

*The Holmes Safety Association*

# **BULLETIN**

*November 1999*



## ***FEATURES:***

***PART 46: New Training Requirements***

***Preventive Maintenance Program***

***Mining Blasting Safety/Application Seminar***

***Out West***

***Holmes Safety Association***

***1999-2001 Program Committee's Listing***



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The **Holmes Safety Association Bulletin** contains safety articles on a variety of subjects: fatal accident abstracts, studies, posters, and other health- and safety-related topics. This information is provided free of charge and is designed to assist in presentations to groups of mine and plant workers during on-the-job safety meetings. For more information visit the **MSHA Home Page** at [www.msha.gov](http://www.msha.gov).

**PLEASE NOTE:** The views and conclusions expressed in Bulletin articles are those of the authors and should not be interpreted as representing official policy or, in the case of a product, represent endorsement by the Mine Safety and Health Administration.

**COVER:** Photograph taken by Daniel McClain, Div. of Minerals and Geology Mine Safety and Training Program, State of Colorado. If you have a potential cover photo, please send an 8" x 10" print to Donald Starr, Holmes Safety Association Bulletin, National Mine Health and Safety Academy, 1301 Airport Road, Beaver, WV 25813-9426.

KEEP US IN CIRCULATION--PASS US ALONG

## **Part 46**

# **New Training Requirements for Surface Nonmetal Mines**

*Dear Mine Operator,*

*Training for new employees, refresher training for new employees, refresher training and new task training can mean the difference between life and death for workers.*

*Part 46 spells out how you can develop a training program to protect workers for on-the-job hazards. Together, labor, industry, and the U.S. Department of Labor reached a milestone with the development and publication of Part 46. We want to continue working together toward the next milestone, October 2000, when the regulations take effect.*

*We want to make sure you have all the information you need about these new training requirements. Throughout the next 12 months, MSHA personnel will be holding regional meetings across the country, delivering information and sample training plans to your operation, and offering you help to develop your plan. If you are among the many operators who are already providing training to your workers, keep up the good work. The rule will tell you exactly what is expected. If you currently have no training program, we can help you develop one.*

*A brochure is being distributed, which highlights the main provisions of the rule. It is designed to introduce the rule to you. More detailed materials will be delivered to you. If you want information right away, simply call us, or e-mail us. We also welcome your comments, suggestions, and success stories.*

*Part 46 will be successful and beneficial to miners through our combined efforts. Together, we can make our mines safe and healthier for everyone.*

*Sincerely,*

*J. Davitt McAteer, Assistant Secretary of Labor  
Mine Safety and Health Administration*

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## *Five Steps to PART 46 Compliance*

*1. Effective programs  
for training new miners*

*2. Training for newly-  
hired experienced  
miners*

*3. Training miners for  
new tasks*

*4. Annual refresher  
training*

*5. Site-specific hazard  
awareness training*



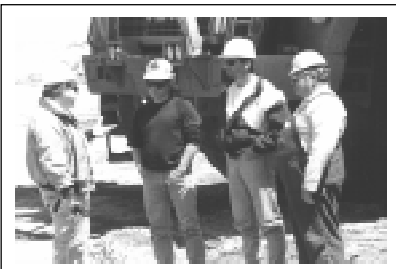


## Tasks

New tasks bring new responsibilities AND new hazards. Miners assigned to new tasks must receive training in the safe and healthy work procedures specific to their task.

## Roaming

Some Miners have Special Skills-drillers and blasters, for example. These workers move from mine to mine as a regular part of their employment. Not all sites are identical-they may use different equipment or be in a different stage of the mining process. Miners who roam must receive orientation about the hazards at the mines where they will be working, in addition to the comprehensive training that independent contractors or production-operators must provide.

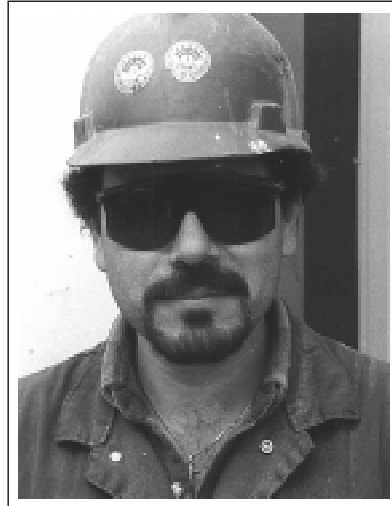


## Annual

Annual reminders are a easy and effective way to keep workers focused on their jobs and how to perform them without risking injury or illness. All miners must receive no less than total of 8 hours of refresher training every year. If you hold safety talks, keep a record of the time-those minutes add up and can fulfill the 8-hour requirement. It also gives you the flexibility to design a training program that will be effective for the miners at your operation.

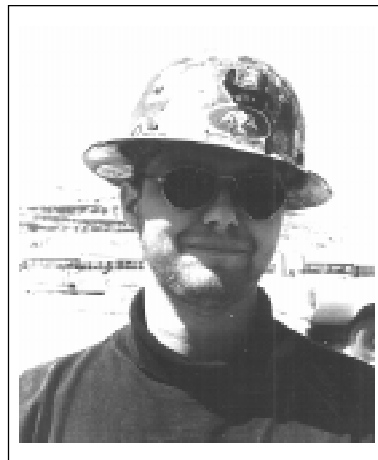
## Inexperienced

A new employee may have never worked at a mine before. Mining may even be his or her first job! New miners must receive a total of 24 hours of new miner training within 60 days of beginning work. Forty hours of training on specific topics, such as an introduction to the worksite, must be given before they begin work.



## Newly Hired

Newly Hired  
A new but experienced employee may have worked at another mine, but he or she is new to your operation. Not all work sites are the same. In fact, most differ in some way. Newly-hired experienced miners must receive training in the same subjects required for new miners - such as an introduction to your worksite - before they begin work. They also must receive instruction in additional subjects no later than 60 days after beginning work.



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## Preventive Maintenance Program for Surface Haulage Trucks

Since 1995, defective braking systems have contributed to 11 fatalities. The Mine Safety and Health Administration (MSHA) recommends that mine operators and independent contractors develop and implement a comprehensive preventive maintenance program for service brakes on surface haulage trucks. This program should include detailed periodic inspections of the braking system on each truck. Accident information clearly demonstrates the need to perform thorough brake inspections to determine if the brake system, including all of its components, is working properly and is adjusted within the manufacturer's specifications. In order to detect and correct the type of brake defects that contributed to the fatal accidents, this inspection should include taking diameter measurements of brake drums, checking the thickness and condition of brake shoes and other internal parts, and adjusting all component parts, when warranted, to the manufacturer's specifications. The recent fatal accident investigations demonstrated that brake inspections had not been frequent enough or thorough enough for the operator to

