Masonry Preservation Workshop

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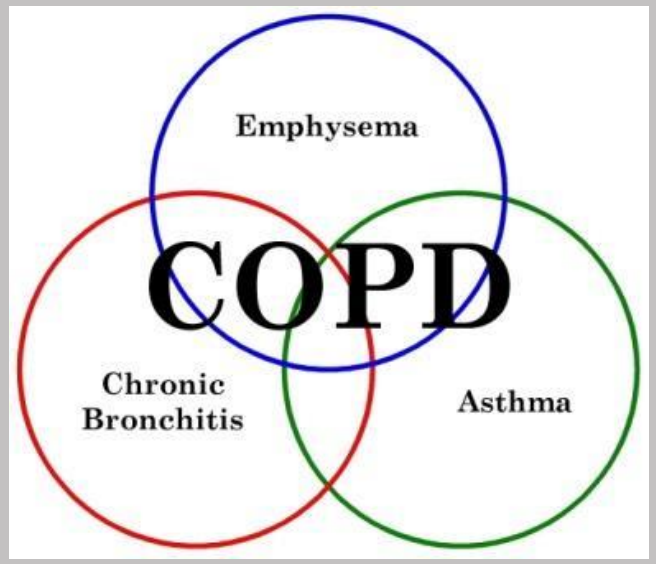
Silica—A High Priority for Construction

ELCOSH images

2 million U.S. construction workers exposed to silica every year

Respirable crystalline silica causes:

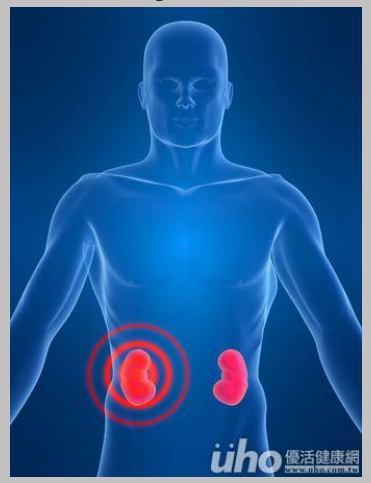
- **Silicosis**—a serious lung disease
- **Lung cancer**–classified as a carcinogen
- **Chronic obstructive pulmonary disease**

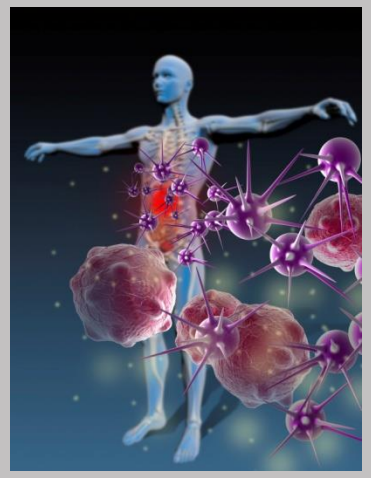


And contributes to:

Heart disease

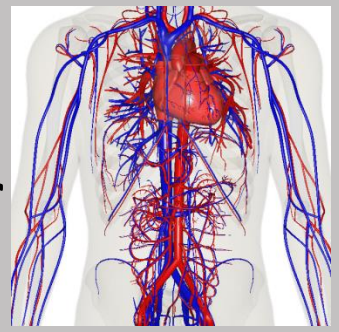
Kidney disease





Autoimmune disease

Vascular disease



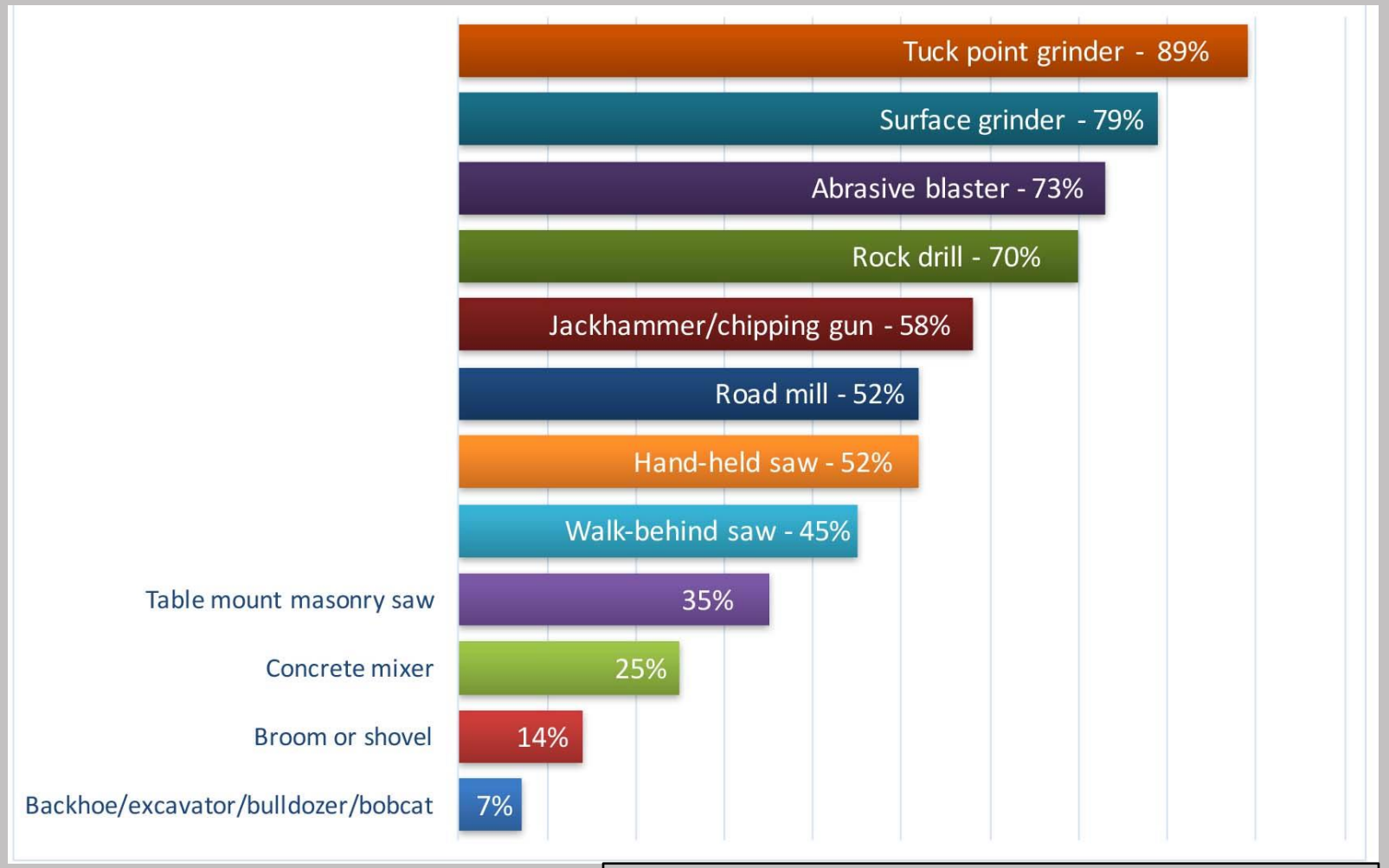
Tuberculosis (TB) and other infections

Silicosis Facts

- ✓ **Permanent**
- ✓ **Irreversible**
- ✓ **No cure**
- ✓ **Worsens after exposure ends**
- ✓ **Deadly**

