BULLETIN

HOLMES SAFETY ASSOCIATION

November 1993

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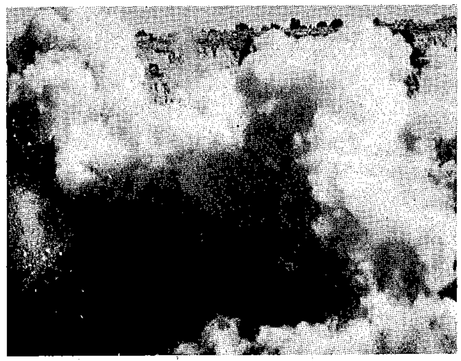

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KEEP US IN CIRCULATION

The Holmes Safety Association Bulletin contains safety articles on a variety of subjects: fatal accident abstracts, studies, posters and other 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.

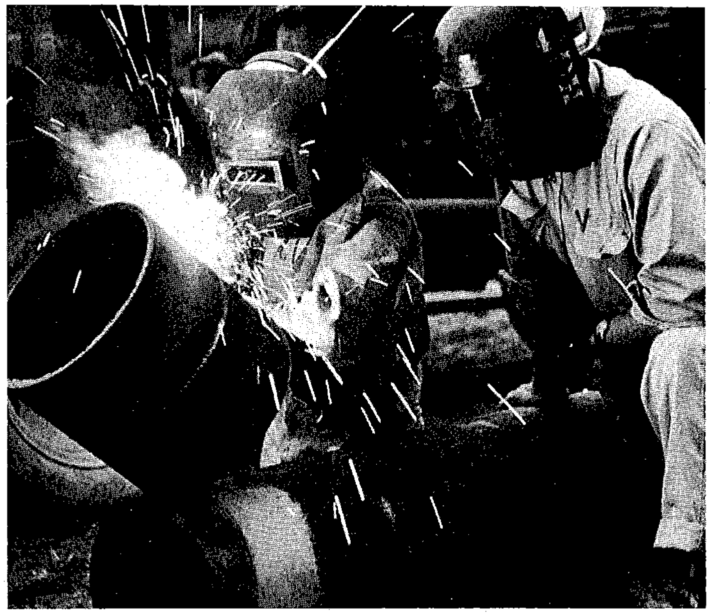
Welcome new members

NAME	CHAPTER NO.	LOCATION
Chemstar Ten-Mile Plant	10569	Bancroft, ID
Glass Mountain Pumice, Inc.	10570	Tulelake, CA
Blake Wholesale Stone Company	10571	Ridgecrest, CA
Express Services, Inc.	10572	Butte, MT
R.J. Valente Excavating	10573	Troy, NY
Ruckers Safety Association	10574	Soda Springs, ID
Blue Phantom	10575	Bonnerdale, AR
Appalachian Stone Co.	10576	Marion, NC
Switzerland Stone Quarries	10577	Marion, NC
Steel-tek Construction, Inc.	10578	Belle, WV
Longview Mine	10579	Frigdens, PA
Mine #37	10580	Friedons, PA
Diamond T-b	10581	Friedens, PA
Diamond T-c	10582	Friedens, PA
Don Colgan	10583	Homer City, PA
Stibnite Mine, Inc.	10584	Boise, ID
Intermountain Concrete	10585	Vernal, UT
Lexco, Inc.	10586	Vernal, UT
Abb-ce	10587	Grand Rapids, MN
Johnston & Rhodes Bluestone	10588	Downsville, NY
George Schmid & Son's, Inc.	10589	Washougal, WA
Stewart Stone, Inc.	10590	Pawnee, OK
Robinson Brothers	10591	Walton, NY
Cornerstone	10592	Walton, NY
Reserve Silica Corp.	10593	Ravensdale, WA

NAME	CHAPTER NO.	LOCATION
Bradley Plant & Barrow Pit	10594	Atascadero, CA
Interstate Crushing	10595	Coeur d'Alene, ID
O'Dell Stone	10596	Forest City, PA
Northern Indiana Material	10597	Lowell, IN
The Kentucky Stone Co.	10598	Mt. Vernon, KY
Ecker Contracting Co., Inc.	10599	Lake Elsinore, CA
Conda Mining, Inc.	10600	Soda Springs, ID
Montana Department of Transportation	10601	Bozeman, MT
Becky Coal Corp.	10602	Midlesboro, KY
M & W Milling & Refining, Inc.	10603	Virginia City, MT
Madison Star, Inc.	10604	Melrose, MT
Bureau of Mining & Reclamation	10605	Knox, PA
Bureau of Mining & Reclamation	10606	Timblin, PA
Austin Creek	10607	Cazadero, CA
Stage Gulch Quarry	10608	Fulton, CA
Bromley/Oxnam	10609	Perris, CA
Kowalski & Kieler, Inc. No. 1	10610	Dickeyville, WI
Eureka Co.	10611	Bloomington, IL
Village of Malone	10612	Malone, NY
Cowden, Inc.	10613	Bellingham, WA
Premier-Brownsville Operation	10614	Brownsville, TX
Razorbacks	10615	Springdale, AR
Penland Drive	10616	Benton, AR
Kenyon Noble Ready-Mix	10617	Bozeman, MT
Poignant Gravel Pit	10618	Lacon, IL

Hazard alert

Welded high pressure hydraulic fittings



A miner was conducting maintenance on a special high pressure hydraulic fitting and working near the fitting while it was pressurized. The fitting failed, resulting in serious injuries to the miner. The special fitting consisted of two different fittings welded together. The fitting failed through the weld that joined the two fittings that had been used to fabricate it. The type of steels used to make the fittings involved in the accident are not recommended for welding.

Some high pressure fittings are not meant to be welded together. The following steps should be taken prior to weld fabrication of high pressure fittings:

1. Contact the fitting manufacturer as to the suitability of the fittings for welding.
2. Follow the fitting manufacturer's instructions when welding fittings together.
3. Mark all high pressure hydraulic lines in work areas.

Not all steels are recommended for welding. Contact Mike Sheridan, Denver Safety and Health Technology Center, at (303) 231-5430 if you have questions concerning this hazard alert.

Submissions sought for 1994 safety slogan

The Holmes Safety Association requests your support in submitting a slogan for our 1994 safety campaign. Our 1993 slogan was "Stay Injury Free in '93" and was submitted by Diane Covell of Blue Circle Cement Co., Ravena, NY. The slogan must be very brief and end with the words "in '94." The Executive Committee approved an award of a $100 U.S. Savings Bond to the person submitting the winning slogan.

Please submit all entries to the following address:

Holmes Safety Association
P.O. Box 4187
Falls Church, Virginia 22044-0187

All entries must be received before January 14, 1994. The winning slogan will appear in the March 1994 *Bulletin.*

Robert Glatter, HSA Secretary

Holmes Safety Association Monthly safety topic

Fatal powered haulage accident

GENERAL INFORMATION: A 39-year-old mine foreman with 14 years of mining experience received fatal crushing injuries after his head was caught between the mine roof and the frame of the locomotive he was operating.

The mine operates three continuous mining sections producing an average of 2,000 tons of raw coal daily, 5 days per week. A total of 112 employees work two production shifts and one maintenance shift.