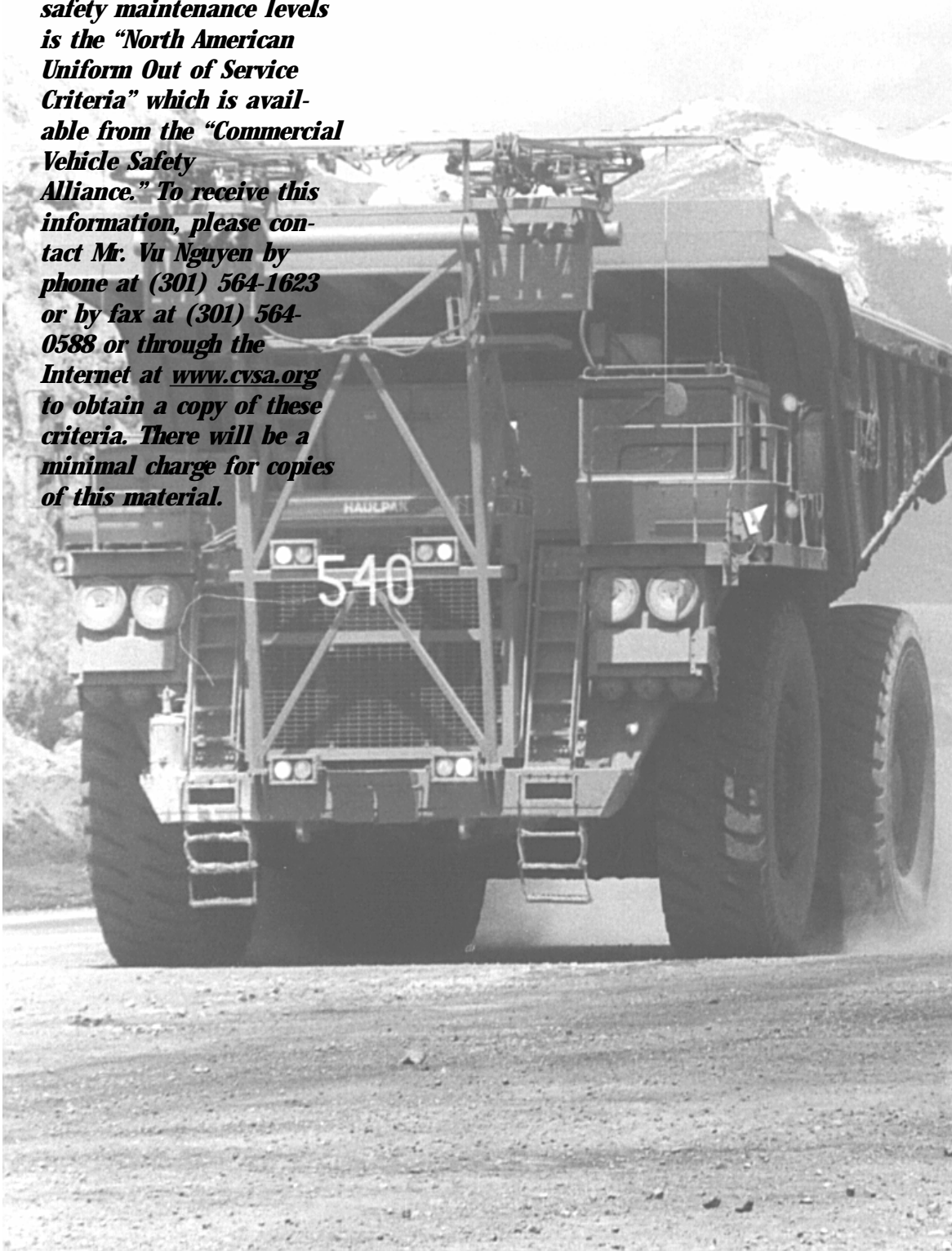
know the condition of the brakes.

MSHA's study of surface haulage truck accidents has revealed that a majority of the trucks involved in accidents were not being maintained within safe operating specifications. In most cases, MSHA's Accident Investigation teams found brake system components that were deficient. These deficiencies included brake drum diameters that were excessively worn-out of specifications, brake linings that were excessively worn or broken, grease on brake linings, slack adjusters not properly adjusted, air leaks in the brake system, and the brake retarder system not operating according to the manufacturers's specifications. The braking capacities for these trucks are greatly reduced when operated with the above-mentioned maintenance problems. The potential hazards associated with reduced braking capacities will increase when the trucks are operated on wet, muddy haul roads with steep grades. Haulage trucks should be maintained in good repair and operated within their design specifications in order to allow the equipment operator to maintain control of the truck when poor haul road condi-

tions are encountered. Operators should make complete and thorough periodic examinations of the brake system that include visual examination of internal brake components and adjustments or replacement of the necessary parts to ensure the truck can be operated safely at all times.

*Article taken from Mine Safety and Health Administration Bulletin No. P99-14, dated September 8, 1999.*

***For on-highway trucks, a quick reference for determining proper adjustments and acceptable safety maintenance levels is the “North American Uniform Out of Service Criteria” which is available from the “Commercial Vehicle Safety Alliance.” To receive this information, please contact Mr. Vu Nguyen by phone at (301) 564-1623 or by fax at (301) 564-0588 or through the Internet at [www.cvsa.org](http://www.cvsa.org) to obtain a copy of these criteria. There will be a minimal charge for copies of this material.***



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## **Mining Blasting Safety and Application Seminar** **January 19-21, 2000**



This seminar is for mining company managers, blasting engineers, blasters, and others involved with the planning, design, and use of explosives in the mining industry.

This seminar will be held at the National Mine Health and Safety Academy, Beckley, West Virginia, starting at 8:00 a.m.

on Wednesday, January 19, 2000, and ending at 12:00 noon on Friday, January 21, 2000. There is no charge for the seminar.

The most recent innovations in drilling and blasting design technology will be addressed, along with specific blasting applications, up-to-date blasting regulations, and blasting related information from recognized experts. Presenters are drawn from manufacturers of explosives and accessories, blasting consultants, design experts, and government agencies. Examples of topics include:

- Safety issues in drilling and blasting, including safety in storage, transportation, and use of explosives, and how to recognize and prevent malfunctions.

- Blasting design technology for a wide range of mining applications.

- Specific applications.

- Violations of safe blasting practices and a review of fatalities and accidents.

- Drilling design.

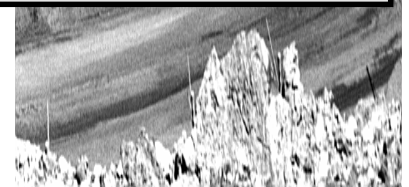
- Current blasting practices nationally and internationally.

- The use of seismology in blasting applications.



For more information on the Seminar, please contact Wayne Lively at 304-256-3301 or by e-mail at [willively@msha.gov](mailto:willively@msha.gov).

**Note: The State of West Virginia will accept this seminar as part of the blasting recertification requirements. The State of Virginia will only accept it for contractors.**





# What Works (and What Doesn't) in Mining Ergonomics

(From a paper by Sean Gallagher, NIOSH)

Edited for the Bulletin by Charlotte Richardson, Staff Writer

**Ergonomics -- the study of the interactions and stresses between man and his total working environment. The term has evolved to include the mechanics of adapting and fitting the machine, the tool, and the job to the worker.**

## History and Background

When the Bureau of Mines started an ergonomics research program in the early 1980s, some quarters of the industry expressed a great deal of skepticism and pessimism that ergonomic approaches could be applied successfully in underground mining. A number of fundamental ergonomics techniques for reducing injuries appeared to be impractical and unusable in many mining locations.

For example, an ergonomist tries to design a job so that it eliminates, or at least reduces, unnecessary and uncomfortable body positions that contribute to the risk of injury. When dealing with a factory worker who continuously bends down to pick up items from the floor, a simple solution is to provide a lift table. The lift table raises the materials to a height that allows the worker to remain standing upright to complete the job. However, such a solution requires sufficient space to stand up in-- a luxury not afforded in many underground mines. In fact, restricted space in several types of underground

mines compel employees to work in awkward postures, and there's not a lot an ergonomist can do about it.

Another technique is to provide mechanical devices to assist with lifting duties. Again, these devices often require more space than what is available, both in underground and surface operations. Designing solutions that will work well in a variety of complex dynamic mining surroundings is especially challenging. Controlling other environmental factors -- such as uneven or slippery walking surfaces and climate or atmospheric problems -- present additional obstacles to using many of the traditional methods of reducing risks of injuries.

In spite of the difficulties mentioned above, some mining companies began to experiment with ergonomics programs in the late 1980s and early 1990s. They believed that many things could be done to reduce injuries, although their programs didn't have all the means typically available to an ergonomist. And some of these

programs have been quite successful at reducing low back injuries and other musculoskeletal disorders.

What is interesting is that these separately developed efforts show a lot of similar designs and applications. This article will examine what the characteristics of successful programs are and what kinds of ergonomic interventions help reduce the risk of injuries in underground mining.

