should be consulted before beginning any exercise program.

Napping is a controversial issue. Naps of 30-45 minutes duration are sometimes useful. Longer naps are disruptive to the sleep/wake cycle. However, some people believe that longer naps just prior to night shift are acceptable.

Exposure to light can help to adjust to new sleep/wake cycles. In general, workers exposed to brightly lit work environments perform better than in dimly lit workplaces. A worker should avoid bright light just prior to and during sleep. Try to spend one to two hours outside just after daytime sleep.

Short term solutions during the shift include increased physical activity, conversation, activity variation, and caffeine (especially during the 2-4 a.m. circadian dip).

Most important, be sure to schedule quality time with family and friends. The anchor sleep regimen is a particularly useful tool to use in order to free up the afternoons for recreation. In a perfect work environment, everyone would work a nine to five shift, but as Shakespeare observed in Hamlet, "Some must watch while some must sleep."

Taking Silicosis Personally

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We often expect a second chance. As children, a parent or guardian would stop us if we were in danger of hurting ourself or someone else, and we would get a second chance to learn about and change our actions. Tragically, many construction workers continue to work in dusty conditions and silicosis will not offer a second chance.

Silicosis has taken a serious toll in the United States, attacking workers in many settings. Here is a real life story...

A West Virginia driller will not see his pre-teen daughter grow up; he will not be there when she gets married; he will not be there when she starts a family of her own. During the fall of 1988, a driller in his late 40's had chest pain so he went to a hospital

in Morgantown, West Virginia. The doctors told him he had silicosis. He continued to work and support his family as many workers do. He died from silicosis during December of 1993, after 18 years of drilling. After his death, doctors found his lungs were so hard, due to rock dust in his lungs, that it was difficult to cut them with a scalpel.

Hundreds of workers died of silicoses during construction of a three-mile tunnel through Gauley Mountain, in Fayette County, West Virginia, during the early 1930's. The rock in which the Hawk's Nest Tunnel was constructed had a very high crystalline silica content. Since wet drilling methods were not used, it is believed that the airborne levels of freshly fractured silica crystals were extremely high. Due to the short period between exposure and disease onset, it is suspected that many of the deaths were due to acute silicosis.[1] Acute silicosis is a form of silicosis resulting from working conditions in which very high concentrations of crystalline silica dust are present.[2,3]

The tragedy at Hawk's Nest Tunnel, years ago, must remind us of what can happen if crystalline silica dust exposures go unchecked today or in the future. If we do not remember these lessons of the past, we are destined to relive them. Silicosis is not a disease of the past. The National Institute for Occupational Safety and Health (NIOSH) is still reporting recent cases of silicosis.[2,3]

Silicosis is a debilitating, incurable, and potentially fatal lung disease caused by breathing very fine rock or sand dust containing crystalline silica. Since a major portion of the earth's crust contains crystalline silica, there are numerous ways in which construction workers may be exposed to its dust. For example, when rock drilling, sandblasting, or concrete and masonry sawing are performed, controls are necessary to prevent silica dust from being in the air. Since 1974, NIOSH has recommended that silica sand or other abrasives containing more than 1 percent crystalline silica not be used for abrasive blasting. Concrete and masonry contain crystalline silica in varying amounts, and therefore, pose a health problem if they are sawed, drilled, blasted with abrasive or otherwise made into a dust and dispersed into the air. Sanding drywall joint compound is another source of crystalline silica exposure for many construction workers.

Thousands of people are exposed to crystalline silica dust at work every day.

One of the most striking points about silicosis is that although it has been around nearly as long as man has worked stone, some in the construction industry are still not fully aware of it. While conducting industrial hygiene surveys in the construction industry to determine which construction occupations may be at risk of developing silicosis, NIOSH has spoken to both workers and managers that were unaware of silicosis. One manager, whose workers were involved in sawing and drilling concrete, asked "What is silica? Is this something new?" Another manager asked whether silica was a man-made substance. Since 1971, the Occupational Safety and Health Administration (OSHA) has regulated crystalline silica exposure, and since 1974, there has been a NIOSH recommended exposure limit for crystalline silica.

Once a worker has silicosis, modern medicine offers no cure.

Silicosis doesn't necessarily provide a clear warning that you're being harmed. During the initial stages of silicosis, there may be no symptoms or illness to let you know that your life is in danger -- you may not get a second chance. While silicosis may take many years to develop at relatively low dust levels, young workers exposed to high dust levels can be affected even in their twenties. Once a worker has silicosis, modern medicine offers no cure. The lung damage of silicosis is permanent and may get worse even after the worker is no longer exposed.

In its classic "chronic" form, silicosis can take up to 40 years to develop; therefore, when you are about to enjoy retirement, silicosis can rob you of the part of your life that you have worked for so long and hard. When construction workers find they are performing a task in dust which may only take 15 minutes and they don't want to stop and use dust controls or get their respirator, they should think of their retirement years. Maybe they should think of the grandchildren they will not get to know, and the co-workers -- often, good friends -- that are also being exposed to the dust. If so, maybe they will then start taking dust exposure personally and be motivated to prevent themselves and their co-workers from breathing dust. Supervisors should understand that it is not in the long-term interest of either the construction company or the workers to allow dusty working conditions on their jobsite.