DESCRIPTION OF ACCIDENT: The victim reported for work on the evening shift at 3:00 p.m., and met with the mine superintendent to discuss a variety of maintenance tasks to be performed during the shift. The victim, accompanied by the mantrip operator, began the first task which was to bring two sets of old batteries from the 002 and 004 sections to the surface. The victim was also assigned the task of hauling supplies (belt conveyor material, belt structure, brattice material, etc.) to the different sections that needed them. After bringing the batteries to the surface along with a 120-foot section of used 42 inch conveyor belt, the two employees loaded two supply cars—one in front and one behind the locomotive. The front car was loaded with brattice materials (cinder blocks and 5 gallon buckets of plaster). The rear car was loaded with belt structure and several cases of drinking water. The section of belt, previously mentioned, was attached to the rear of the car to be dragged behind it.

The victim and the mantrip operator proceeded underground toward the 003 section.

While enroute they encountered some difficulty with the supply of drinking water. Two cases fell off the car as it passed through a run-through brattice. One case was loaded back onto the car, the other was left behind. They proceeded on toward the section.

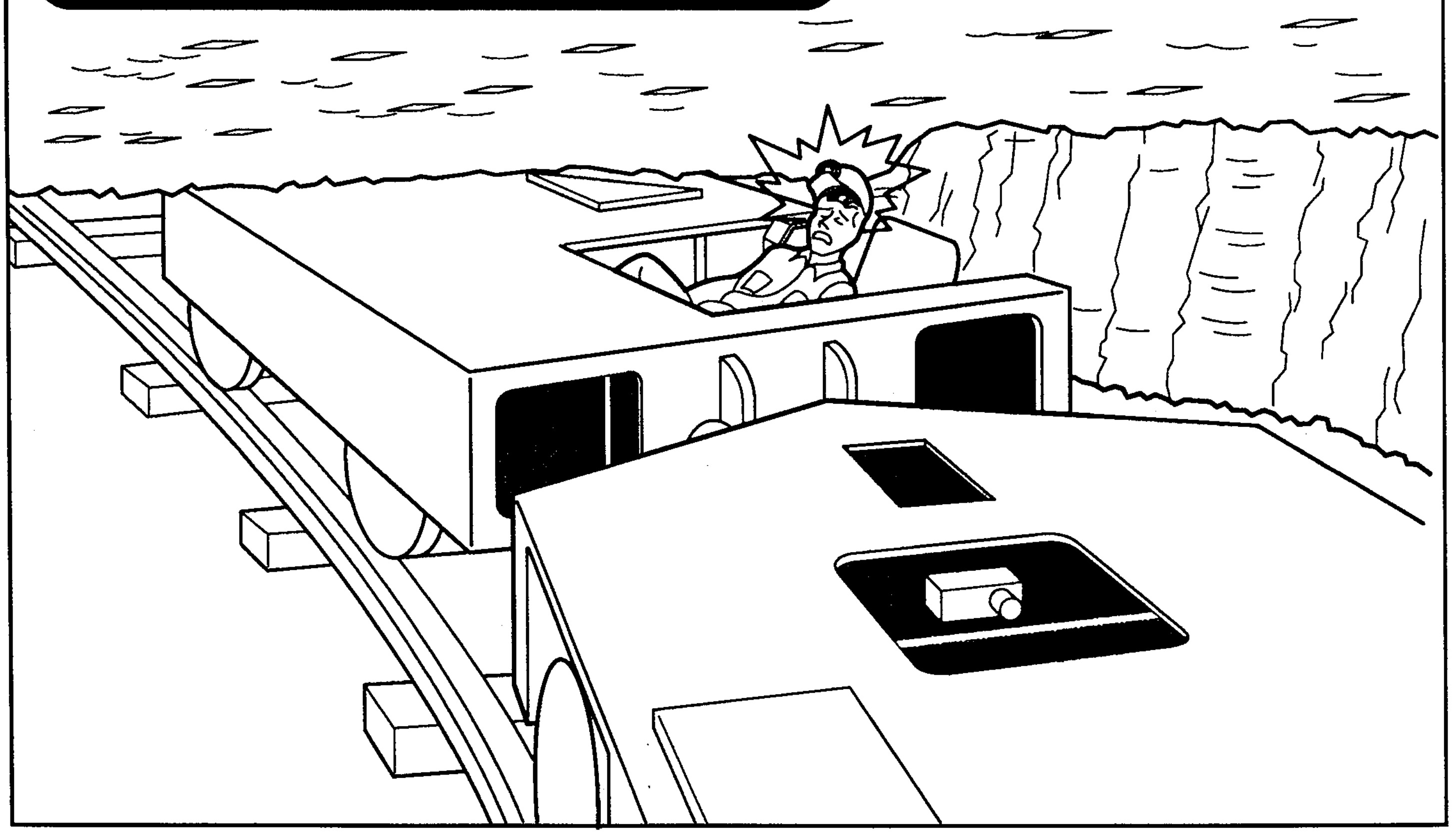
As they approached to within one crosscut of the No. 12 Belt Drive at about 6:25 p.m., the locomotive suddenly stopped. The mantrip operator, who occupied the passenger side of the locomotive, wondering why they stopped, raised himself from the compartment and peered back over the locomotive. He saw the victim caught between the mine roof and the locomotive. He immediately went to render assistance.

The victim's head was caught between the roof and the rear top frame of the locomotive. The mantrip operator examined the victim and found no vital signs. He tried unsuccessfully to pry the locomotive down away from the roof. Failing this, he telephoned for assistance.

Word of the accident quickly spread and, an electrician who was repairing the batteries which had been brought to the surface, went to the scene of the accident. Upon arrival he observed the mantrip operator trying to free the victim. He obtained a

Coal mine fatalities to date—thru 11-22-93

Type	1989		1990		1991		1992		1993	
	UG	S	UG	S	UG	S	UG	S	UG	S
Roof fall	17	0	18	0	19	0	9	0	11	0
Haulage	3	5	6	6	5	6	8	5	2	8
Machinery	5	6	7	3	2	3	6	3	4	4
Electrical	2	2	5	3	3	0	1	1	4	3
Other	12	10	3	8	6	9	0	9	0	3
Total	39	23	39	20	35	18	24	18	21	18



lifting jack from his locomotive and proceeded to the victim's locomotive. Placing the jack between the mine roof and the frame, they jacked the locomotive down approximately one inch freeing the victim. He was placed on a stretcher and transported to the surface.

Emergency medical personnel were waiting at the surface when the victim arrived. He was examined by the ambulance attendants and finding no vital signs, they immediately transported him to the hospital where he was examined and pronounced dead upon arrival.

Apparently, the victim had raised his head above the frame of the locomotive as he entered the higher area possibly to visually examine the load of supplies before reentering the lower area. His head struck the roof brow forcing it above the frame as the locomotive passed through the transition area.

CONCLUSION: The accident occurred due to the operator's failure to adequately mark the sudden change in overhead clearance. Also the victim failed to keep all body parts within the confines of the operating compartment of the locomotive.