## Basics

Regardless of the industry involved, there are certain fundamentals that are key to the success of an ergonomics effort. The two most important keys are:

- Management commitment and participation
- Worker acceptance and participation

Experience has shown that without BOTH of these ingredients, chances of success are seriously diminished.

## Management commitment

(Continued on next page)

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## Hoists

Management commitment includes more than just statements of support. Instead, it requires active participation and the assurance of sufficient technical and financial involvement to sustain the effort. At a recent conference on ergonomics, Tim Martin of American Electric Power (AEP) talked about the strong safety culture and the commitment of resources his company has provided: "I can honestly say that [management] has empowered each committee. We have never been turned down for any project with merit."

Management commitment often takes the form of active participation on an ergonomics committee as stated by Mr. Martin. All too often, ergonomics committees are established without the influence of a management member who has the authority to "get things done", that is to dedicate necessary resources to the efforts. Such committees are continually frustrated by the fact that they have great ideas that can reduce injury risks but can't get management to provide the funds, the training, or technical assistance to carry them out. These committees don't usually last long and don't accomplish much of significance.

Active management participation on committees ensures attaining the resources needed for success.

### **Worker Acceptance**

As ergonomics efforts cannot be successful without active management support, employee involvement is equally important. "[Miners] are the people that know the problems in the mining industry, and...they can be the most creative and innovative with ideas for improvements", says Mr. Martin of AEP. At the same conference, Dan Anderson of CONSOL related that employees were more than willing to provide ideas for job improvements. Mr. Anderson said: "I was surprised at just how many ideas came in, and how fast they came in. We had an excellent response." Getting workers involved practically guarantees their acceptance and participation in ergonomics programs.

### **Successful applications**

Engineering controls put into place by effective ergonomics programs follow very similar themes, some of which are listed in this article. Although these approaches have been effective in a variety of companies and mining situations, not all these methods can be applied. But there are many mines that can use or adapt these controls and techniques to prevent or reduce injuries.

### **- Hoists**

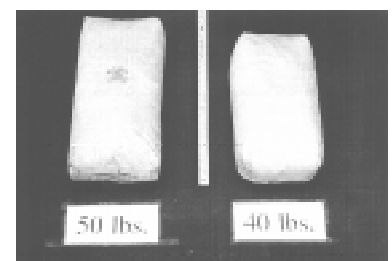
One device that has met with considerable success is the standard hoist mechanism (both underground and on the surface) to handle timber,



track, and other bulky materials. Several mines report that installing hoists at central destination and delivery points have eliminated a significant amount of manual handling of heavy or cumbersome objects.

### **Reducing Weights**

If a lifting task cannot be replaced with a mechanical means, one way to reduce the strain on employees' backs is to reduce the weight of objects handled. A number of mines have gone to lighter weights of bagged materials; for example, going from 50-pound bags of rock dust to 40-pound bags. One problem discovered when a mine goes from handling 50-pound bags to 40-pound bags is the increase in the amount of bags. For example, dividing 1,000 pounds of material among 40-pound bags will add five bags to the total handled. Too often, workers will attempt to reduce the amount of movement and minutes re-



50 lbs. and  
40 lbs. Bags

quired to handle the additional bags by attempting to grab two of the bags at a time.

Another common material handled in underground mines is wood products. A particular problem with wood products is that they can easily absorb a great deal of water if care is not taken to prevent this from happening. The weight of timbers can actually increase on the order of 20 to 40 pounds when wet. Proper storage (both underground and on the surface) can eliminate this weight gain. Elevating the timbers and the stringent use of water-resistant coverings such as tarpaulins are both effective methods in reducing unnecessary weight gain.

*Working with Suppliers*

Many companies have eliminated some materials handling operations entirely simply through better coordination with their suppliers. A common problem is that supplies such as cables or concrete blocks may delivered on spools or in loads stacked too high for delivery in a mine with limited seam heights. These materials then have to be reconfigured (usually by hand) in a layout suitable for underground delivery. The experience of many mines indicates that suppliers are more than willing to work with them on these issues. In some cases, redistributed loads actually saved money for both the mine and the supplier!

*Developing Specialized Mining Tools*

Another problem ergonomics committees identified is the limited range of tools specifically designed for mining tasks. Several of these committees developed in-house tool designs themselves, relying on innovative ideas developed by the miners familiar with the demands of the jobs they perform routinely. The photo below shows an example of such a tool that is used to help remove conveyor belt rollers.

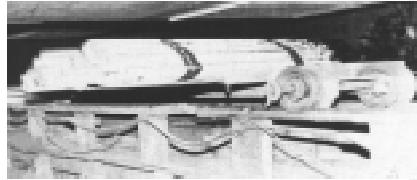


This tool has a two-handed handled on one end and a prong which fits into the hole on the belt roller at the other end. The tool provides the needed leverage in the removal (or installation) of belt rolls, freeing the miner from direct contact with the roller, which can be quite hot.

Another demonstrated success is the development of specialized vehicles. In many instances, these vehicles were built entirely of salvaged parts and supplies, making these solutions quite cost effective.

The next picture shows a materials-handling cart called the "Zipmobile" for the miner who developed it. This cart rides on the handrails of the

longwall conveyor and moves supplies along the longwall face. Instead of having to



*"Zipmobile"*

manually carry supplies beneath the longwall shields, a miner can simply load up the car and pull the supplies down the face.

Another example of a specially developed vehicle is the belt car shown below. The belt car was made from a recovered supply car that was modified so it could carry a 500-foot roll of conveyor belt. Modifications consisted of



*Roller Handling Tool*

*Belt Car*

cutting a hole in the car's bottom (allowing for a larger roll of belt) and installing a pair of stanchions to hold the roll. Workers could then drive the car right up to the tailpiece and splice 500 feet of belt without having to do any manual handling of the belt other than pulling it off the roll to perform the splice.

Some miners developed specialized utility vehicles used

*(See next page)*

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underground to benefit maintenance and repair workers. A good example is the "Ergobus" developed at AEP's Parker Run Portal. Made almost entirely of recovered parts and equipment, the "Ergobus" provides a mobile unit packed with tools and equipment for any number of maintenance tasks. Other useful features designed into this vehicle include:

- compressed air and hydraulics to run power tools
- acetylene torches and welding equipment
- winches for pulling heavy parts
- two toolboxes that hold both power and handheld tools

Maintenance and outby crews at the Parker Run facility use this popular vehicle extensively.



### Improved Seating

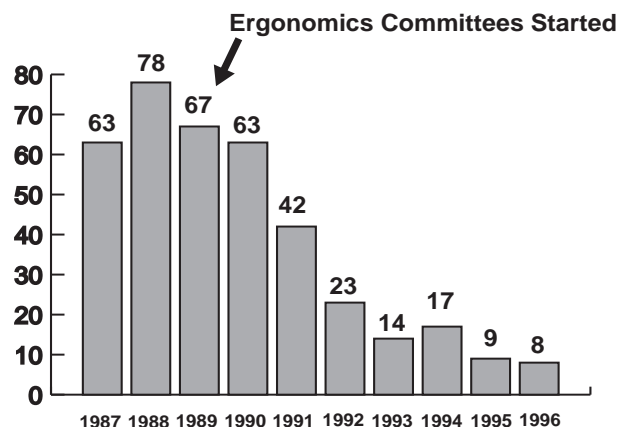
Nearly all mining ergonomics effects have focused on improving seat designs, primarily on shuttle cars, scoops, and mantrips. Traditional seating in or on underground equipment is poorly designed. Committees identified inadequate seats -- either ones that were torn up or had unsatisfactory vibration transmission characteristics -- and systematically replaced them throughout the mine. Shuttle cars at some AEP coal

mines are now equipped with air-ride suspensions that reduce workers' exposure to the damage of whole-body vibrations.

