Silica Stats & Facts



DID YOU KNOW?

Silica is one of the most common naturally occurring elements on the planet. Silica, the mineral compound silicon dioxide (SiO2), is found in two forms – crystalline or noncrystalline (also referred to as amorphous). Sand and quartz are common examples of crystalline silica.

Experts estimate 1 to 2 million U.S. workers are still exposed to silica. With thousands afflicted by silicosis annually and litigation rising, will silica be the next asbestos?

A striking irony about silicosis is that while it is one of the oldest recognized occupational diseases, experts say they really don't know how many people are suffering and dying from it today.

"I know from personal experience lots of silicosis is misdiagnosed or not recognized," says Tee Guidotti, M.D., Ph.D., director of the division of occupational medicine and toxicology in the School of Medicine at George Washington University.

Many other experts agree that silicosis is a far bigger issue than the story told by the official numbers. Indeed, it may be that the principal reason silica remains such a deadly hazard in U.S. workplaces is because too many people think it's no longer a serious problem.

Official Numbers

Silicosis is caused by breathing small particles of crystalline silica. Once the particles are inside the lungs, they become trapped and cause areas of swelling around them. Over time, these swollen areas grow larger, breathing becomes increasingly difficult, and lung failure may cause death. In addition, silica exposure is also being connected to diseases besides silicosis, including cancer, tuberculosis, immunological disorders and kidney ailments.

Occupational exposure to silica particles of respirable size occurs in a variety of occupations, including mining, quarrying, drilling and sand blasting activities. Because silica sand is an inexpensive and versatile component of many manufacturing and construction processes, millions of workers throughout the world are at risk for the disease.

There are three types of silicosis:

- Chronic silicosis, the most common form of the disease, usually develops after 10 or more years of exposure to relatively low dust concentrations.
- Accelerated silicosis results from exposure to high concentrations of silica over a 5- to 10-year period.
- Acute silicosis is a rare but highly fatal disease that is caused by brief but massive exposure to dust with high quartz content.

David Goldsmith, Ph.D., associate research professor, division of occupational medicine and toxicology in the School of Medicine at George Washington University, recalls that the worst case of acute silicosis occurred in the 1930s during the construction of the Gauley Bridge hydroelectric tunnel at Hawk's Nest, W.Va.

Approximately 2,000 workers were digging a tunnel through high-silica rock with no respiratory protection, even though the health effects of silica exposure had been documented for decades. As many as 1,500 men died as a result of inhaling silica dust. This incident, sometimes called America's worst industrial disaster, introduced the nation to the dangers of silica dust.

The Work-Related Lung Disease Surveillance Report issued by the National Institute for Occupational Safety and Health (NIOSH) states, "Over the past several decades, silicosis mortality has declined, from well over 1,000 deaths annually in the late 1960s to fewer than 200 per year in the late 1990s."

Though the country would seem to be winning the war against silica-related deaths, Goldsmith cites current estimates that 2 million U.S. workers are still exposed to silica. He and other experts including NIOSH researchers say the true prevalence of the disease is unknown.

"It looks like it's not a big problem, but the national data are bad on this condition," says Edward Petsonk, M.D., senior medical officer in the Division of Respiratory Disease Studies at NIOSH's Morgantown, W.Va. research center.

The annual number of silicosis deaths does not begin to tell the story of how many people suffer from the disease. First, not all cases of silicosis are fatal. Second, even in death, the disease is often undiagnosed. Petsonk and other experts point to the startling results of a recent study by Kenneth Rosenman, M.D., professor of medicine at Michigan State University, published last year in the American Journal of Industrial Medicine.

"Our research showed that silicosis deaths represent 4 to 8 percent of the silicosis cases per year," says Rosenman. "This means estimates based on deaths alone miss more than 90 percent of the silicosis cases in the country." By that calculation, some 2,500 to 5,000 silicosis cases could be occurring each year.

In addition, Rosenman's study revealed that 53 to 77 percent of the silicosis cases that occurred each year in Michigan were either not being diagnosed or not reported to the state's surveillance system.

Respirable crystalline silica – very small particles at least 100 times smaller than ordinary sand you might find on beaches and playgrounds – is created when cutting, sawing, grinding, drilling, and crushing stone, rock, concrete, brick, block, and mortar. Activities such as abrasive blasting with sand; sawing brick or concrete; sanding or drilling into concrete walls; grinding mortar; manufacturing brick, concrete blocks, stone countertops, or ceramic products; and cutting or crushing stone result in worker exposures to respirable crystalline silica dust. Industrial sand used in certain operations, such as foundry work and hydraulic fracturing (fracking), is also a source of respirable crystalline silica exposure. About 2.3

million people in the U.S. are exposed to silica at work.

Workers who inhale these very small crystalline silica particles are at increased risk of developing serious silica-related diseases, including:

- Silicosis, an incurable lung disease that can lead to disability and death;
- Lung cancer;
- Chronic obstructive pulmonary disease (COPD); and
- Kidney disease.

To protect workers exposed to respirable crystalline silica, OSHA has issued two respirable crystalline silica standards: one for construction, and the other for general industry and maritime.

NIOSH recommends the following measures to reduce exposures to respirable crystalline silica in the workplace and to prevent silicosis and deaths in construction workers:

1. Recognize when silica dust may be generated and plan ahead to eliminate or control the dust at the source. Awareness and planning are keys to prevention of silicosis.
2. Do not use silica sand or other substances containing more than 1% crystalline silica as abrasive blasting materials. Substitute less hazardous materials.
3. Use engineering controls and containment methods such as blast-cleaning machines and cabinets, wet drilling, or wet sawing of silica-containing materials to control the hazard and protect adjacent workers from exposure.
4. Routinely maintain dust control systems to keep them in good working order.
5. Practice good personal hygiene to avoid unnecessary exposure to other work site contaminants such as lead.
6. Wear disposable or washable protective clothes at the work site.
7. Shower (if possible) and change into clean clothes before leaving the work site to prevent contamination of cars, homes, and other work areas.
8. Conduct air monitoring to measure worker exposures and ensure that controls are providing adequate protection for workers.
9. Use adequate respiratory protection when source controls cannot keep silica exposures below the NIOSH REL.
10. Provide periodic medical examinations for all workers who may be exposed to respirable crystalline silica.
11. Post warning signs to mark the boundaries of work areas contaminated with respirable crystalline silica.
12. Provide workers with training that includes information about health effects, work practices, and
13. Report all cases of silicosis to State Health Departments and OSHA