Fire on surface mine haulage truck

Fire protection for mobile mining equipment

PART II - Fire suppression systems for rubber-tired and tracked vehicles

by William H. Pomroy, U.S. Bureau of Mines
Twin Cities Research Center, Minneapolis, MN

This article is the second in a three-part series which covers mobile equipment fire protection at mining operations. Part I provided an introduction and background to the mobile equipment fire problem. This installment covers manually operated and automatic fire suppression systems for electric or diesel-powered rubber-tired and tracked vehicles such as haulage trucks and dozers in surface mines and load-haul-dumps and scoops in underground mines. Part III will cover fire suppression systems for large electrically-powered enclosed surface mining machines such as shovels and draglines.

Despite the best efforts of mine operating and maintenance personnel to prevent fires on mobile equipment, ignition sources and fuels cannot be eliminated completely from these vehicles, and fires continue to occur. So, in addition to good maintenance and housekeeping practices, proper training, and better equipment designs, a provision for adequate fire suppression is essential wherever mobile equipment is operated.

Hand portable fire extinguishers

One or more hand portable fire extinguisher is a logical starting point for fire protection on mobile equipment. The extinguisher should be of a size and type to deal with expected fires on the equipment, and should be readily accessible to the operator.

On larger machines, consideration should be given to placing extinguishers both in the operator cab and at ground level. On larger machines, consideration should also be given, to placing two ground level extinguishers on either side of the machine. On a large haulage truck, for example, it may be advisable to place one hand portable in or adjacent to the operator's cab, a second extinguisher at the base of the ladder, and another at ground level on the side opposite from the ladder.

In underground mines, two extinguishers may be required even on smaller equipment. In low coal, or in other situations where access to potential fire hazard areas may be difficult due to limited clearance around the machine, a second extinguisher opposite the operator may be desired.

Depending on the environmental conditions at a given mine, it may be necessary to cover the extinguishers to protect against dirt or ice build-up. It is also important to insure that extinguishers are properly inspected and maintained, and that operating and maintenance personnel are properly trained and periodically retrained in extinguisher usage.

Manually operated fire suppression systems

For large equipment, total machine coverage by hand portables is impractical, and other fire suppression options should be considered. To supplement hand portable extinguishers, fire protection equipment manufacturers began marketing manually activated, fixed fire suppression systems in the mid 1950s. These systems were specifically engineered for off-highway equipment application.

A fixed dry chemical suppression system consists of one or more containers for agent storage, a hose or piping network leading from the containers to potential fire hazard areas on the equipment, nozzles to direct the dry chemical onto the hazard areas, and a means of actuating the system in the event of fire (figure 1). Dry chemical of the A-B-C type is normally used, as equipment fires may involve ordinary combustibles (class A), combustible liquids (class B), or energized electrical equipment (class C), and A-B-C dry chemical is effective on all three types of fires.

The dry chemical containers can be either pressurized or unpressurized. Pressurized containers are loaded with compressed expellant gas. Opening a release valve causes discharge of the suppressant agent by the expellant gas. Unpressurized containers are fitted with a small expellant gas cartridge under very high pressure. When the cartridge is ruptured, the high pressure gas is piped into the dry chemical container where it fluidizes and expels the container contents.

These systems are manually actuated by the equipment operator in the event of an on-board fire. When the equipment operator becomes aware of the existence of a fire, a plunger-type actuator is depressed. The plunger either directly releases the contents of a pressurized dry chemical container, or punctures the seal on a high pressure gas cartridge. Expellant gas released from the gas cartridge either operates the release valve on a pressurized dry chemical container or directly or indirectly pressurizes and fluidizes the dry chemical in an unpressurized system. The dry chemical suppression agent then flows through the hose or piping network and nozzles onto the fire.

From the mid-1950s through the late 1960s, the manually actuated fixed dry chemical fire suppression system was the most advanced form of fire protection available for diesel-powered mobile equipment, such as haulage trucks, wheeled and tracked loaders, hydraulic shovels and backhoes, wheeled and tracked dozers, and similar equipment. These systems had a good performance record, and many manually actuated fixed dry chemical suppression systems are still in use in the mining industry. However, by the late 1960s, a growing number of mine equipment fires causing serious personal injuries and substantial property damage were occurring despite the use of fixed, manually actuated fire suppression systems.

Analysis indicated that these fires were originating in areas outside the operator's normal field of view, and that they grew too quickly for the operator to respond appropriately with a manually actuated suppression system. Throughout the 1950s and 1960s, and continuing to this day, manufacturers have steadily increased the size of mobile mining equipment to increase production efficiency. An unintended result of this scale-up was the adverse effect on the operator's view of potential fire hazard areas. Consequently, fires could grow to a larger size before the operator noticed and activated a suppression system. Because these fires grew to a larger size, more damage was caused before the suppression system was discharged, and a growing number could not be extinguished at all because larger fires are more difficult to extinguish.

Automatic fire suppression systems

In 1972, the Bureau of Mines initiated research to improve fire protection for surface mining mobile equipment. The research produced a recommended system design, and several alternate designs. The recommended design featured fully automatic operation, wherein on-board sensors detected the presence of fire, and after warning the operator, dry chemical suppressant was automatically released (figure 2). A prototype of the recommended

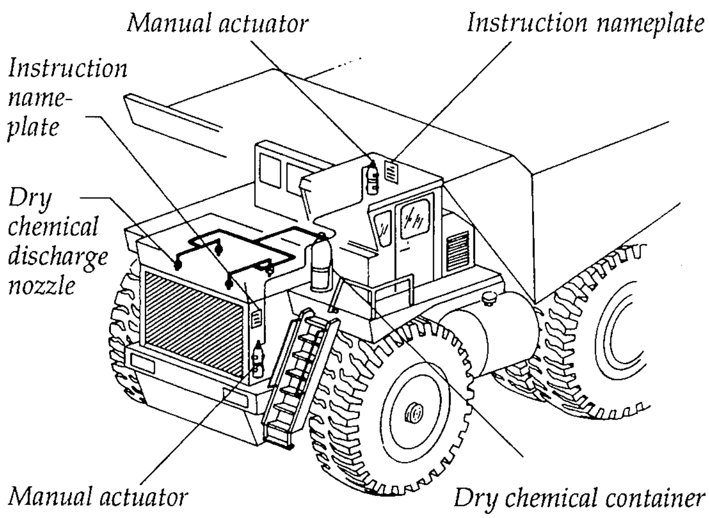


Figure 2.—Manually activated fixed dry chemical suppression system.

system was fabricated, tested for functionality on a vehicle mock-up, and successfully field tested on an actual haulage truck in an operating surface mine.

Over the next several years, a variety of

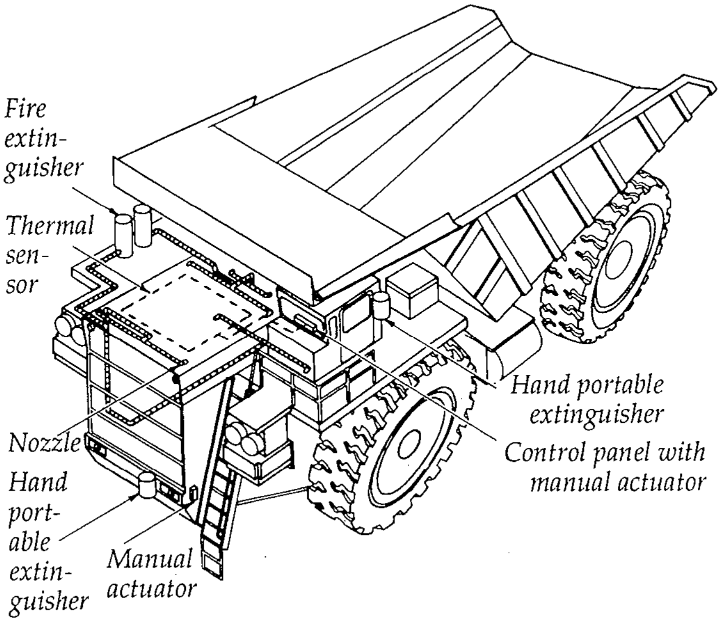


Figure 3.—Automatic fire suppression system for mine haulage truck.