### Results

While there is not yet a tremendous amount of data proving the effectiveness of ergonomics programs in mining, the existing data suggests that these approaches are working. In the mid-to-late 1980s, Island Creek instituted an ergonomics program and saw a 13-to-15 percent injury reduction over a two-year period. AEP's Fuel Supply Division experienced a dramatic decrease in lost-time back injuries since they initiated their program, as shown in the chart below. This chart shows that this division had about 70 lost-time back injuries per year before the program was started in 1989. By 1995-96, they had less than 10 of these injuries per year. Along with this dramatic drop in injuries came a drastic reduction in compensation costs, increased productivity, reduced downtime, and improved employee relations

LOST TIME BACK INJURIES AT AEP FUEL SUPPLY



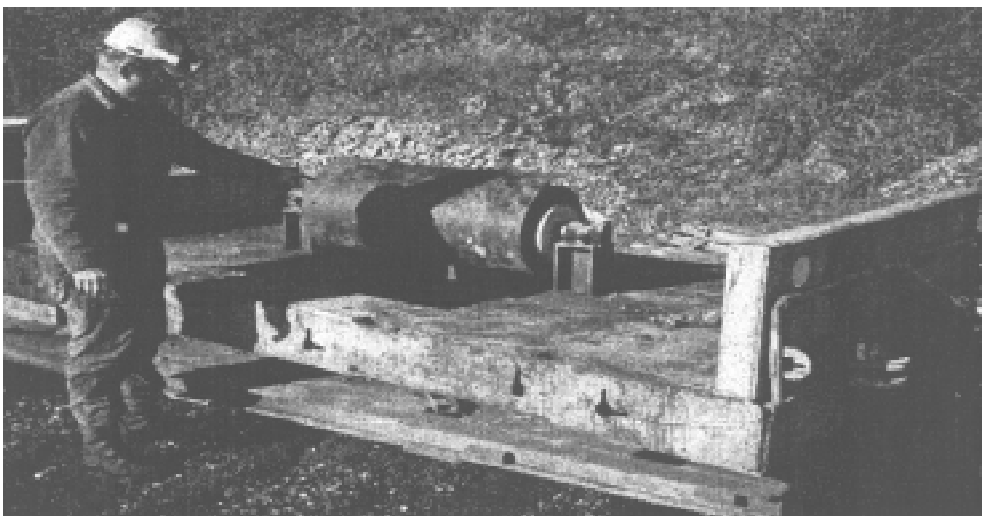


**Conclusions**

Many difficulties of the mining environment cannot be overcome by ergonomics. Miners forced to work in restricted spaces will continue to be put in awkward positions that increase the risk and likelihood of injuries. Ergonomics can do little, if anything, to improve floor conditions, and workers will continue to slip and fall.

However, this is not to say that nothing can be done or that ergonomic techniques can't be applied in mining. The techniques, methods, and designs passed along here can and have substantially reduced worker injuries. This suggests that there are many other mines that could adapt some of these same solutions and benefit from them.

Despite the successes described in this article, ergonomics in the mining industry has yet to be fully realized. Perhaps the information here will stimulate ideas for further changes and developments that the mining industry can implement.



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## Shop Safety Questions and Reminders

by Steve Hoyle, Staff Writer

If you work in a shop that repairs and takes care of mining equipment, then you have a real important job. People depend on you to do your job correctly -- your buddies and your family count on you to do your job safely.

Can you answer "yes" to the following? If you can, then you have a good chance of completing your shift safely.

### When working around the shop:

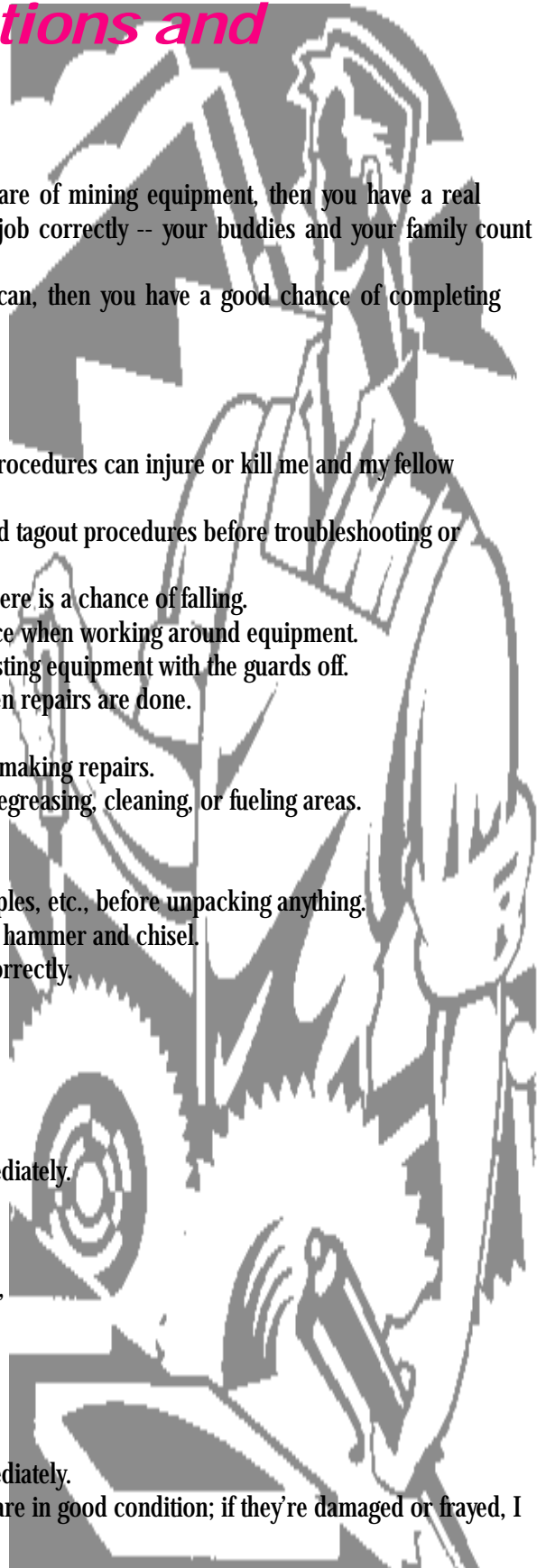
- ☛ I wear appropriate personal protection.
- ☛ I understand that taking shortcuts in work procedures can injure or kill me and my fellow workers.
- ☛ I de-energize equipment and use lockout and tagout procedures before troubleshooting or attempting to make repairs.
- ☛ I use safety lines or other fall protection if there is a chance of falling.
- ☛ I make sure guards are adequate and in place when working around equipment.
- ☛ I'm well clear of moving machinery while testing equipment with the guards off.
- ☛ I replace guards promptly and correctly when repairs are done.
- ☛ I never work beneath a suspended load.
- ☛ I follow manufacturer's specifications while making repairs.
- ☛ I don't smoke or use open flames around degreasing, cleaning, or fueling areas.
- ☛ I get help to move heavy or awkward loads.
- ☛ I pay attention to pinch points.
- ☛ I look for rough edges, protruding nails, staples, etc., before unpacking anything.
- ☛ I use the proper tools to open drums - not a hammer and chisel.
- ☛ I always handle compressed gas cylinders correctly.

### When using hand tools:

- ☛ I use the right tools for the job - always.
- ☛ I store tools safely.
- ☛ I inspect hand tools before I use them.
- ☛ I remove defective tools from service - immediately.
- ☛ I keep knives sharp.
- ☛ I use knives equipped with blade locks.
- ☛ I cut away from my body.
- ☛ I use wrenches properly - no "cheater bars."
- ☛ I use pliers for their intended purpose.

### When using power tools:

- ☛ I inspect power tools before I use them.
- ☛ I remove defective tools from service - immediately.
- ☛ I check to see if power cords and air hoses are in good condition; if they're damaged or frayed, I replace them.