Silicosis Prevention

The key to preventing silicosis is to prevent dust from being in the air. OSHA (under 29 CFR 1926.55) requires that engineering controls be used whenever possible. It is the employer's responsibility to comply with the OSHA regulations. Workers have a right to expect that their employer will abide by all OSHA regulations. Apparent violations of OSHA regulations can be reported to the local area OSHA office. OSHA compliance can be achieved through controls as simple as using a water hose to wet down the dust at the point of generation. It is easier to control the application of water than it is to control the dust after it is released into the air. Here are some specific steps which will protect workers from silica dust:

- During rock drilling, use water through the drill stem to reduce the amount of dust in the air.
- Use dust collection systems which are available for many types of dust generating equipment. Use local exhaust ventilation, when available, to prevent dust from being released into the air. Always use the dust control system and keep it in good maintenance.
- When sawing concrete or masonry, use saws that provide water to the blade.
- Use good work practices to minimize exposures and to prevent near-by workers from being exposed.
- Use abrasives containing less than 1% crystalline silica during abrasive blasting to prevent harmful silica dust from being released into the air.
- Respirators should only be used after dust controls are in place. Respirators should not be the only method of protection. If dust controls cannot keep dust levels below the NIOSH Recommended Exposure Level (REL) then respirators should be used. When respirators are used they should be selected in order to provide enough protection against the levels of dust in the air. Respirators must be maintained so that they are always in good condition.

When respirators are used, the employer must establish a comprehensive respiratory protection program as outlined in the NIOSH Guide to Industrial Respiratory Protection[4] and as required in the OSHA respiratory protection standard 29 CFR 1910.134.

A Personal Note:

Recently, I attended a construction company safety meeting for the company's supervisors. I had been asked by the safety director to give a talk on silicosis. Since I have been making site visits to collect industrial hygiene information on the nature of crystalline silica exposures, I agreed to speak. That was the easy part. During the past two years, I have made several appearances at conferences and meetings. These gatherings are mostly made up of safety and health professionals, and those who may have once worked with their hands but now work at a desk away from the day-to-day hazards of construction work.

While preparing for this talk, I thought of the questions these workers might ask, and what they might feel was important. What I didn't expect, and what I hadn't prepared for, was the reaction that I saw on some of their faces. The vision of one man in particular is etched on my mind. I see him listening very intensely. Tall with his back arched, his eyebrows furrowed, his shoulders square, looking as if he didn't know whether he should fight or weep, this man, with high cheekbones and a face red from outdoor work, was taking what I had to say very personally. To him, I wasn't talking about nameless workers as are often reported in the health and safety literature--I was talking about him and his own family and I could tell it hit home. He was concentrating on what I was saying as if his life depended on it and so were a number of his co-workers. Afterward, while mingling with the group, he volunteered that his father had died of "black lung." There was nothing either of us could say.

The experience shared by my friend at this safety meeting serves to remind all of us that there are, indeed, real lives at stake. Loved ones -- friends, wives, children, and grandchildren -- go with each worker that is exposed to excessive dust levels. Let's all take it personally. Let's make the changes needed to protect the workers and their loved ones.

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Hand Tool Safety

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Often we assume that workers on a job site know how to use hand tools safely. Sometimes we learn only after someone is injured that the worker was not familiar with the particular make or model of the hand tool in use at their job site. To prevent injuries from improper use of hand tools, you can ask a new worker a few simple questions before issuing any hand tools on your job site.

There is no need to offend the worker by asking "Do you know how to use an electric drill?" The question you may need to ask is "Have you ever used this brand of drill before?" This type of question allows a worker to ask questions without appearing foolish. New workers at a job site are often hesitant to ask for help. When issuing powder-actuated tools the employer needs specific information about past training. The OSHA standard states "Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool. (29 CFR 1926.302 (3)(1))

Any time there is a change in the equipment used on a job, all employees need to be made aware of the equipment and how it may operate differently from other equipment on the job site. Make employees aware of the location of any operating instructions that come with the equipment and where that information will be kept in the future.

Employees should know how to report damaged or malfunctioning equipment. Equipment that is not in operating condition should be marked or tagged "out-of-service."

As you conduct routine safety inspections of your job site, take a few moments to watch your employees as they use hand tools. Are they using the tools for the purpose intended? Are the tools in good working order? Are the tools appropriate for the environment. Are unused tools stored

EXCEL
West Virginia University

A Quarterly Newsletter

Winter/Spring 1995 Vol. 7/No. 5,6

Construction safety is greatly enhanced by pre-planning efforts, including the elements of training, teamwork and trust. The first two articles in this issue of EXCEL show how two companies have approached these concerns and the various strategies involved.

DIA's Construction Safety Team Reflects Commitment to Safety Excellence

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Although the Denver International Airport (DIA) has received a great deal of negative publicity recently through the media, there are several noteworthy accomplishments attained by the workers and contractors who participated in this endeavor. This project incorporated a strong commitment to safety into all aspects of the job.

The airport construction effort was originally planned to encompass $1.7 billion of activities and was scheduled to open at the end of October, 1994. The overall scope was then expanded by the client to $3.2 billion with an anticipated opening 1 year sooner (10/28/93), which greatly complicated the construction schedules.

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