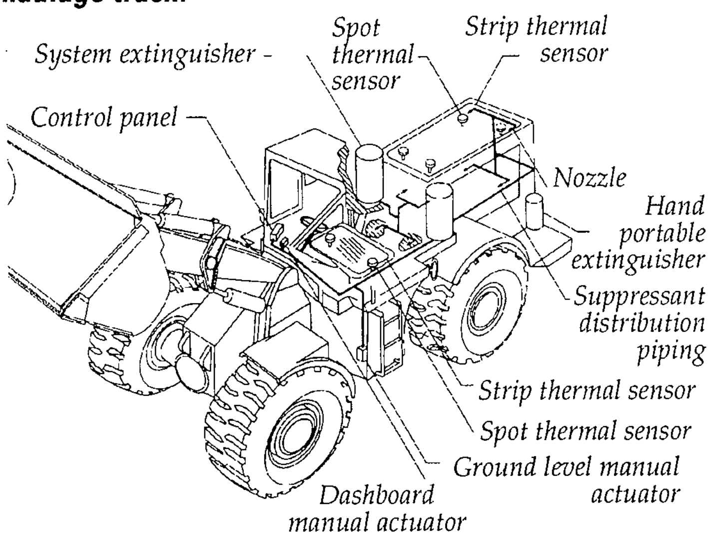


Figure 4.—Automatic fire suppression system for front-end wheel loader.

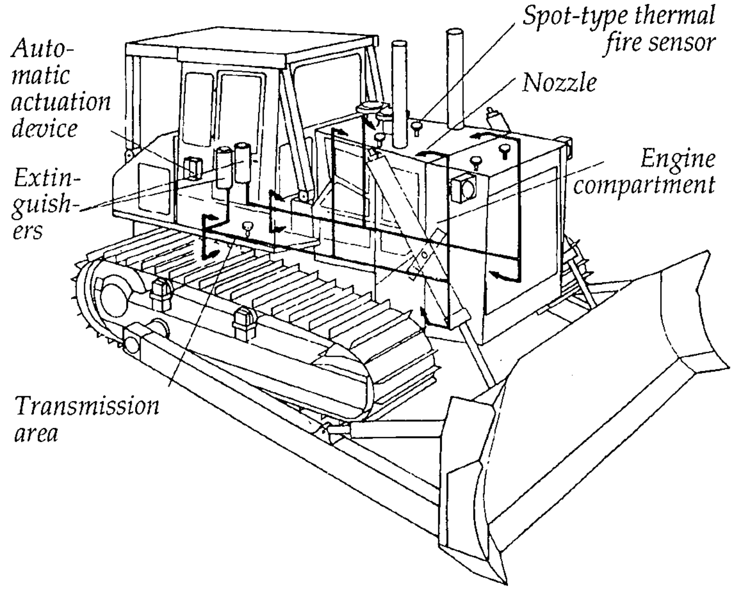


Figure 5.—Automatic fire suppression system for tracked dozer.

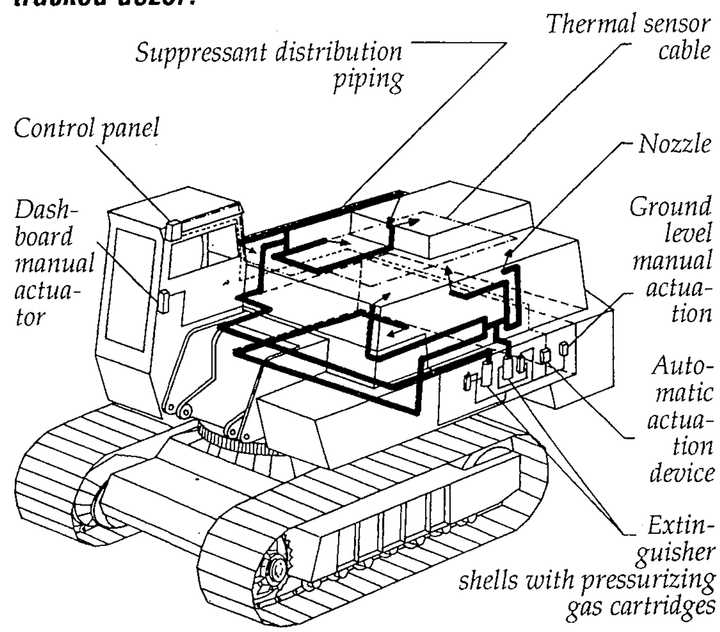


Figure 6.—Automatic fire suppression system for hydraulic shovel.

automatic fire suppression systems were designed by the Bureau and tested on mobile equipment at surface and underground mines around the U.S. As experience was gained, subsequent systems were improved or specialized features were incorporated to address the needs of a particular application (figures 3-9). During this period, working relationships were established with fire suppression equipment manufacturers to promote spin-off of technology to commercial products.

By the mid- to late 1970s, several commercial firms were marketing automatic fire suppression systems to the mining industry for use on mobile equipment. Certain features were common to most systems. They were designed primarily for automatic operation, however a means for manual actuation was also provided. They used either spot-type or linear thermal-

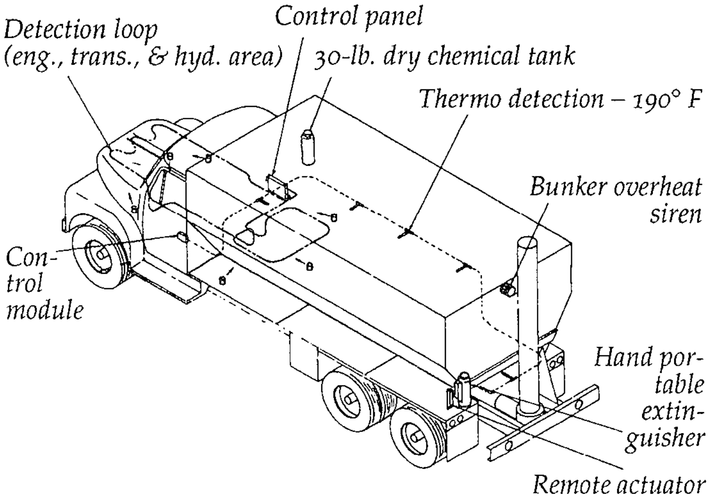


Figure 7.—Automatic fire suppression system for AN-FO hauler.