**When using power tools (cont.):**

- ☛ I keep cords and hoses away from heat, solvents, oils, and chemicals.
- ☛ I don't hang power cords or air hoses on nails, bolts, or over sharp edges.
- ☛ I disconnect the power source before changing accessories on power tools. - I correctly replace all guards before using the tool again.
- ☛ I use proper shear pins in power-driven sockets.
- ☛ I make sure a pneumatic tool's in position to start before I activate it.

**With compressed air:**

- ☛ I don't use it to clean or dry equipment, tools, or clothing.
- ☛ I never point an air hose at another person.
- ☛ I bleed the pressure before I work on a compressed air system.

**Tram  
Conference/  
National Mine  
Instructors  
Seminar Annual  
Materials  
Competition  
1999**

An important feature of the annual TRAM Conference/National Mine Instructors Seminar is the training materials competition. This, the fourth year of competition, provided an opportunity for trainers in the mining community to share materials that were developed during the past year. Materials were solicited from academia, states, and industry. Twelve organizations entered a total of 24 separate items this year. The materials were judged by a panel of safety experts prior to the conference. Some of the criteria used by the judges included whether the material addressed a current health or safety problem; whether the

material used updated training methods or techniques; and whether the material included suggestions for presenting it to the intended audience. The winners were announced on the first day of the conference and were later presented with a plaque containing a certificate. All other entrants received a certificate of appreciation.

Winners were selected for each of the three entry categories: academia, states, and industry. Each category was also divided into three classifications: coal, metal/nonmetal, and general. An overall grand prize winner was also selected. In addition to the certificate and plaque, the grand prize winner was given possession of a traveling trophy with their name inscribed. The names of all winners are inscribed on permanent plaques displayed in a prominent place at the Academy. This year's winners included:

**Category: States  
Coal-Tie**

Commonwealth of Virginia; West Virginia Miners Health and Safety Training

**Metal/Nonmetal**

Colorado Division of Minerals and Geology

**General**

Illinois Office of Mines and Minerals

**Category: Academia**

**Coal**

The Pennsylvania State University

**Metal/Nonmetal**

Michigan Technological University

**General**

The Pennsylvania State University

**Category: Industry**

**Coal**

Drummond Company, Inc.

**Metal/Nonmetal**

Martin Stone Quarries

**General-Tie**

SF Phosphates

TXU Mining

**Grand Prize: Illinois Office of Mines and Minerals**

Plans are underway to make these materials available to the mining community. A flyer advertising the products will be mailed to all interested parties. ■



## Fitness and Wellness

Before beginning any program, it's important to understand some of the terminology and basic concepts used in the field. Much information about physical fitness is fairly new. Ongoing research and experimentation have produced a dynamic field of study that continues to undergo constant change and to yield exciting new developments.

### The Components of Physical Fitness

Wellness professionals divide fitness into four separate components: **flexibility**, **cardiovascular fitness**, **muscular fitness**, and **body composition**. Muscular fitness is further divided into muscular **strength**, **endurance**, and **power**.

Each component is equally important, and one component should not be emphasized over the others. Furthermore, each

component is measured separately, and there are specific methods to improve fitness in each area. For individuals to be considered "physically fit," they must possess acceptable levels of fitness in all four fitness components. The four components are described below briefly.

#### Flexibility

Flexibility is the ability to move the joints of the body through their normal range of motion. An adequate degree of flexibility is important to prevent injury and maintain body mobility.

#### Cardiovascular Fitness

Cardiovascular fitness, also known as aerobic fitness, is the capacity of the heart-lung system to supply the working muscles with oxygen, and the ability of muscle tissues to process that oxygen. Since stamina is built through this component, cardiovascular fitness measures the ability to participate in sustained vigorous physical activity over extended periods of time. Aerobic fitness also plays a major role in preventing artery disease, high blood pressure, diabetes, and obesity.

#### Muscular Fitness

Muscles are bundles of tissues that shorten, or contract, when stimulated. Through their connection to bones and joints, they provide a system of levers which permit movement. Muscles also contribute to the

maintenance of body heat, since a by-product of contraction is heat production. Subcomponents of this dimension of fitness include:

**Muscular strength**--the force a muscle or muscle group can generate with maximum effort, measured by how much weight can be pushed or pulled. This is sometimes known as absolute strength.

**Muscular endurance**--the ability of a muscle or group of muscles to generate force without fatiguing, measured by the length of time or number of times the action is repeated (multiple or sustained contractions).

**Muscular power**--how fast muscular strength can be applied.

#### Body Composition

Body composition is defined as the ratio of the body's lean and fat tissues. Lean body mass--consisting of the muscles, bones, nerve tissue, skin, and organs--represents the metabolically active part of the body that makes a direct and positive contribution during exercise. Body fat is tissue that stores energy for use during some forms of exercise, but otherwise does not contribute directly to performance. Although some body fat is essential, excess body fat (obesity) acts as a dead weight and leads to injury



and a number of health problems.

**Fitness and Health**

**Fitness** is best defined as a state of optimal physical well-being. Fitness means having the energy and physical ability to maintain a desirable quality of life--enthusiasm for living, without fatigue or exhaustion from routine required activities. Persons with high levels of fitness are, on average, healthier and more able to participate in activities for personal enjoyment. On the other hand, persons with low fitness levels often have difficulty completing daily requirements and usually have little or no energy left for other activities.

**Health** may simply be described as the absence of illness. A person with excellent health is usually considered to be someone who is not sick, not requiring medical attention, and not dependent upon prescribed medications on a daily basis. Many healthy individuals are also physically fit. However, it's important to realize that health and fitness are not always synonymous--you can be one and not the other.

**Fitness and Performance**

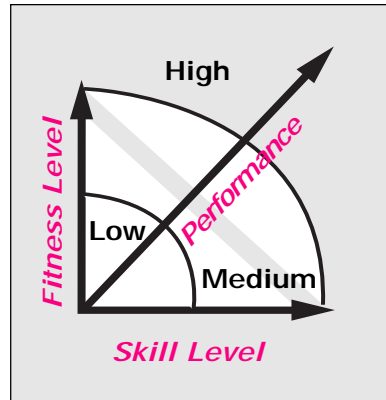
What is the relationship between fitness and performance, i.e., how well you do on the job, in sports, or on some other task? Simply stated, it depends on the task--fitness is more important for some

activities than it is for others.

Performance is generally defined in terms of athletics and skill. However, high athletic ability and skill may or may not be related to physical fitness. It is possible for a highly skilled individual to have a low level of fitness. It is just as possible for a physically fit individual to have a low level of fitness. It is just as possible for a physically fit individual to have little or no athletic skills.

Good performance requires that you have at least the levels of fitness required to accomplish the task at hand. Some activities involve high levels of overall fitness. Others demand exceptional levels of one or more of the four components of fitness (e.g., runners require high levels of cardiovascular fitness, while football players may need to emphasize strength).

Fitness is directly related to work performance. Fit employees are able to perform tasks more quickly and with less injuries than nonfit personnel. As shown in the graphic, performance generally improves as fitness and skills increase, but both are necessary. Neither a high level of fitness combined with a low level of skill, nor high level of skill combined with a low level of fitness, will result in outstanding performance. See the chart.



Therefore, the levels of fitness you need depend on 1) the requirements of general health, 2) daily needs at home and on the job, and 3) your own goals and interests. Obviously, everyone should strive to stay healthy.

Miners, in addition, must maintain levels of fitness above those of most other workers because of their physically demanding occupation.■

*This article was written by Sharon Casto, Bulletin Staff Writer.*



**Look for Stress on the Job -- Part III, in the Holmes Safety Association Bulletin, December Issue**

## The Red Ash Mine Disaster March 6, 1900

by Steve Hoyle, Bulletin Staff Writer

***In the three decades after the Civil War, the United States became an industrial giant. The Nation's mines fueled this transition as they met an ever-larger demand for coal and other mined products. No other fuel could challenge the ascendancy of coal, but it was mined at a high price. Here's part of that story.***

### **West Virginia Coal Mines in 1900**

In 1901, James W. Paul, Chief Mine Inspector for the State of West Virginia, sat down to draft a report about the past year's coal mining activity in the mountain state. He had a lot to write about, much of it good news - with one exception. The huge growth of West Virginia's coal industry from 1897 to 1900, according to his findings, had "...never been equaled by any nation...in the world." West Virginia's mines produced nearly 19 million tons of coal from June 30, 1899, to June 30, 1900, (a ton weighed 2,240 pounds). About one-third of the coal mined was used to manufacture coke. The value of this coal came to a little over \$14 million (in 1900 dollars) and the value of the coke produced was a little more than \$4 million.

