Silica Exposure of Underground Coal Miners

U.S. Department of Labor
Mine Safety and Health Administration

Health Hazard Information Card

MSHA's final rule on dust controls for drilling in rock underground became effective April 19, 1994. The rule is designed to protect miners from exposure to harmful amounts of dust containing crystalline silica while working on and around rock drills such as roof bolting machines. Breathing excessive amounts of crystalline silica during rock drilling can cause a serious and sometimes fatal respiratory disease called "silicosis", according to the National Institute for Occupational Safety and Health (NIOSH).

- **What is silica (quartz)?**

The terms "crystalline silica" and "quartz" refer to the same thing. Quartz is a natural constituent of the earth's crust and is not chemically combined with any other substance.

- **What is silicosis?**

Silicosis is a disease of the lungs due to breathing of dust containing silica particles. Silica dust can cause fibrous or scar tissue formations in the lungs which reduce the lung's ability to work to extract oxygen from the air. There is no cure for this disease, thus, prevention is the only answer.

- **What are the symptoms of silicosis?**

There are several stages of silicosis. Early stages may go completely unnoticed. Continued exposure may result in the exposed person noticing a shortness of breath upon exercising, possible fever and occasionally bluish skin at the ear lobes or lips. Silicosis makes a person more susceptible to infectious diseases of the lungs. Progression of the disease leads to fatigue, extreme shortness of breath, loss of appetite, pain in the chest cavity which all may lead eventually to death. Acute silicosis may develop after short periods of exposure to high levels of quartz. Chronic silicosis usually occurs after 10 or more years of exposure to lower levels of quartz.

- **Where are miners exposed to silica dust?**

The most common exposures underground occur during the drilling of rock, transportation of men or material, and loading of mine material. Miners operating equipment such as locomotives, roof bolters, continuous miners, and shuttle cars as well as other miners working downwind of such equip- have a high probability of exposure. Furthermore, all miners working ment,at underground coal mines are at risk of being exposed to silica-containing dust as a part of the coal mine dust.

- **How is MSHA addressing exposure to silica dust?**

MSHA has published a rule which requires that controls be used when drill-ing rock to prevent miners from being exposed to dust from the drilling action. This regulation requires that dust from drilling in rock be con-

trolled by use of permissible dust collectors, or by water, or water with a wetting agent, or by ventilation, or by any other method or device approved by the Secretary that is as effective in controlling the dust to prevent dust exposures. Previously MSHA regulated dust from drilling in rock under § 70.400. MSHA included a provision requiring that dust collectors be maintained in operating condition and recodified the regulation as § 72.630. In addition, MSHA continues to enforce the 2.0 mg/m 3 or lower standard for respirable coal mine dust. Samples are analyzed for crystalline silica (quartz) content to determine if the respirable dust standard should be reduced to control the miner's exposure to silica. If the quartz level exceeds 5%, then the respirable dust standard for that area of the coal mine is reduced to provide for a safe level of exposure.

- **What can miners do to limit their exposure to silica-containing dust?**

Exposure to silica-containing dust at any time poses a potential health hazard. The improper control and disposal of silica-containing dust today not only posses a hazard now, but it can continue to contaminate the work atmosphere as long as miners and equipment work or travel in the area.

Mine operators are required to provide and assure the maintenance and use of appropriate controls for dust while drilling in rock. Miners should use all available engineering controls such as dust collectors, wet drilling, and adequate ventilation when drilling in rock. Roof bolter operators and helpers are encouraged to either bag the dust from dry dust collection boxes and place it in the return or shovel the dust from the box against the ribs to prevent resuspension of the dust during normal mining activities. Miner operators can reduce the amount of silica-containing dust generated by staying in-seam while mining. Cutting sandstone top and/or bottom while min-ing generates excessive amounts of silica-containing dust. Mining and bolt-ing on cycle, to limit the number of times the roof bolter works downwind of the miner, is another work practice that can lower exposures to quartz.

- **How can a person determine if he/she has silicosis?**

Mine operators are required to have an x-ray program for the benefit of miners to help protect them from developing lung disease. MSHA encour-ages all miners employed at underground mines to participate in this x-ray program. All underground mines are required to have posted an approved x-ray plan that affords miners the opportunity to receive a chest x-ray at an approved facility and at the operator's expense. An examination is increasingly important for miners who have worked in areas with a high probability of exposure to silica-containing dust. Roof bolters, transportation workers, roof bolter helpers, miner operators, and miner helpers are examples of some occupations that have a high probability of exposure to silica-contain-ing dust.

If an x-ray shows evidence of silicosis, miners should undergo a com-plete medical examination to determine the existence of silicosis. The medi-cal examination should include: a medical and work history detailing expo-sure to silica dust, observation of early signs and symptoms of respiratory disease, chest x-ray, pulmonary function test (spirometry—commonly called a breathing test), and evaluation for tuberculosis.

Mine operators are required to report to MSHA any cases of silicosis or other occupational lung disease for which a medical diagnosis or a notice of an award of compensation is received involving a miner. It is MSHA's policy under 30 CFR 50.20-6(b)(7)(ii) that a chest x-ray reading of 1/0 or above, using the International Labor Office classification system, is a reportable occupational illness for a miner who has a history of exposure to silica.

If you have any questions about any occupational health matter, feel free to ask us. Our job is to protect your health and safety. For more informa-tion, contact your local MSHA office or MSHA's national office at (703) 235-1358.