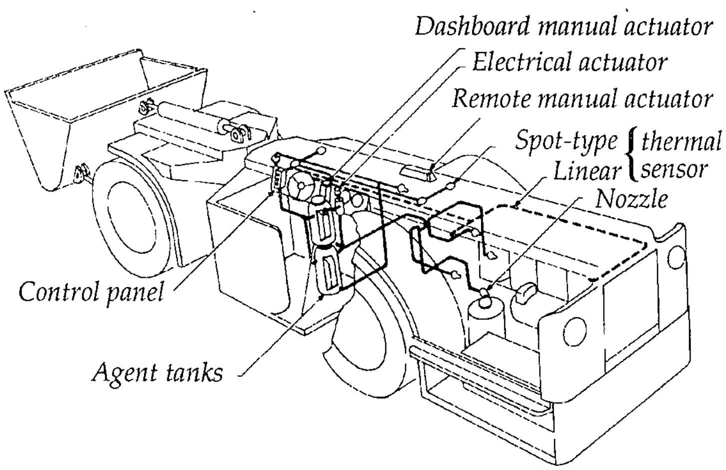


Figure 8.—Automatic fire suppression system for underground load-haul-dump vehicle.

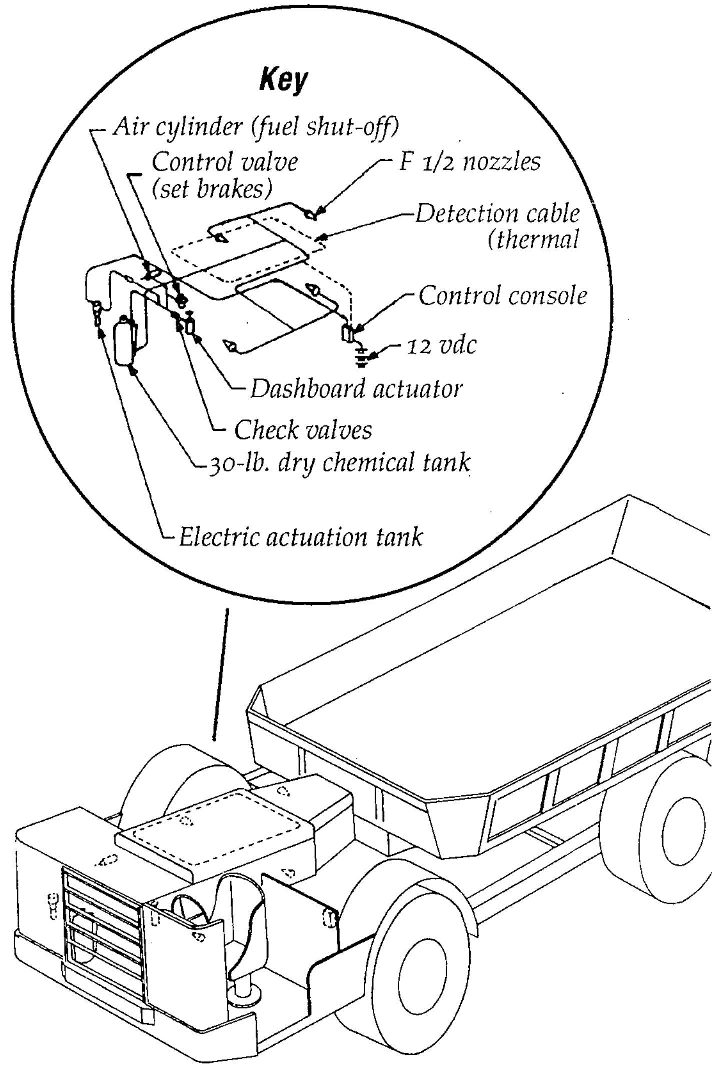


Figure 9.—Automatic fire suppression system for underground hauler.

detection, or both. Spot-type or point-type detectors respond to elevated temperature at a discrete point, whereas linear detection wire or cable responds to elevated temperature at any point along its length. All systems used dry chemical fire suppressant agent; some pressurized and others unpressurized. For both pressurized and cartridge operated systems, actuation with carbon dioxide was standard, but nitrogen actuation was introduced for low temperature applications.

The greatest differences between products lay in the design and operation of the detection and control systems. In one system, the heat from a fire would close the electrical contacts of a spot-type fire detector, thereby completing an electrical circuit consisting of a battery and an explosive "squib"-type actuation device. The completion of the detection circuit actuated the squib, whose gaseous reaction products operated a plunger which ruptured the seal of a high pressure gas cartridge. Another common variant used the same type detectors to operate a solenoid valve to release dry chemical from a pressurized container. In another system, the heat from a fire would soften a pressurized plastic tube until the tube burst. The rapid loss of pressure then operated a pneumatic actuator to discharge a suppression system.

By the late 1970s and early 1980s, mobile equipment fire protection was becoming a mature technology, and customers were demanding higher performance and better reliability. Many users, some prompted by their insurance carriers, were also expressing the desire to purchase only systems which had been granted a listing or approval from a nationally recognized independent testing laboratory. Consequently, the manufacturers began to upgrade their products as necessary to conform to the listing or approval requirements.

Prompted by competition and ever-increasing customer expectations, most control systems were upgraded to incorporate such advanced features as solid state electronics, continuous status monitoring of major system components, electrical and/or mechanical override of automatic functions, explosive "squib"-type actuation devices, audible and visual warning devices, and a field adjustable actuation delay. The actuation delay, usually 10 to 30 seconds after a fire had been detected, was provided to allow the operator time to safely stop the vehicle and shut down the engine before dry chemical was discharged. Stopping the vehicle and shutting down the engine are important because the operator's visibility could be impaired by the dry chemical discharge, and because engine shut down prior to dry chemical discharge can help prevent a re-ignition of the fire.

By the 1990s, the basic functional design of suppression systems had changed little from the upgraded versions of the early 1980s. However manufacturers did continuously improve their products to produce better performance and reduce costs. Improvements included better high temperature wiring and electrical connectors, stronger brackets to withstand the harsh shock and vibration environment of a mine vehicle, improved batteries, more corrosion resistant materials and finishes, greater variety in agent storage container size and shape, enhanced detectors which are both more rugged and more sensitive, and improved control systems and electronics.

Various private sector firms have directed a limited effort toward engineering specialized systems which incorporate alternatives to dry chemical suppressant agents. Although dry chemical is an effective agent for achieving quick "knock down" of an intense fire, it does not cool potential re-ignition sources or secure a fuel surface against re-ignition. Water-based foam systems offer the potential to both extinguish a fire and cool the area to prevent re-ignition. One U.S. and two Australian firms manufacture mine vehicle fire suppression systems using aqueous film-forming foam fire suppressant, while in Canada, work to develop a high expansion foam system has been initiated.

Halon 1211 and halon 2404 systems were introduced for mobile surface mining equipment applications in the early 1980s. These halons are vaporizing liquid agents which do not leave a chemical residue after discharge. However, chlorofluorocarbon compounds such as halon fire suppression agents are being phased out to protect the atmospheric ozone layer. This issue will be discussed in greater detail in the final article of this series.

In 1992, the Mine Safety and Health Administration (MSHA) issued new regulations for underground bituminous coal mine ventilation. Among the new provisions is a requirement that mobile equipment, operated in the primary escapeway, be provided with fire detection and suppression systems. The regulation specifies dry chemical suppression capable of both manual and automatic actuation, and that systems be listed or approved by a nationally recognized independent testing laboratory. This new regulation has prompted the greatest changes in vehicle fire protection system designs in the past decade. These design changes were necessary because the automatic fire suppression systems available at the time the regulation was issued did not satisfy MSHA's safety requirements for electrical equipment used in the potentially explosive atmosphere of a gassy underground coal mine.

