

Silica Dust Exposure

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PURPOSE

This Bulletin provides information on a safety concern that may impact operations at Department of Energy (DOE) facilities. Specifically, the concern is the exposure of workers to silica dust during construction and demolition activities.

BACKGROUND

Recent information and incidents at DOE suggest that cutting and grinding cement during construction and demolition activities are more hazardous than previously recognized.

Exposure to free crystalline forms of silica (silicon dioxide) from quartz, cristobalite, and tridymite could cause respiratory disease. Quartz is the most common form of crystalline silica and is found in granite, sand, and other minerals. Potential work exposure to airborne crystalline silica includes abrasive blasting, sandblasting, rock cutting, chipping, drilling, grinding, jack hammering, concrete work, and demolition of concrete and masonry structures.

DOE records show 17 health-related incidents involving crystalline silica dust over the past 5 years. Thirteen of these occurrences resulted in worker overexposures. The remaining cases had working environments that had the potential for overexposures.

WHAT ARE THE HAZARDS?

Over exposure of workers to airborne crystalline silica may lead to the development of silicosis, lung cancer, and airways diseases. Silicosis increases the risk of tuberculosis infection. These exposures may also be related to the development of autoimmune disorders, chronic renal disease, and other adverse health effects.

The DOE exposure limit for respirable crystalline silica follows the lower Threshold Limit Value (TLV) of 0.050 mg/m³ of air given by the 2005 American Conference of Governmental Industrial Hygienists (ACGIH) as required by 10 Code of Federal Regulations 851, "Worker Safety and Health Protection." However, in 2006 the ACGIH adopted the value of 0.025 mg/m³ of air as the lower TLV for respirable crystalline silica in recognition of the increased risk from silica overexposure.

CONTROLLING THE HAZARDS AND GENERAL GOOD WORK PRACTICES:

- Post warning signs where silica exposure may occur.

- Provide engineering or administrative controls, where feasible, such as local exhaust ventilation, blasting cabinets, dust collection shrouds, and protective measures; e.g., water sprays.
- Use wet drilling methods or exhaust ventilation controlled drills when drilling through the overburden layer.
- Use safer abrasive blast media containing no or low silica.
- Stay upwind of silica dust sources and avoid visible clouds of dust.
- Monitor exposure level in workspace.
- Wear a N95, or higher rated, National Institute for Occupational Safety and Health certified respirator, if respirator protection is required.
- Wear only a Type CE abrasive-blasting respirator for abrasive blasting.
- Wear disposable or washable work clothes and shower if facilities are available. Vacuum the dust from your clothes or change into clean clothing before leaving the worksite.
- Be aware of the operations and job tasks creating crystalline silica exposures in your workplace environment and know how to protect yourself.

ADDITIONAL SOURCES OF INFORMATION

- Your Safety and Health Office
- Occupational Safety and Health Administration:
<http://www.osha.gov/Publications/OSHA3176.html>
http://www.osha.gov/SLTC/etools/silica/determine_exposure/determine_exposure.html
- National Institute for Occupational Safety and Health:
<http://www.cdc.gov/niosh/topics/silica/default.html>
<http://www.cdc.gov/niosh/docs/2004-108/default.html>
- DOE Operating Experience Summary Report 2004-22:
<http://www.hss.energy.gov/csa/analysis/oesummary/oesummary2004.html>

SUMMARY

Crystalline silica exposure may lead to serious or fatal respiratory disease. Overexposure to silica can be avoided. Use appropriate respirators and other controls whenever necessary.

If you have any questions, please contact Dr. Bill McArthur by telephone at (301) 903-9674 or at bill.mcarthur@hq.doe.gov.

(Signed by)

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PREVENT EVENTS

Learning from Industry Experience

PREVENT EVENTS is intended for use by personnel during morning meetings, pre-job briefings, and work unit meetings to communicate key industry experience.

Management:

1. Do we have written procedures for handling silica dust during construction, demolition, and other work where there is potential for exposure to airborne crystalline silica?
2. What training have we provided our workers on handling silica dust?
3. Have we ensured employee access to general good practice guidelines for working with silica?
4. Have we made available to our workforce the control measures and personal protective equipment (PPE) to work safely with silica dust?

Supervisors and Workers:

1. Do we need respirators and other PPE for the job?
2. Is there a respiratory protection program or written procedures to help us select, use, and properly fit the appropriate respirator?
3. Will the air in the work area be sampled to confirm an acceptable air quality for work?
4. Have all employees for the job been properly trained?
5. Are we aware of the general good practices for preventing silica exposure?
6. Would workers on the job be participating in exposure monitoring and health screening and surveillance programs to track any adverse health effects from crystalline silica exposures?
7. Are there special equipment or control measures we could use to help minimize exposure to the silica dust?

