Silicosis: A silent killer

by Barbara Mulhern and Faye Rice, MPH, RHIA, CCS

A 35-year-old construction worker took a job sandblasting so he could make enough money to support his family. He noticed a lot of dust at work sites, but covered his mouth and nose with a bandana. His wife became concerned when he started wheezing and coughing at night. The worker then learned that he had advanced silicosis, a lung disease caused by breathing dust containing crystalline silica. He died at age 35, leaving behind his wife and four children ranging in age from 10 to 17.

A 47-year-old man who had worked as a rock driller for 22 years learned that he had advanced silicosis after being rushed to the hospital with respiratory failure and right heart failure. Until then, he never had a chest X-ray or had seen a doctor for this problem. Two years later, he died of the disease while on a ventilator. The drills he had used at work were equipped with dust controls, but they were often broken.

A 49-year-old nonsmoker who had reported shortness of breath and possible pneumonia was diagnosed with emphysema, asthma and advanced silicosis. He worked as a tile installer for 23 years where he had to polish and drill tile. Although he did not do sandblasting, he was exposed to grout dust and sandblasting and he did not use a respirator.

These three cases are among the many reported each year among workers who have breathed dust containing very small particles of crystalline silica. Crystalline silica is a major part of the earth's crust. Quartz is the most common form of crystalline silica and may be found in soil, silica sand and rock.

Many workers develop silicosis in their 30s. Some are only in their 20s. Often, there are no symptoms in the early stages. In fact, the disease can develop within a few months of high silica dust exposure or it can go undetected by chest X-ray for 20 or more years of exposure to relatively low levels of silica dust in the workplace. Chronic silicosis may develop or progress even after the cessation of exposure to silica dust.

As silica dust builds up in the lungs, it becomes harder to breathe. Silica in the lungs can also weaken the body's ability to fight infections, so other illnesses may result. As silicosis progresses, symptoms may include shortness of breath, severe cough and/or weakness. Fever, weight loss, night sweats, chest pains, respiratory failure and death can also result from silicosis.

The National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention estimates that more than one million workers in the United States are at risk of developing silicosis each year. Although the reported number of U.S. deaths with silicosis is about 160 per year, the actual number is thought to be much higher, and hundreds more become disabled because of the disease. In addition, NIOSH reported recently that silicosis deaths continue to occur among workers between the ages of 15 and 44, indicating that intense overexposures to silica dust are still occurring despite the existence of Occupational Safety and Health Administration (OSHA) limits.

Although there is no cure for silicosis, it is preventable through effective workplace control measures and elimination of exposure to crystalline silica dust.

Who is at risk?

Many different tasks place workers in construction-related occupations at risk of breathing silica dust and developing silicosis and other silica-related diseases such as pulmonary tuberculosis, lung cancer, kidney disease, chronic obstructive pulmonary disease and other adverse health effects. (Visit the NIOSH "Safety and Health Topic: Silica" Web page, www.cdc.gov/niosh/topics/silica, then click on "NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica" for details.) Particularly risky tasks include:

- Chipping, hammering, drilling, sawing and grinding stone, concrete, or masonry.
- Crushing, loading, hauling and dumping rock.
- Abrasive blasting of concrete, including bridges and buildings.
- Demolition of concrete and masonry structures.
- Abrasive blasting using sand.
- Cutting cement tiles on roofs.
- Grinding mortar.
- Preparation of surfaces prior to painting.
- Dry sweeping or pressurized air blowing of concrete or dust.
- Using a jackhammer on various materials.
- Using mobile excavation equipment (e.g., loaders, graders, dozers and trucks).

Even if you are not performing these tasks yourself, you may be working at a site where silica dust is present. Silica dust can be found in many materials such as soil, mortar, sand, plaster, block, brick, concrete, granite, grout, slate, cement board, some drywall joint compound mud, and concrete roofing tiles and aggregate. Even the very small particles you cannot see can get into the air you breathe and become trapped in your lungs. These particles are so small that it could be hazardous even if you can't see the dust.

Steps to take

NIOSH has a number of recommendations for reducing exposures to crystalline silica at work sites. OSHA also implemented a National Emphasis Program in 2008 for work sites where employees are exposed to silica, such as in construction. Employers need to know which OSHA standards apply and comply with all applicable OSHA regulations concerning exposure to silica dust.