Most fire suppression system manufacturers had anticipated the possibility of such a regulation, and had developed conceptual designs for detection and control systems and actuation devices they believed could be certified by MSHA as permissible. However, until the regulation was issued, the market for such a product was only hypothetical. Hence, no manufacturer had actually produced such a system or gone to the expense of submitting a system to MSHA for certification. Following issuance of the regulation, several manufacturers finalized their designs and submitted requests for certification to the MSHA Approval and Certification Center. MSHA approval and the subsequent commercial availability of several manufacturers' products are expected in the coming months.

For most manufacturers, the explosive "squib" used to actuate their suppression systems was the component which presented the greatest problem with certification and approval. One solution was to substitute a gas generator cartridge for the explosive "squib." The gas generator cartridge not only satisfies MSHA's safety requirements, but it is cheaper, has a longer shelf life, and is easier to ship and store. Another solution was the use of a mechanical releasing device, where the energy required to rupture a high pressure gas cartridge is stored in a spring.

System selection, installation, and usage recommendations

Like any safety equipment, the maximum value of a fire suppression system can be achieved only if it is properly selected, installed, and used. Selection of appropriate fire suppression equipment should be based on a thorough and systematic fire risk assessment conducted on each type of mining equipment to be protected. Where more than one make or model of equipment is used, for example, a mixed fleet of haulage trucks comprising various sizes and manufacturer's models, a separate risk analysis on each vehicle is required only if significant differences exist which affect the fire risk. Useful information on fire risk assessment is provided in the National Fire Protection Association's NFPA 121, Standard on Fire Protection for Self-Propelled and Mobile Surface Mining Equipment.

Selection, installation, and use of fire suppression systems must be in compliance with appropriate MSHA regulations or other applicable state or local fire codes. Depending on specific circumstances at a given mine, it may also be necessary to comply with standardized operating procedures established by the mine, a corporate loss control department, or an insurance carrier.

It is important to follow all instructions provided by the mining equipment manufacturer and the fire protection equipment manufacturer when selecting and installing a system. Selection of an inappropriate system could cause damage to the mining equipment, void a warranty or approval, or result in ineffective fire protection coverage on the machine. Likewise, systems must be properly installed and maintained to insure functional readiness in the event of a fire.

Cumulative trauma disorders of the arm and hand in the U.S. mining industry

Objective

Determine the extent of upper extremity cumulative trauma disorders (UECTDs) in the U.S. mining industry.

Background

UECTDs are injuries that develop gradually over a period of time as a result of repeated stress to a particular body part without adequate time between stresses for full recovery to occur. The stresses that contribute to UECTDs may occur because of the following work components: awkward position of wrist or arm, excessive manual force, high repetitions of manual movement and effort, cold environment, and vibration. Cumulative trauma injuries to the arm and hand have become an ever growing concern among safety and health professionals in a number of different industries and work settings, such as meat packing operations, assembly-line work, and keyboarding. Mine workers are also exposed to a combination of stressors and work design deficiencies that result in arm and hand injuries. For example, certain job tasks and environments, such as that of an underground jackleg driller, expose miners to segmental (hand-arm) vibration and cold temperatures. Operators of underground mobile equipment, such as scoops and trams, regularly have their hands in direct contact with vibrating levers and controls.

Approach

Mining accident information is maintained in a computerized data base by the U.S. Mine Safety and Health Administration's Denver Safety and Health Technology Center for all reportable U.S. mining accidents, injuries, and illnesses. The 5-year period from 1985 through 1989 was selected for analysis of UECTDs. The injuries were selected by specifying irritated tendon injuries and occupational diseases to the upper extremities for both coal and metal-nonmetal mining accidents. UECTDs were divided into two groups: (1) carpal tunnel syndrome (CTS) injuries (identified by a CTS diagnosis or surgery notation within the narrative) and (2) cumulative trauma disorder (CTD) injuries excluding CTS results.

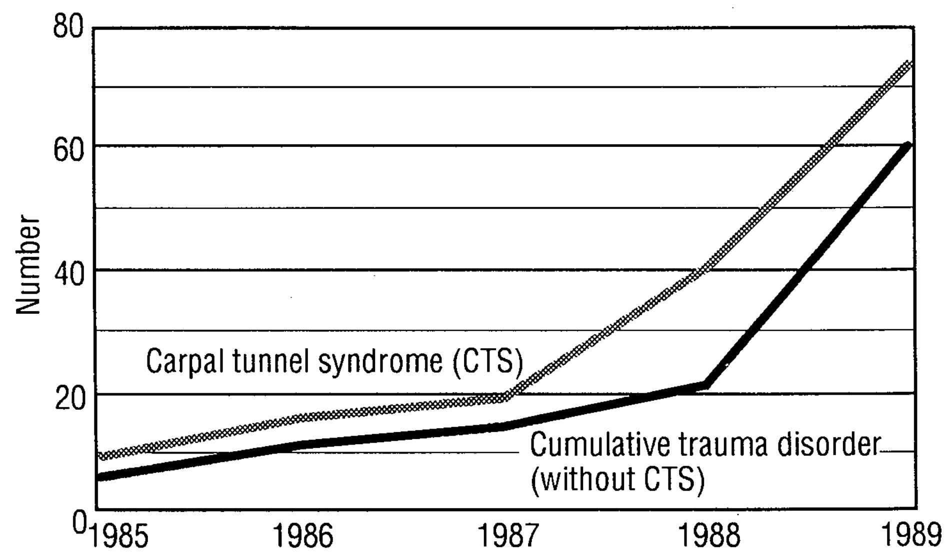


Figure 1.—UECTD injuries in the U.S. mining industries, 1985 through 1989.

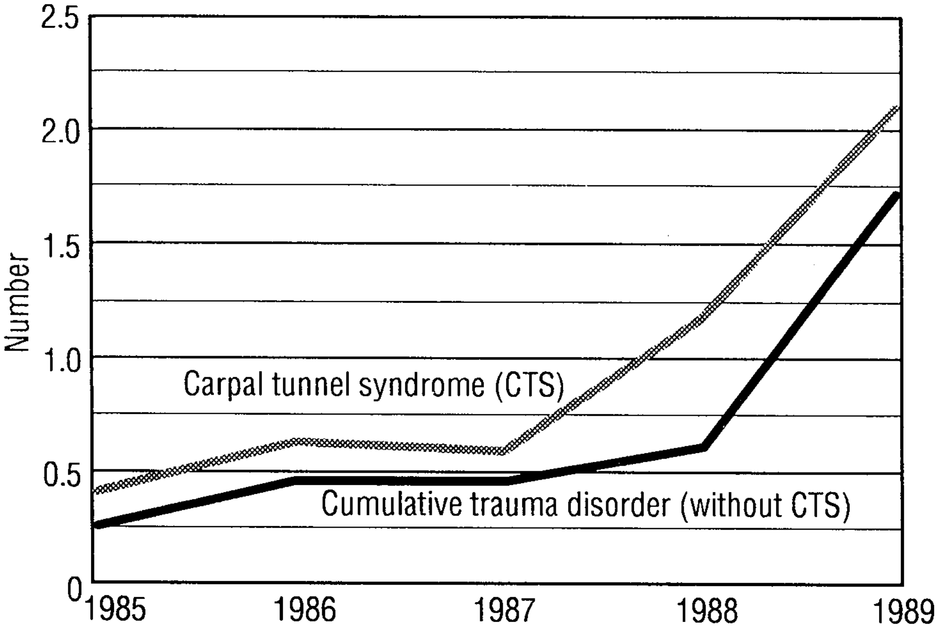


Figure 2.—UECTD injuries per 1,000 injuries in the U.S. mining industries, 1985 through 1989.

