Controlling Silica Exposures

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Silica Management Program

**Evaluation**
- Qualitative
- Quantitative
- Improvements/Controls
- PPE Selection

**Monitoring**
- Shifts
- Experience Level
- Env. Conditions
- Representative

**Results**
- Notification / Training
- Written Corrective Action
- Repeat Monitoring
- Medical Surveillance
Evaluation / Controls
Prohibited Practices

- **Use of Compressed Air**
  - Unless used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air.

- **Dry sweeping and Dry brushing are prohibited**
  - Where such activity could contribute to employee exposure to silica unless wet sweeping, HEPA filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.
Housekeeping
HEPA Vacuums

- Dustless HEPA Certified Contractor: evacuumstore.com
- HEPA Pack Backpack Vacuum: homedepot.com
- Pullman Holt HEPA Cannister: spycor.com
- HEPA Vacuum Cleaners: allergybuyersclub.com
- Aramsco - Cyclone HEPA Vacuum: aramsco.com
- HEPA-Vacuums: mastercraftusa.com
- Industrial H.E.P.A. Vacuums: niko.com
- HEPA Vacuums: pneutekco.com

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Power Tools
Power Tools
Substitution/Elimination

Crystalline SiO₂ (Quartz)

Amorphous SiO₂ (Glass)

Selection of planktonic diatoms
(not representative for the Mediterranean)
Wet Roadways
Automation

Figure 3 - Left side shows screenshot of EVADE software of miner performing manual deployment of scraper device with high peak in dust exposure shown in the bottom of the screen; right side shows photo of new pneumatic system to eliminate worker performing the task.
Remote Access
Water

Spray Type
- Full Cone
- Hollow Cone
- Flat Spray
- Atomizing Spray

Spray Pattern and Angles
- Whirlchamber: 15° to 125°
- Deflector: 40° to 165°
- Spiral: 100° to 180°
- Tapered: 15° to 110°
- Even: 25° to 85°
- Deflectec: 50° to 180°
- Hydraulic: 35° to 165°
- Air Assisted

Cleaning Effectiveness of Air (Equivalent Air Volume)

Key:
- Atomizing
- Hollow-cone
- Flat spray
- Fullcone

Water Pressure, √k Pa

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Conveyors
Conveyors
Crushing
Transfer Points

FORWARD FEED
0° TO HORIZONTAL
TYPE 1

BACK FEED
60° TO HORIZONTAL
TYPE 2
CHUTE TYPE 2 SELECTED

IMPACT PLATE (DEFLECTOR)
0° TO HORIZONTAL
TYPE 3

CHUTE ANGLES AND EFFECTS
Baghouse Bag Changes
Local Exhaust Ventilation

Air velocity 1,800 fpm

30° Min

45° Min

Figure 4-7. Canister-type dust collector system.
Transfer Points
Screens
Kiln demo
Enclosed Cabs
Vinyl Seats

- 78% lower exposure to cleaner cab (e.J. Haas and A.B. Cecala, Min Eng. 2017 Jul; 69(7): 105-109)
Foam Pads
Dumping

Figure 2-5. Dust samplers mounted on haul truck in gold mine.
Enclose the Primary Hopper
Dumping
Underground Blasting

Diagram:
- **1** Baseline Concentration
- **2** Shot Time @ 3.0 hrs
- **3** Arrival Time @ 3.5 hrs 360 Minutes
- **4** Peak Concentration
- **5** Peak Time @ 5.0 hrs 120 Minutes
- **6** Average Concentration
- **7** End Time @ 9.0 hrs 360 Minutes
- **8** Duration of Dust Cloud: End Time - Arrival Time = 330 minutes
- **9** Return to Baseline

Example: pDR located 610 m (2000 ft) from shot.

<table>
<thead>
<tr>
<th>Velocity</th>
<th>m/s</th>
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<tbody>
<tr>
<td>Arrival</td>
<td>0.340</td>
</tr>
<tr>
<td>Peak</td>
<td>0.085</td>
</tr>
<tr>
<td>End</td>
<td>0.028</td>
</tr>
<tr>
<td>Average</td>
<td>0.151 (29.8 fpm)</td>
</tr>
</tbody>
</table>
Clothes Cleaning Booth
Control Room Ventilation

![Diagram of control room ventilation system with labels for key components such as Air-conditioner Main unit, Condenser, Outside air Pressurization unit, Recirculating pick-up, Dust laden recirculation air, and Outside filtered air.]
Bagging
Clapping/Climbing
Water

Reduce your dust exposure
Spraying or hosing cleanup

Did you know?
Starting with a forceful stream of water during housekeeping (e.g., hosing down equipment, walls, beams, and the floor) can **elevate dust exposure**

During housekeeping, begin with a wide spray to wet everything down.

Then use a narrow, forceful stream.
Thank You