dust can be impeded and concentrations can build up. Parking garages, pits, trenches, empty swimming pools, open-top structures with 3 walls, or other structures with limited air movement could be considered enclosed[4]<br><br>Tips for this tool continued on next page. |





# Exposure Control Database

ecd.cpwrconstructionsolutions.org


**To share data, contact Sara Brooks at sbrooks@cpwr.com**

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# Thank You!

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