Preventing exposure is your best defense

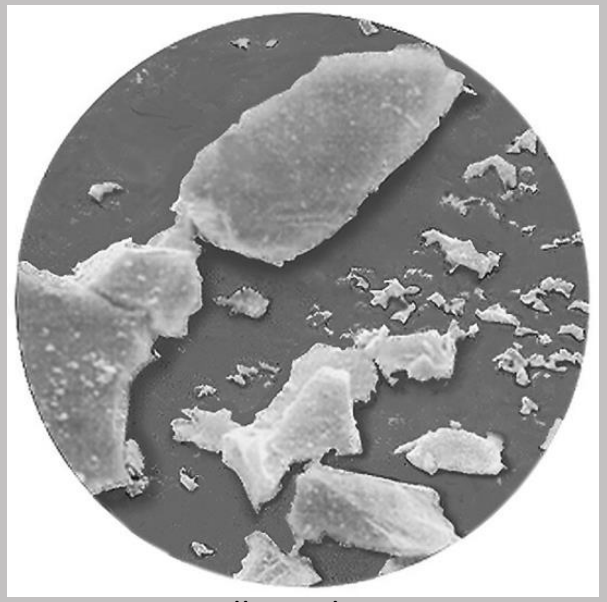
Tasks with high chance of exposure



The probability (in %) of being overexposed
Based on PEL of 0.1 mg/m^3

Size matters!

"Respirable" silica is small enough to penetrate body's natural defenses and get deep into your lungs



Crystalline Silica

Photo source: CDC

wikimedia

It's 100 times smaller than ordinary beach sand

Respirable Particles

A single human hair is between 80 – 120 microns (µm) in diameter

Respirable dust is <u>less</u> than 10 microns (µm) in diameter

Slide courtesy of Construction Safety Council, Illinois

How much silica dust is too much?
3 Important terms:

- TWA ✓**Time weighted average**
- AL ✓**Action Level**
- PEL ✓**Permissible exposure limit**

New limits for Silica

AL = 25 micrograms per cubic meter of air
(25 µg/m^3) calculated as 8-hour TWA

PEL = 50 micrograms per cubic meter of air
(50 µg/m^3) averaged over an 8-hour day

Requires employers to:

Control exposures <PEL **AND** **Comply with these**

Specified Controls
Follow OSHA "Table 1"

OR

Alternative Controls
Air monitoring/
Objective data

1. **Housekeeping**
2. **Written exposure control plan**
3. **Medical surveillance**
4. **Communication of hazards/training**
5. **Keep records**

Table 1 Tasks/Equipment

- Stationary masonry saws
- Handheld power saws
- Handheld power saws for fiber cement board
- Walk-behind saws
- Drivable saws
- Rig-mounted core saws or drills
- Handheld and stand-mounted drills
- Dowel drilling rigs for concrete
- Vehicle-mounted drilling rigs for rock and concrete
- Jackhammers and handheld powered chipping tools

Table 1 Tasks/Equipment con’t

- Handheld grinders for mortar removal (tuckpointing)
- Handheld grinders for other than mortar removal
- Walk-behind milling machines and floor grinders
- Small drivable milling machines
- Large drivable milling machines
- Crushing machines
- Heavy equipment and utility vehicles to abrade or fracture silica materials
- Heavy equipment and utility vehicles for grading and excavating

What is “Table 1”

Matches 18 tasks with effective dust control methods and respirator requirements

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10

Table 1 Entry – Stationary masonry saw

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum APF	
		≤ 4 hr/shift	> 4 hr/shift
Stationary masonry saws 	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

Table 1 Entry – Handheld power saw

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

Table 1 Entry – Handheld grinder

Equipment / Task	Engineering and Work Practice Control Methods	Required Minimum Protection and APF	
		≤ 4 hour/shift	≥ 4 hour/shift
Handheld Grinder for Mortar Removal i.e. tuckpointing 	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with tool manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater air flow per inch and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter cleaning mechanism	APF 10	APF 25

Option 2: Alternative Exposure Control

If employers do not follow Table 1, they must comply with section (d) of the standard

(d) Alternative exposure control methods. For tasks not listed in Table 1, or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1:

(1) 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 $\mu g/m^3$, calculated as an 8-hour TWA.

(2) Exposure assessment—(i) 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)(ii) or the scheduled monitoring option in paragraph (d)(2)(iii) of this section.