Nearly 28 thousand men worked at West Virginia's coal mines and coke ovens. Of this total, 17 thousand were "machine" operators or "pick" miners. An additional 4,700 people worked "underground." About 6,200 men worked as

"outside" or "coke" employees. Of the more than 9,100 coke ovens in West Virginia, at any time an average of 7,400 of these ovens were working.

A hand loader worked from 12 to 14 hours a day. He had his own tools such as picks, shovels, a slate bar, breast auger, tamping bar, and powder bag. He had to buy his own powder (at about \$1.77 per keg). On average, in a year, a West Virginia miner produced 1,104 tons of coal for which he received a little over \$500 in wages or about \$42 a month.

About 240 electrically-powered or compressed air driven mining machines were used in mines in the mountain state. A machine miner earned about \$2.20 a day and a machine helper made \$1.78 per day.

### **Mine Accidents**

Whatever the method, it was hard, dangerous work. One hundred forty-one miners perished in West Virginia coal mines in 1900. Put another way, one out of every 198 working miners died on the

job. Five of the victims were 14 years of age or younger. These accidents left behind 42 widows and 95 orphans. Explosions of gas and powder were the leading killers in West Virginia's mines in 1900. There were five fatal gas explosions in which a total of 50 miners were killed - 46 in one explosion at the Red Ash Mine.

### **"Firedamp"**

Methane, called "firedamp" by the miners, was a big problem in many underground mines in West Virginia. It's a colorless, tasteless gas that rises to the top of a mine because it is lighter than air. Methane forms a violently explosive mixture when it occurs in a range of 5 to 15 volume percent in air. If the mixture ignites, the resulting explosion propagates away from the ignition source and destroys everything in its path.

### **Safety in the Mines**

At the coal mine, the "fire boss," was the first line of defense against methane. By 1900, West Virginia's mine

safety laws required a preshift examination of "...every working place and all other places where gas [was] known to exist (with a flame safety lamp) by some competent person appointed for that purpose...." If the preshift examination disclosed a problem, then the gas had to be removed.

The original flame safety lamp was developed by Sir Humphrey Davy in 1815. In this device, the flame is generally surrounded by a cylindrical covering of wire gauze. An explosive or flammable mixture of gas entering the lamp will be ignited by the flame, but the flame of combustion will be contained by the wire gauze, thus preventing the gas outside the lamp from igniting. The flame safety lamp was used to check for methane. The lamp flame increased in size when it encountered a mine atmosphere that contained methane. The flame decreased in size in an oxygen-deficient atmosphere. Hand-held gas detection instruments have replaced the flame safety lamp.

A fire boss dated and marked the time of the preshift examination before people entered the mine to start work. The law specified that in "...all mines generating firedamp, accumulations of fine, dry, coal dust...be prevented and such dust...be kept properly watered down." The reason for this was

to help reduce the potential of coal dust spreading an explosion.

Each mine also had a "mining boss" who was responsible for day-to-day operations. He was to visit all working places at least once every three days, and to pay special attention to conditions affecting ventilation and roof control.

### *The Red Ash Mine*

Red Ash was on the south side of the steep, heavily wooded New River Gorge in Fayette County, West Virginia. The tracks of the Chesapeake and Ohio were the only way into and out of the area. Red Ash had opened in 1892 to produce steam and coking coal. The mine had good top and needed very little timbering, "...even...where the headings [held] two tracks each of 44-inch gauge." It was thought a safe mine.

Since 1892 three miners had died in slate falls at Red Ash, and eight had been injured in falls of slate or coal, "...a record commendable for a mine of its [size]," according to the State inspector's report.

Red Ash was gassy, however, which caused miners to be very cautious inside. There was a fire boss at Red Ash, and the miners were aware of "...the existence of...gas. [I]t was [their] custom to wait...for the fire boss to make his inspection." Something went wrong on March 6, 1900.

### *Explosion!*

That morning, a group of miners entered the 7th left heading at Red Ash, an area that had not been fire bossed. At about 7:15 a.m., the open lights carried by the miners ignited accumulated gas and an explosion tore through the workings. After "...a rush and...compression of air through...the mine," coal dust, suspended by the initial explosion, ignited and detonated kegs of blasting powder stored underground.

News of the disaster spread quickly and West Virginia mining officials at Montgomery boarded a C&O "fast freight" for the trip to Red Ash. When they got there they found a crowd had gathered and "...much excitement...existed," with "...many stories, ideas, suggestions, and rumors as to the cause of the accident..."

Recovery began as soon as ventilation was restored to the mine. It took 17 days to recover all 46 bodies from the mine. The rescuers found that many of the victims had skull fractures and additional broken bones "...showing that [they] had been hurled violently" by the force of the blast.

The victims ranged from 16 to 40 years of age. Fourteen of the miners killed at Red Ash were married. Two of them had five children each. Twenty-five of the victims were white and

*(Continued on next page)*

21 were African-American.

The coroner's inquest found that a machine runner had left the mine at midnight, March 5. He opened the door on the 7th left heading, went through it and "...gave it a kick and did not look to see if it had closed." The door probably remained open which changed the ventilation in the mine and allowed the gas to accumulate.

Red Ash was not the only disaster that occurred in 1900. Two months later, 200 miners were killed in an explosion at the Winter Quarters 1 and 54 Mines at Scofield, Utah, and another 23 miners perished in a blast at the Cumnock Mine in Cumnock, North Carolina.

Red Ash suffered two more explosions on March 18 and 19, 1905, and 24 more miners perished. The first explosion occurred either from blasting or when a mine car ran over explosives left on the tracks. The second blast was triggered by open lights on the members of a rescue party who were attempting to recover victims of the first explosion.

### *Safety Conditions*

These and other disasters reflected the state of knowledge of the time. There were no permissible explosives and no certified permissible equipment of any kind in use in U.S. coal mines. Most mines used open oil lamps or acetylene lamps for illumination and, except in mines known to be gassy,

blasted with black powder - an extremely unstable explosive even under the best circumstances.

Rock dusting to allay coal dust was not practiced and many mines had inadequate ventilation. There was, in fact, very little hard information available about mine ventilation as most operators did their ventilation through trial-and-error. Many people in the United States believed that coal dust in suspension could not be ignited in the absence of methane in the mine atmosphere.

Little was known about the properties of combustible gases found in mines before and after explosions. There were no gas masks, only the simplest respirators. In time, though, the violence and loss of life associated with mine explosions focused national attention on coal mine safety and produced legislation intended to attack the problem.

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**NOTE:** This book contains reports for three years as the State legislature did not authorize funding for printing annual reports.

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## Out West...

### *Ignorance of Prop. 65 requirements can lead to big costs*

What businesses don't know about Prop. 65 can definitely bite them, frequently in the pocketbook. It pays to know whether the law applies to you and, if so, to satisfy the relatively easy requirements, according to a report in *Aggregates Manager* by Mark Harrison and Thomas Henry of Associate Member, The Diepenbrock Law Firm.

The 1986 law now lists more than 600 chemicals known to cause cancer or reproductive harm. One of these is crystalline silica in respirable size. Another is Vitamin A.

It is the quartz called crystalline silica, commonly found in sand and gravel, that most concerns the aggregate and construction materials industry.