One of federal OSHA's requirements is to report any employee cases of silicosis on the OSHA No. 300 illness and injury recordkeeping log. For more information on OSHA's silica-related standards, visit this Web

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page: www.osha.gov/SLTC/silicacrystalline/standards.html. Also see the accompanying article, "Checklist for silica dust inspections," for a non-mandatory checklist for OSHA compliance officers who conduct silica-related inspections. This checklist is Appendix H of the OSHA National Emphasis Program, which you can access from the above Web page (click on "National Emphasis Program - Crystalline Silica" under "directives").

Note: For specifics on OSHA's Permissible Exposure Limits (PELs) for crystalline silica, refer to OSHA regulation 29 CFR 1910.1000, Table Z-3.

The following are among NIOSH's recommendations for employers. (For more detailed recommendations, see the five new NIOSH Workplace Solutions publications on reducing hazardous dust, www.cdc.gov/niosh/pubs/workplace_date_desc_nopubnumbers.html. Also see the "Silica resources" section at the end of this article.)

• Develop a site-specific safety and health plan that includes measures to control silica. This plan should include guidance for recognizing when silica dust may be generated and describe strategies to control or eliminate dust. Include engineering controls, personal protective equipment and work practices.

• Assess work site activities and implement relevant engineering controls such as wet drilling or wet sawing of materials containing silica, enclosed operator cabs, and ventilating confined structures to maintain a continuous air flow and prevent any leakage of dust to the outside.

• Establish a documented maintenance program for dust control systems that are used.

• Perform air monitoring of respirable crystalline silica exposures to make sure engineering controls are working and to determine whether workers need respiratory protection. For information on NIOSH's recommended exposure limits and respirator recommendations for crystalline silica, visit this Web page: www.cdc.gov/niosh/topics/silica and click on the "NIOSH Pocket Guide to Chemical Hazards/Silica." Also visit these Web pages: www.cdc.gov/niosh/npptl/topics/respirators and www.cdc.gov/niosh/docs/2008-140.

Note: For information on OSHA's respiratory protection standards, refer to 29 CFR 1926.103 (respiratory protection standard for construction). Also see the OSHA eTool on Respiratory Protection: www.osha.gov/SLTC/etools/respiratory/index.html.

• Take safety precautions to minimize the presence of unprotected workers near such activities as rock drilling where silica dust may be present. Also, use warning signs and barriers to separate workers, pedestrians and vehicles from equipment being used in activities that may generate silica dust. Note: Make sure all warning signs are in a language or languages workers will understand.

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Checklist for silica dust inspections

The Occupational Safety and Health Administration (OSHA) has published this nonmandatory checklist as a tool to be used by OSHA compliance officers conducting silica-related inspections. This checklist is a good tool for employers to use as well.

Employee Exposure Monitoring
- Sample for respirable dust/silica
- Leak test filters/cyclones
- Bulk samples of settled dust
- Employer's monitoring records
- Other _____

Engineering and Work Practice Controls
- Location of employees
- Ventilation
- Wet methods
- Other _____

Respiratory Protection
- Written program
- Cartridge selection and change-out schedule
- Medical and fit test records
- Breathing air quality and use
- Other _____

Hazard Communication
- Written program
- Material safety data sheets (MSDSs)
- Training
- Bulk samples of products
- Other _____

Symptoms of Silicosis in Workplace
- Survey/interview employees
- Employees obtaining medical evaluations
- Other _____

Medical Surveillance
- Employer aware of silicosis risk
- Employer identifying possible cases
- Employer referring cases to physician
- Other _____

Housekeeping and Hygiene Practices
- Facility cleanliness
- Clean-up methods (compressed air; dry sweeping)
- Change rooms/personal protective equipment storage
- Separate break areas
- Other _____

Employee Exposure and Medical Records
- Employer monitoring and medical records
- Employee access and confidentiality
- Other _____

Abrasive Blasting (on site or off site)
- Sample for silica and metals (including bystanders)
- Sample for noise
- Ventilation and dust containment
- Personal protective equipment and respirators
- Carbon monoxide alarm on compressor
- Manual control of blast nozzle operating valve
- Electrical grounding
- Pressure range (90-120 psi)
- Heat stress
- Other _____

New 75 TPH Transportable Classifier System from Buell

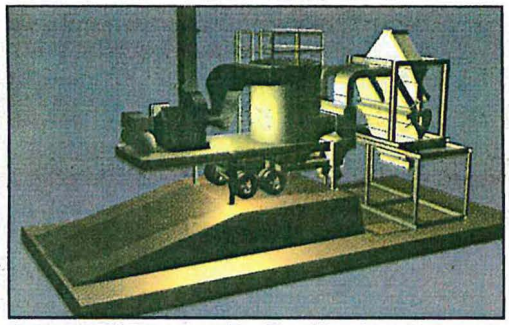
Buell has a New 75 TPH Transportable Classifier System that utilizes a dry process for the removal of minus 200 mesh material to produce an in spec manufactured sand product.