Air monitoring

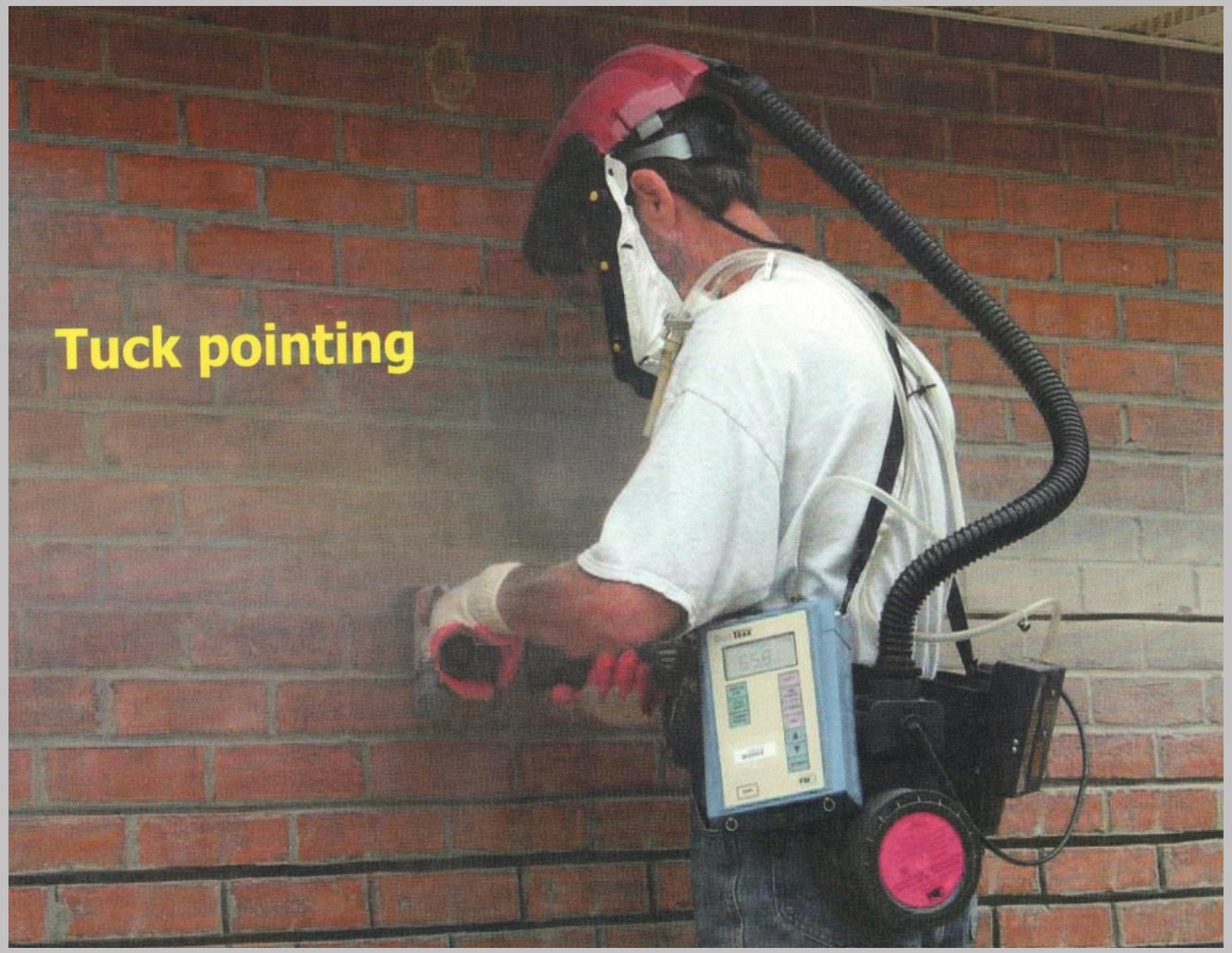
Done by professionals

Identifies/ quantifies contaminants

Specialized, calibrated equipment

Personal monitoring of workers

General ambient air monitoring


Tuck pointing


Factory Services
By FL
16726
Battery
Fault
Flow Adj.
On
Off
GilAir5
Tri-Mode Air Sampler
WARNING
Substitution of components may impair intrinsic safety. Use only specified GilAir5 battery packs. See Labeling for intrinsic safety approvals.
Pat. Pending
Made in U.S.A.
Gilian
Flow
RFI