Crystalline silica wound up on the Prop. 65 list—not through an evaluative process—but through a listing by the “authoritative body” International Agency for Research on Cancer. It is now in the highest classification, meaning conclusive data from both human and animal studies link it with cancer in humans.

Penalties for exposure to a Prop. 65 substance emission can run up to \$2,500 a day, per person. Multiply by 10 employees, and it's \$25,000. The fine is seldom \$250,000 a day—but it could be.

Warnings required by Prop. 65 must meet two requirements. They must be given in advance of exposure and state potential harm, either causing cancer or birth defects.

Language must be precise. A chemical that “may” cause cancer won't cut it. Inadequacy in wording can invite litigation.

The best warning is blunt: “WARNING: This product contains chemicals known to the State of California to cause cancer.” Three situations require warnings: when employees are exposed; when consumers are exposed through products with Prop. 65 substances; and when exposure occurs to the general public.

Warnings on exposure to employees can use signs or posted notices. Consumer warnings may be placed on product labels or on display shelves. When company operations result in exposure to the public, advertisements are acceptable, as are notices mailed to each person exposed. Language must meet strict standards. ■

*This article taken from the California Mining Association, California Mining, Vol. XXXIV No. 6, October 1999*

### *SMGB Releases New 50-Year Figures for Aggregates Resources*

The Joint Committee of the State Mining and Geology Board at a September meeting received updates on 1983 Mineral Land Classifications in the Monterey Bay Production-Consumption Region and Sacramento County.

In 1986, the SMGB had designated “aggregate resource areas of regional significance.” in the Monterey Bay needed to meet demands of the future.

In the original 1983 study, future demands for the region were projected for a 50-year period ending in 2030. The updated report projects demand from 1998 to 2047 and shows 1,210 million tons of resources underlie the region.

As of January of this year, 27 mines and one proposed mine, operated or controlled by 16 different companies, were producing or permitted to produce construction-grade aggregates in the Monterey Bay region.

Depletion of reserves was projected in 36 years in a 1997 evaluation. Annual production rose from 7.2m. tons in 1980 to 7.7m. tons in 1997.

In the Sacramento County region, the update focused on Portland Cement Concrete Aggregate (PCCA) and clay resources.

Annual aggregate production has increased from 5.4 m. tons

*(continued on page 23)*



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**50-Year Figures for  
Aggregates Resources  
(Continued from page 21)**

in 1983 to a projected 10 m. tons in 1999, with permitted reserves falling from 57 to 50.7 m. tons for the same period.

As of January 1999, 15 aggregate mines operated by eight different companies were producing construction-grade aggregate in Sacramento County. There are six PCCA mines operated by four mining companies.

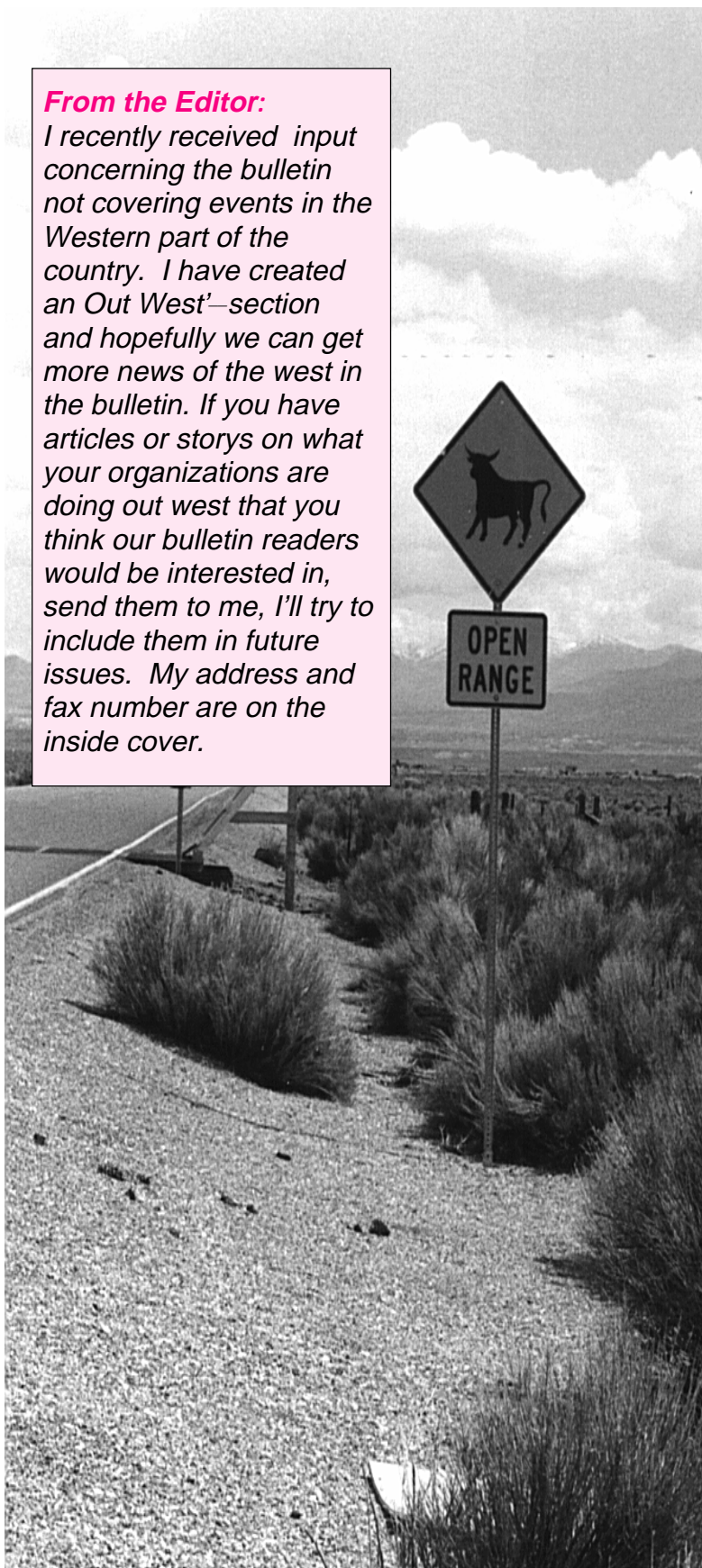
Identified deposits of fire clay amounting to 10.6 square miles were classified in Sacramento County. At historic rates of production and consumption, existing resources are expected to last for "many decades," according to the updated report.

There are five active clay pits operated by three producers in Sacramento County. ■

*This article was taken from  
California Mining, Vol. XXIV, No. 6,  
October 1999*

**From the Editor:**

*I recently received input concerning the bulletin not covering events in the Western part of the country. I have created an 'Out West'—section and hopefully we can get more news of the west in the bulletin. If you have articles or stories on what your organizations are doing out west that you think our bulletin readers would be interested in, send them to me, I'll try to include them in future issues. My address and fax number are on the inside cover.*



# 24

## *What's happening at the...* **National Mine Health and Safety Academy**

### *Conferences/Seminars*

**Blasting Seminar, January 19-21, 2000**

### *Videos:*

The following videos have been produced and are available from the Academy for \$8.00 each.

**Stay Calm and Stay in the Cab!** - Cat No. VC 940, 12 min.

**The Disease...Silicosis (C/MNM)** - Cat No. VC 888, 5 min.

**The Time Was Right! Mary Lou George (C/MNM)** - Cat No. VC 923, 12 min.

### *Publications:*

**Fatal Accidents Involving Independent Contractors at Coal Mines, 1990-1998**

Cat No. OT 38, Free of charge.

**Fatal Accidents Involving Independent Contractors at Metal and Nonmetal Mines, 1990-1998**

Cat No. OT 39, Free of charge.