This analysis found that UECTD incidence rates in mining were lower than in private sector industry, although the number of reported UECTD injuries increased in number sevenfold (see figure 1) and their percentage of all mining injuries increased fivefold (see figure 2) from 1985 through 1989. Metal-nonmetal mines accounted for 80 percent of UECTD injuries, while coal mines accounted for 20 percent. Nearly 63 percent of UECTD injuries were accounted for by only four occupations—mechanics, laborers, boney (crusher) operators, and miners not elsewhere classified (NEC)—with an incidence rate well above the private sector industry rate.

Conclusions

Although incidence rates for CTDs in mining are generally lower than in private sector industry, there are certain occupations, in metal-nonmetal mines specifically, that have a greater incidence rate than in private sector industry. Future investigations should identify the specific risk factors associated with these occupations in metal/nonmetal mines (i.e., mechanics, laborers, boney (crusher) operators, and miners NEC) that experience a high incidence rate of UECTD injuries.

For more information

To obtain further information, contact Christopher M. Keran, Twin Cities Research Center, U.S. Bureau of Mines, 5629 Minnehaha Avenue South, Minneapolis, MN 55417-3099 (telephone: 612-725-4529).

*Reprinted from the Bureau of Mines' **Technology News** of November 1992.*

Safety slogan reminder!

The HSA requests your support in submitting a slogan for 1994. Our 1993 slogan was "Stay Injury Free in '93" and was submitted by Diane Covell of Blue Circle Cement Co., Ravena, NY. The slogan must be very brief and end with the words "in '94." An award of a $100 U.S. Savings Bond will go to the person submitting the winning slogan.

Please submit all entries to the following address:

Holmes Safety Association
P.O. Box 4187
Falls Church, Virginia 22044-0187

All entries must be received before January 14, 1994. The winning slogan will appear in the March 1994 *Bulletin*.

Strengthening abutment pillars can reduce bumps

The Bureau of Mines, working in cooperation with Island Creek Coal, has released a new investigational report dealing with abutment pressures in bump prone strata. The research was performed at the Virginia Pocahontas Division's No. 3 mine located near Oakwood, Virginia. The project was specifically designed to gain a better understanding of the load-bearing characteristics of longwall gob and to build on previously gathered gate-road stress data. The researchers measured the mining-induced abutment and the floor's gob consolidation pressures.

The Pocahontas No. 3 coalbed is relatively flat and averages 5.5-feet (ft) in thickness, while the overburden ranges from 1,200 ft to 2,200 ft. Minewide, a siltstone top ranges from a 110-ft thickness to nonexistent. The siltstone is overlain by a massive sandstone in the main roof that ranges from 135 ft to 450 ft. The mine floor consists of a combination of very competent siltstone and sandstone. All of the gate-entry pillar systems are designed conventionally—they support a major portion of the abutment load resulting from adjacent gob formation—in contrast to an all-yield design. The panels are roughly 600-ft wide and 6,000-ft long. The gate road was developed 238-ft wide and consisted of 20 by 80-ft yield pillars on either side of 120- by 180-ft abutment pillars.

A monitoring station was established in the floor rock below an abutment pillar and two longwall panels. An instrumentation system was put together that consisted of 22 2-inch-diameter stainless steel borehole platened flatjacks (BPFs) for indicating changes in coalbed pillar stress, 18 3-inch-diameter BPFs for indicating floor rock pressure changes, four coal extensometers for measuring pillar dilation, 77 convergence stations for measuring roof-to-floor closure and a differential sag indicator for monitoring bed separations in the immediate roof.

A Conspec 190 mine-wide monitoring data acquisition system was used to monitor all of the rock and coal BPFs remotely and selectcd convergence stations within the system. Data was stored on the surface using a personal computer, which also had Conspec software installed on the hard drive. Two modems transmitted data over a four-conductor shielded signal line. The Conspec software sampled each measuring instrument at five-second intervals.

From the instrumentation and some rigorous calculations, the research team concluded that the majority of the stress is concentrated on the currently mined panel and on the 120-ft-wide abutment pillar, with the smallest portion of the stress carried by the gob of the previously mined panel. A significantly greater portion of the peak front abutment stress is supported by the tailgate side of the currently mined panel than the headgate side. The magnitude of peak front abutment pressure on the tailgate side of the currently mined panel, coupled with the time of failure of the abutment pillar in the adjacent gate road, control longwall face bumps. Therefore, strengthening the abutment pillar can delay failure until it is between two gob areas, mitigating longwall face bumps.

*Reprinted from the May 1993 issue of **Coal** magazine.*

Helping hands

Home Hand Protection Tips

Hand protection is an around-the-clock activity

Keeping your hands safe from injury and disease is just as important at home as it is in the workplace. Household chemicals, tools and machinery, even recreational activities can all be potentially hazardous unless they're handled correctly. On the job, you can protect your hands by following your company's safety guidelines and using the hand protection provided by your employer. Off the job, you can recognize potential hand hazards and learn what you can do to keep your hands safe from injury.

Home hand hazards

In the kitchen, be sure to store sharp objects (knives and cutting blades) away from children. Keep knives sharp (dull blades slip more easily) and select the right one for the job you're doing. Never hold the object you're cutting in your hand—use a cutting board, and *always* cut away from your body. Use graters, can-openers, and vegetable peelers carefully—ragged teeth and sharp blades can easily cut a finger or hand. Wear rubber gloves when working with household chemicals, such as cleaning agents, insecticides, even hair color. In the workshop, be careful of sharp blades and pointed objects. Use tools only for their intended purpose and inspect them before and after each use for signs of damage. When using power tools or equipment, do not wear jewelry, gloves, or loose-fitting clothes that could get caught in moving parts. When painting, hold the brush or roller so that your wrist stays as straight as possible to avoid "overuse" problems. For yard work, wear canvas gloves to protect against stickers or thorns as well as potentially irritating plant oils.