DANGER! DON'T OPERATE
THE MACHINE. BEFORE THE
YELLOW / GREEN WIRE IS
CONNECTED TO THE
GROUNDING SCREW AND
TIGHTLY FASTENED

All employers must comply with these sections of new standard:

Housekeeping: workers need to know

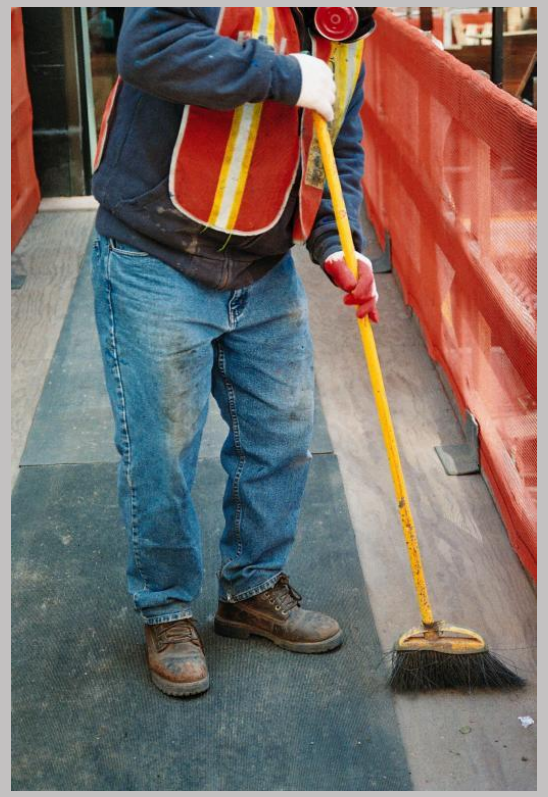


Photo source: elcosh

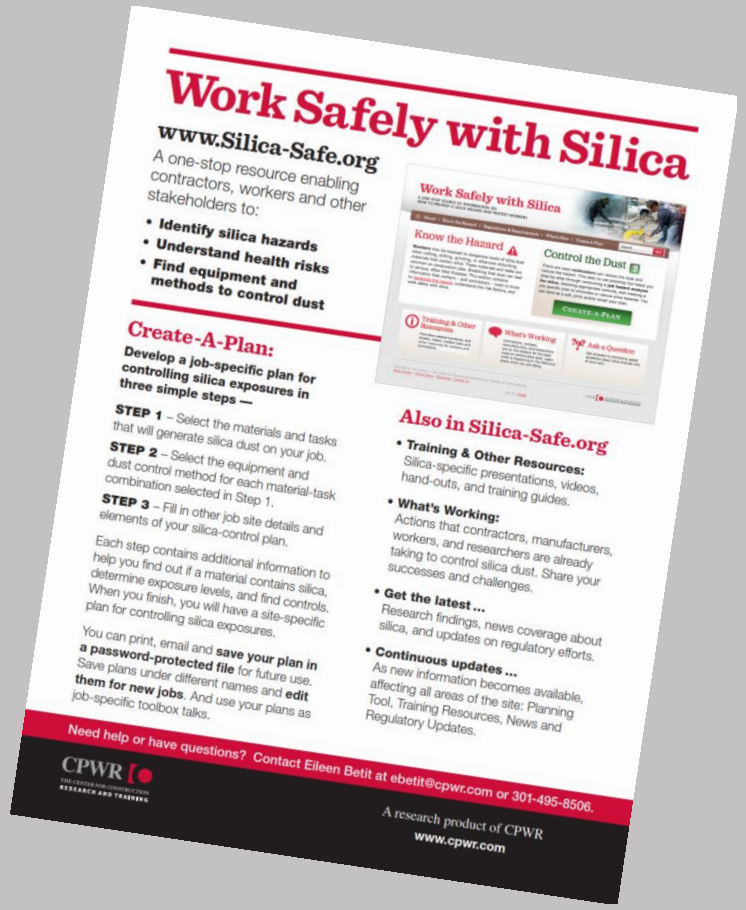
If contributes to silica exposure:

--Dry sweeping or brushing
--Use of compressed air for cleaning surfaces or clothing

NOT allowed unless used with ventilation

Employers must have written plan for managing silica exposure

- Available to each employee
- Describes tasks, controls, PPE, procedures, housekeeping, restricted access to work areas
- Designates a **Competent Person**



Work Safely with Silica

A ONE-STOP SOURCE OF INFORMATION ON
HOW TO PREVENT A SILICA HAZARD AND PROTECT WORKERS

About • Know the Hazard • Regulations & Requirements • What's New • Create-A-Plan

Search GO

Create-A-Plan to Control the Dust

You do not need to register to use the planning tool, however, registering will allow you to **confidentially** save, retrieve, edit, rename or delete saved plans. Only you have access to your saved plans.

REGISTER

Returning users login below.

Email Password

LOGIN

Forgot your password?

CLEAR THE PLAN

Step 1. Will you generate dust containing silica on the job?

The materials listed below contain silica. Select all of the materials you plan to use.
As you select a material a list of dust generating tasks will appear. Please select the task(s) that you will perform with the material.

How does the Create-A-Plan tool work?

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

Personal protective equipment

- Only if engineering and work practice controls aren’t enough
- Must be NIOSH approved
- Employers must comply with OSHA silica and respiratory protection standards
- Medical evaluations

NIOSH-Approved Respirators

PAPR

Full Face APF 50

½ face APF 10

N 95 A APF 10

Slide Courtesy of CPWR

Competent person requirements

- The employer must designate a competent person to frequently and regularly inspect job sites, materials, and equipment to implement the written exposure control plan
- The employer can designate any of his or her employees to be a competent person if the employee is qualified, including the employee who does the work on a jobsite. For example, employees who go to jobsites alone can be designated a competent person if they know how to properly implement controls on the tools they use, can recognize if the controls are not working, and can correct the non-working control.

Medical exam available at no cost

- If you wear a respirator 30 or more days/year for silica exposure
- Exam includes:
  - -Medical/work history
  - -Physical exam
  - -Chest x-ray
  - -Pulmonary function test
  - -Tuberculosis test

Photo: wikimedia

Medical surveillance – paragraph (H)

- Respirator use with past employers does not count toward the 30-day threshold.
- When unexpected circumstances result in employees being required to wear respirators more frequently than first expected, employers must make medical surveillance available as soon as it becomes apparent that the employee will be required by the silica standard to wear a respirator for 30 or more days in the upcoming year.

Medical surveillance – paragraph (H)

- 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.
- Employees who are required to wear respirators must receive medical evaluations required by the respiratory protection standard before they are fit tested for a respirator or wear a respirator in the workplace.

Examples of isolation

- Separate the worker from the dust
- Enclosed cab with ventilation/filtered air
- Separate dusty operations from non-dusty areas

Abrasive blasting containment

Photo: ELCOSH Images

Selecting the Appropriate Tool

- Is every masonry project the *same*?
- Why or Why not?