*For more information about these products  
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*Accident Investigations  
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<http://www.dep.state.pa.us/dep/deputate/minres/dms/dms.htm>





# Mining Our History

## An Overview of Disaster Anniversaries by Melody Bragg

### 114 Years Ago Explosion Bull-Domingo Mine Silver Cliffs, CO

November 13, 1885

Ten men working in the lower levels of this mine were killed when a box of powder in the boiler room exploded. Within a few minutes, the entire shaft house and hoisting works were burned to the ground and rescue was rendered impossible.

### 98 Years Ago Mine Fire Smuggler-Union Mine Pandora, CO

November 11, 1901

A fire was caused by a defective flue in the tramway bunkhouse at the mouth of the Bullion tunnel. The boiler, engine house, blacksmith shop and tramway terminal were rapidly enveloped in flames. Tunnel doors, which had been closed, were opened by men coming out and the strong draft carried the smoke and gases into the mine. Thirty-one victims were later found lying where they had been overcome by the smoke while attempting to escape.

### 90 Years Ago Mine Fire Auchincloss Colliery Naticoke, PA

November 9, 1909

An explosion of gas occurred in the Number Two shaft, fatally burning one man and setting fire to the timber and coal at the face of the chamber. This fire produced smoke and gas that suffocated eight other miners and slightly burned another. The initial blast was believed to have resulted from methane gas being ignited by the open light of a miner.

### 84 Years Ago Explosion Boomer Mine #2 Moomer, WV

November 30, 1915

Two men were slightly overcome by afterdamp when an initial explosion occurred at 10:30 a.m. Forty minutes later, a second explosion of greater violence resulted in the death of 23 men.. Eleven men were injured and five were rescued. Of the five men rescued, one died from his injuries later and two were permanently paralyzed.

Twenty-eight men barricaded themselves behind a rock and earth barrier and escaped the mine 7 hours later. It is believed that gas

from a pillar section was ignited by open lights. The mine was considered nongassy and no inspections were made.

### 73 Years Ago Explosion Mound Mine Moundsville, WV

November 15, 1926

Gas accumulated in this mine while repairs were being made to a ventilation door that had been wrecked by a runaway mine car. The gas was ignited by the arcing of the trolley wheel of a locomotive. The resulting explosion killed 5 of the 18 men working in the mine.

### 63 Years Ago Explosion Bates Mine Bates, AR

November 19, 1936

An early morning explosion killed four of the five men in this mine instantly and fatally burned the other.

Gas accumulated on the longwall when a trapdoor was left open and a feeder was cut by the mining machine. An arc from the controller ignited the gas as the machine was moved back from the cut.

# 26

## Words to think about...

Speeches measured by the hour die with the hour.

**Thomas Jefferson**

The crab instructs its young, "Walk straight ahead - like me."

**Hindustani Proverb**

Life's like a play: it's not the length, but the excellence of the acting that matters.

**Seneca**

All cruel people describe themselves as paragons of frankness.

**Tennessee Williams**

It is terrible to speak well and be wrong.

**Sophocles**

**NOTICE:** We welcome any materials that you submit to the Holmes Safety Association Bulletin. For more information visit the MSHA Home Page at [www.msha.gov](http://www.msha.gov). If you have any color and black/white photographs that you feel is suitable for use on the front cover of the Bulletin, please submit them to the editor. We cannot guarantee that they will be published, but if they are, we will list the contributor(s). Please let us know what you would like to see more of, or less of, in the **Bulletin**.

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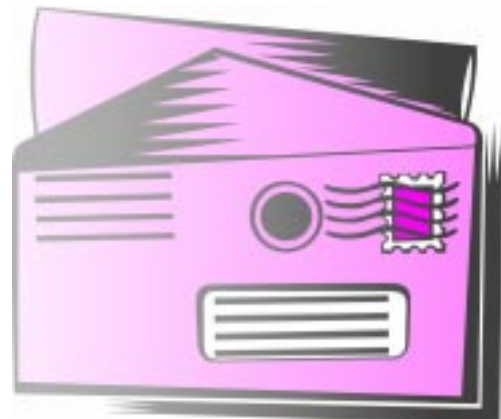
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Bob Randolph.....	Federal	PA	Kevin Myers .....	Mgmt.	KY	Glen Rasco .....	State	GA
Mel Remington .....	Federal	MD	Myron Nehrebecki .....	Mgmt.	PA	Ed Sinner .....	State	OR
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John Shutack .....	Federal	VA	David Rebuck .....	Mgmt.	PA	Sam Vancil .....	State	IL
Judy Tate.....	Federal	TX	Ray Rucker .....	Mgmt.	TX	Michael Weaver .....	State	ID
Timothy Thompson .....	Federal	WV	Subash Sethi .....	Mgmt.	NM	Alan Cook .....	Supplier	AZ
Glenn Tinney.....	Federal	PA	Nancy Staley.....	Mgmt.	MI	Chuck Edwards .....	Supplier	PA
Richard Wood.....	Federal	WV	Cheryl Suzio .....	Mgmt.	CT	Shea Kirkpatrick .....	Supplier	CA
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Joe Main .....	Labor	DC	Penny Traver .....	Mgmt.	MI	Vern Demich .....	Emeritus	PA
Lloyd Armstrong .....	Mgmt.	MN	Gary Moore.....	Mgmt.	NM	William Hoover .....	Emeritus	AZ
H.L. Boling.....	Mgmt.	AZ	Doug Conaway .....	State	WV	Al Simonson .....	Emeritus	MN
						Harry Thompson .....	Emeritus	PA

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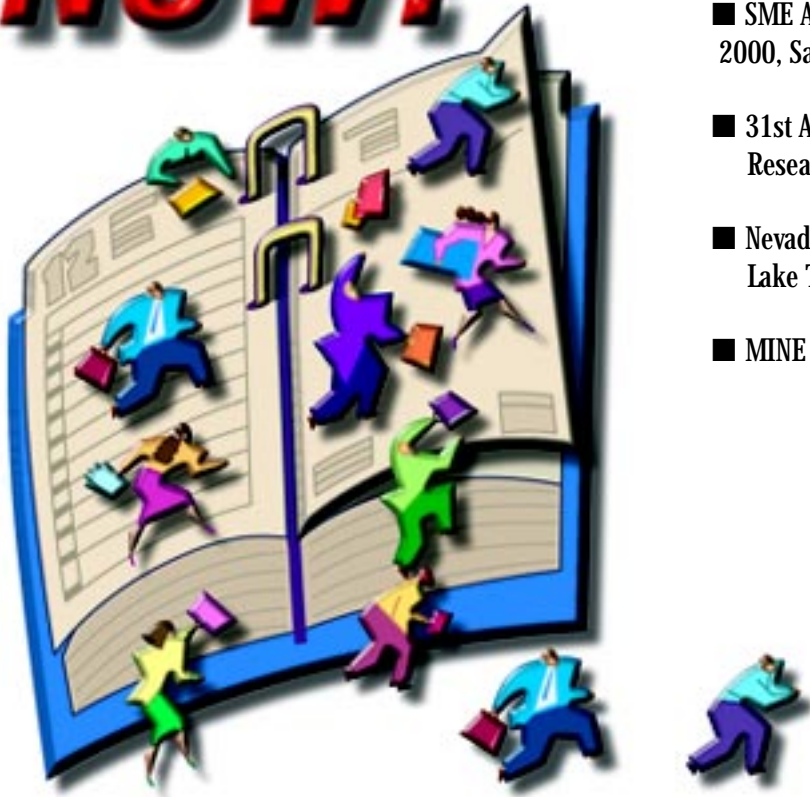
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- National Stone Association 16th Annual Convention, Jan 28-31, 2000, New Orleans, LA
- SME Annual Meeting and Exhibit, Feb. 28-Mar. 1, 2000, Salt Lake City, UT
- 31st Annual Institute on Mining Health, Safety and Research, Aug. 28-30, 2000, Blacksburg, VA
- Nevada Mining Association, Sept. (TBA) 2000, Lake Tahoe, NV (TBA)
- MINE Expo 2000, Oct. 9-12, 2000, Las Vegas, NV