The fact that this is a dry process provides the possible additional benefit that the fines can be sold as a second product such as mineral filler. A key factor in the classifier unique is the fact that there are no moving parts which basically reduces the requirement to the minimum for maintenance as compared to other classifier systems.

The system has an inlet feed rate of 75-TPH and operates at an air flow rate of 14,400-ACFM, which is provided by a clean air fan that is located down stream of the filter which collects the fines material. The system requires 120 total horsepower and a control cabinet is included.

The system has ceramic liners in some areas to provide wear resistance for abrasive materials, and can be transported with no escort required and can be set up in one day. Buell Mobile Classifiers can be rented or purchased to provide a transportable solution for your classification needs and units ar available to classify rate of 75- or 150-tons pe hour.

To learn more go t www.buellclassifier.co or call 717-274-7303.



New 75 TPH Transportable Classifier System that utilizes a dry process for the removal of minus 200 mesh material to produce an in spec manufactured sand product.

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Train employees to:

• Wash their hands and faces before eating, drinking or smoking. Do not eat, drink or use tobacco products in the work area where construction activities are being performed.

• Change into disposable or washable work clothes at the work site. If possible, shower and change into clean clothes before leaving the work site. If this is not possible, use a vacuum with a high efficiency filter to remove dust from clothes.

• Park vehicles where they will not be contaminated with silica dust.

• Practice good housekeeping.

• Use respiratory protection and other personal protective equipment when required.

• Make medical examinations available to all workers exposed to crystalline silica.

Silica resources

Many free or low-cost resources are available in both English and Spanish to help you reduce the risk of silicosis and silicosis-related deaths. In addition to those already mentioned, they include the following:

• The NIOSH "Safety and Health Topic: Silica" Web page: www.cdc.gov/niosh/topics/silica. Among the many resources you can link to from this Web page are five new NIOSH Workplace Solutions documents on reducing hazardous dust when rock drilling, working in enclosed cabs, grinding concrete, tuckpointing, and breaking concrete with a jackhammer; a "Guide for Managing Silica Control Programs in Construction," and a useful guide for workers called "Silicosis: Learn the Facts" in both English and Spanish (www.cdc.gov/niosh/docs/2004-108/default.html). For additional silica-related information specific to the construction industry, visit this Web page: www.cdc.gov/niosh/topics/silica/industry.html.

• The following OSHA Web pages: "Safety and Health Topics: Silica, Crystalline," www.osha.gov/SLTC/silicacrystalline/index.html, the OSHA Silica eTool (a source for helping employers comply with the OSHA standard on respirable crystalline silica), www.osha.gov/SLTC/etools/silica/index.html and a new publication entitled "Controlling Silica Exposures in Construction," www.osha.gov/Publications/3362silica-exposures.pdf.

• The OSHA On-Site Consultation Service: www.osha.gov/dcsp/smallbusiness/consult.html.

• The Center for Construction Research and Training: www.cpwr.com. Click on "Resources and Publications" for English and Spanish training materials. Also, CPWR's "The Construction Chart Book, Fourth Edition" (published in February 2008) includes information and charts related to silicosis in the construction industry.

• Oregon OSHA (OROSHA): "It's Not Just Dust! What you should know about silicosis and crystalline silica," www.cbs.state.or.us/external/osha/pdf/pubs/3301.pdf.

• The "Silica Checklist for Employers" (Hawaii's Occupational Safety and Health Division), http://hawaii.gov/labor/hiosh/sos/pdf/SILICA-CHECKLIST.pdf.

• The electronic Library of Construction (for multilingual documents on silica): www.elcosh.org/docs/hazard/ chemical_silica.html.

• Your state health department.

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Sand and Gravel Dredging Wear Parts

This Dredging Supply Company, Marlin-Class Dredge, currently mines aggregates at the Shelly Materials, Inc. Lockbourne, Ohio facility. (In inset) Lyn Condict, DSC Sales Representative (left) and Shelly Materials Operations Manager Jerry Mock (right) who along with DSC's owners Bill and Bob Wetta were instrumental in improving performance of the dredge when mining operations encountered difficult geology.

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