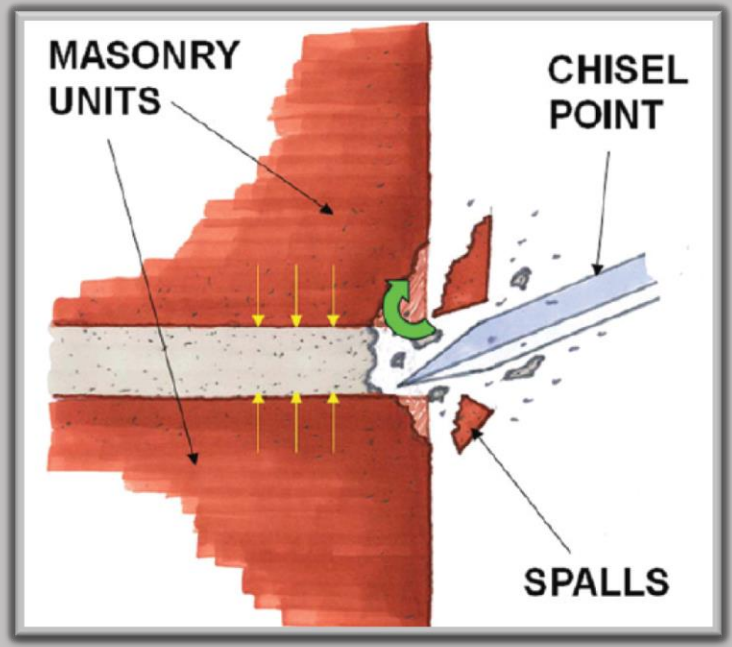
Selecting the Appropriate Tool

Depends on:

- Size of the joint
- Density of existing mortar
- Joint location

Hammer and Chisel

- Labor-intensive
- May not be appropriate for removing mortar from thin joints or joints surrounded by fragile units



Power Saw and Angle Grinder

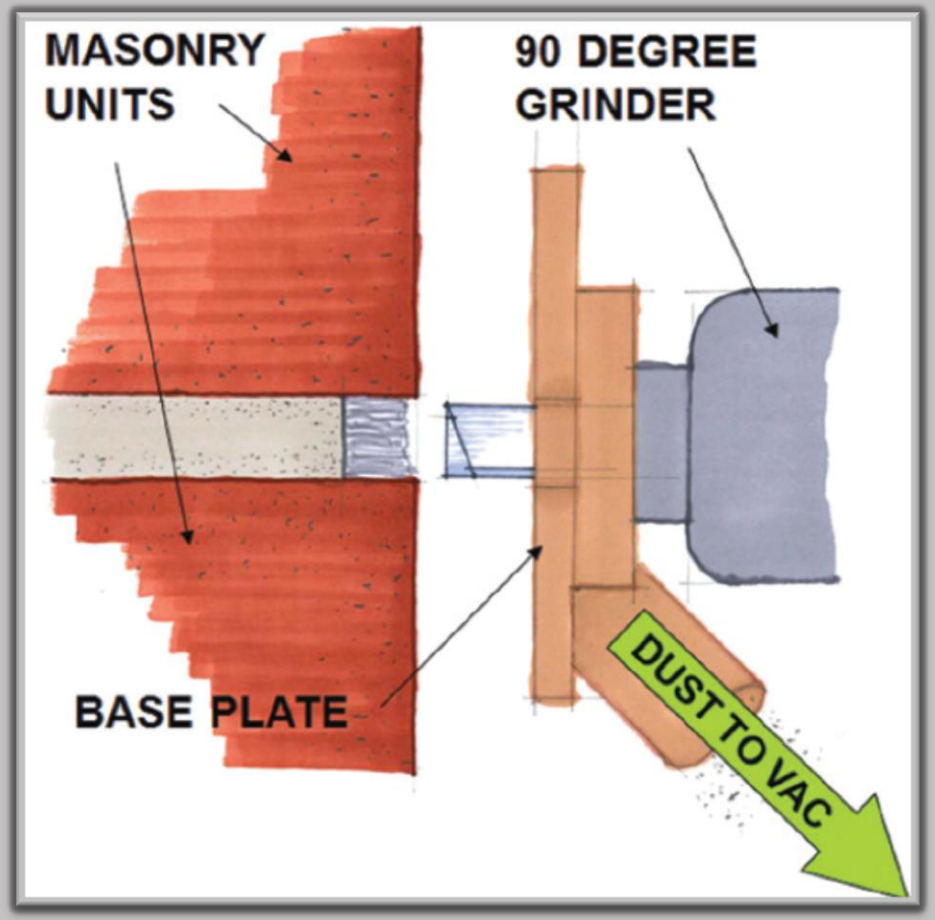
- Most common method
- Most efficient and effective if tools are used properly, with other techniques
- Relatively new to[illegible] f[illegible] removing histori[illegible]

Contractors should have experience before using them!

Oscillating Multi-Tool (Caulking Cutters)

- Feature diamond cutting blades.
- Blades vibrate at very high speeds.
- May minimize unit damage.
- Reduce amount of dust produced.

Masonry Router (90-Degree Grinder)



Pneumatically Powered Chisel

- Feature small chisels
- May be used to cut horizontal joints on hard Portland cement mortar


BOSCH

D. **Mockups:** Prepare mockups of restoration and repointing as follows to demonstrate aesthetic effects and qualities of materials and execution.

1. Clean a 3'-0" x 3'-0" area for review by Architect.

2. Rake out joints and remove grey cementitious material in two separate areas approximately 36 inches high by 36 inches wide and repoint one of the two areas. Coordinate location with Architect.

3. Each worker must demonstrate proficiency with power tools and be approved by the Architect.

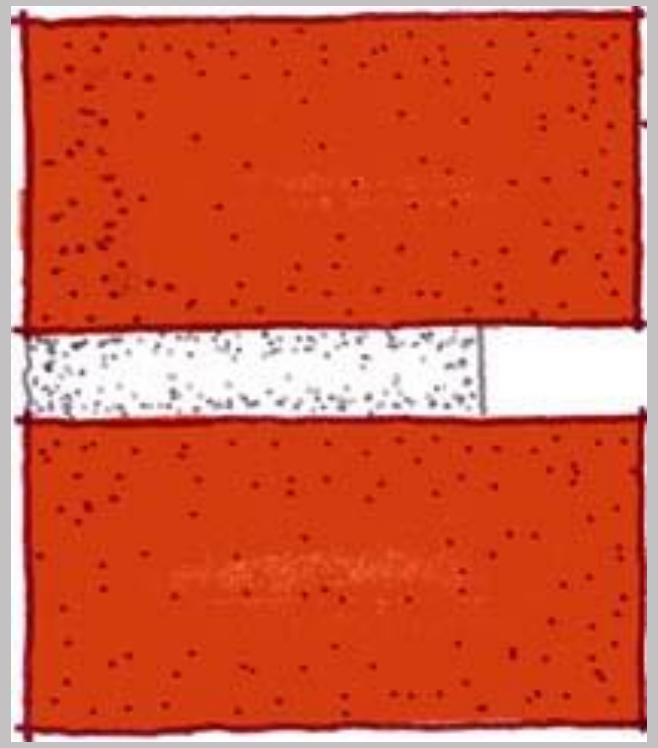
4. Mortar color will be mocked up prior to color approval. Location will be determined by Architect.

QUALITY ASSURANCE

PPE – Personal Protective Equipment

Mortar Removal

- Existing mortar should be removed at least 2 times the joint width, but no more than half the width of the unit.



Finishing
Creating Weathered Appearance

Best practices for workers

- Use equipment and controls properly
- Be aware
- Participate
- Don’t bring dust home
- Give your doctor silica info
- Don’t eat, drink, smoke, or apply cosmetics while near silica dust—wash hands/face

Best practices for contractors

- Use controls to eliminate dust
- Assign competent person
- Provide proper respirators when needed
- Substitute materials
- Create a plan

Photo source: elcosh

Available from OSHA website

Websites that can help you

- **CPWR** (Center for Construction Research and Training) Work Safely With Silica
  www.silica-safe.org
- **Federal OSHA** Silica eTool
  http://www.osha.gov/dsg/etools/silica
- **Cal/OSHA** Silica in Construction eTool
  http://www.dir.ca.gov/dosh/etools/08-019/index.htm