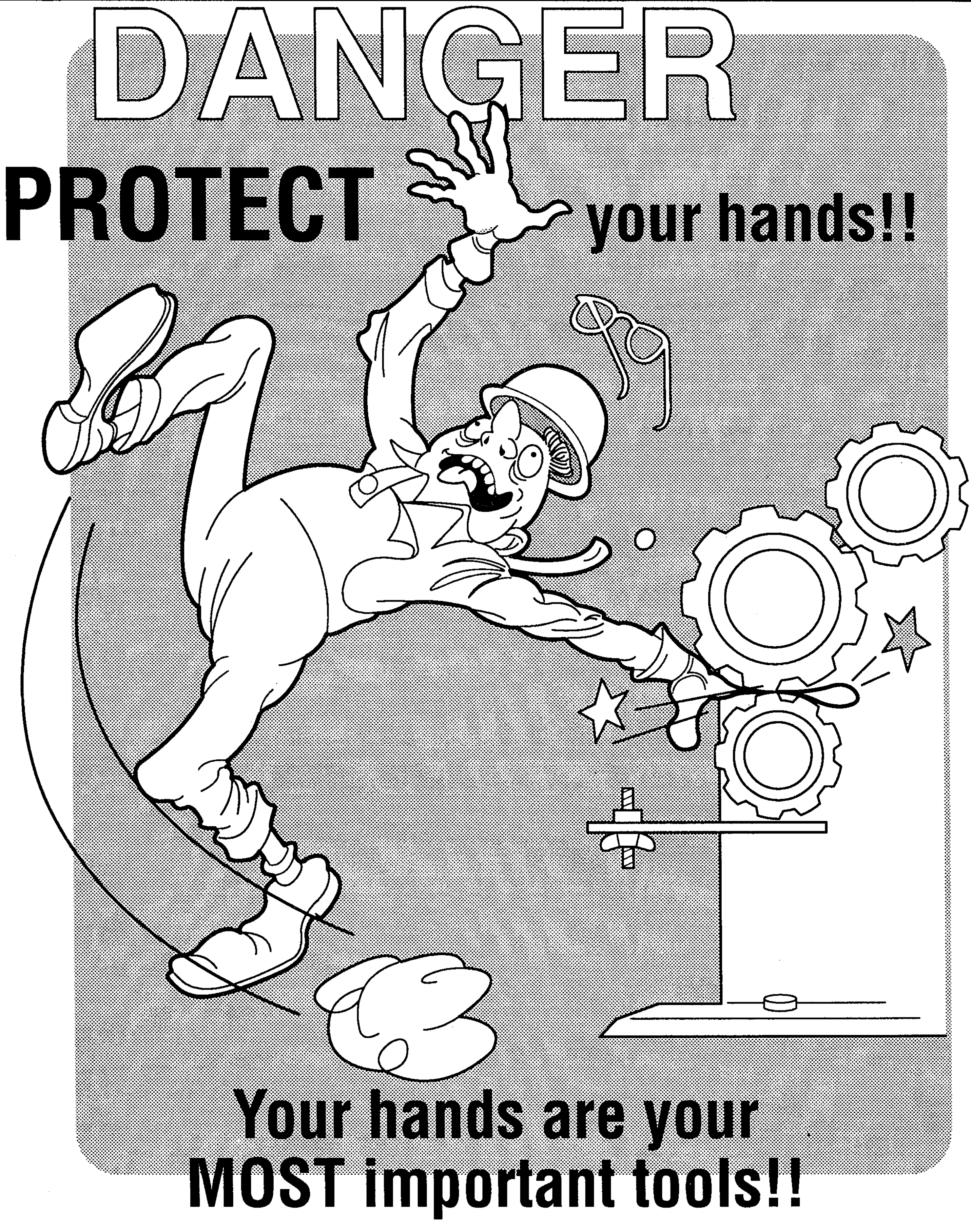
Recreational hand hazards

Many recreational activities can be hazardous to your hands unless care is taken beforehand. Skaters, skateboarders and cyclists should invest in gloves with padded palms that absorb shock and protect against abrasions in the event of a fall. Skiers and other winter sports enthusiasts should wear insulated, water-resistant gloves or mitts to protect against frostbite. For sports that require excessive hand and wrist motion (golf, racquet sports, softball, etc.) specially designed gloves are available to support your wrists and guard against calluses.

Give yourself a hand

Hand safety at home means recognizing potential hand hazards, using tools and equipment properly, and wearing protective gloves when necessary. Protect your hands, they have to last a lifetime.

Reprinted from the Second Quarter FY 1993 issue of the U.S. Department of Interior's Bureau of Reclamation Safety News


DANGER
PROTECT your hands!!
Your hands are your
MOST important tools!!

Choosing blasthole delay times for optimum fragmentation in surface mine blasting

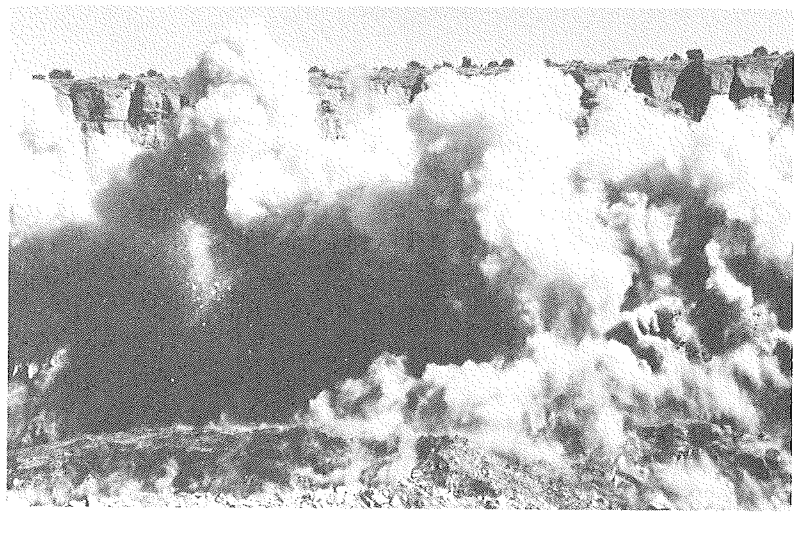
Objective

Provide guidance on the selection of millisecond initiator delays between blastholes in surface mine blasting to provide a desired degree of rock fragmentation consistent with safety and vibration considerations.

The problem

Blasting remains the primary means of fragmenting rock for all kinds of mining, quarrying, construction, and excavation activities, and it is the only practical and economic method of breaking up and moving large amounts of material such as coal overburden and stone aggregate. Because of the large amount of blasting done, typically using 4 billion pounds of explosive to break about 8 billion tons of rock annually in the United States, a small improvement in blasting performance will have a significant productivity impact.

Standard blasting practices involve the selection of time delays in a blast for at least three purposes: (1) to control energy flow to minimize adverse vibrations, (2) to provide sufficient time relief for good rock displacement, appropriate muck pile shape for digging, and the prevention of collar violence, misfires, and flyrock, and (3) to provide an appropriate amount of interhole stress wave and gas pressure action for a desired fragmentation size distribution. Timing guidelines that exist are based on subjective observations rather than measurements, even for the relatively new cast-



ing methods. Until this Bureau study, no definitive analysis had been done to quantify the fragmentation and productivity of full-scale blast rounds as functions of precision delay timing.

Approach

The Bureau conducted three series of blasting tests where fragmented rock was screened and weighed to determine fragment size distributions and productivity. Single rows of blastholes were detonated in limestone and dolomite at two sites—one about one-tenth scale and one full size. Precision delays were used between holes, ranging from near zero to 16 ms per foot of burden. These tests were followed by a set of full-scale three-row tests, again using precision delays, and the measurement of fragmentation. For the full-scale tests, delays between holes in each row were held constant at the near-optimum 4 ms per foot; the between-row times ranged from 4 to 20 ms per foot.

Test results

Initiator delays between blastholes in a row did influence blast performance. Most significant is that the best fragmentation was achieved with delays of at least 1 ms per foot of burden. Delays less than 1 ms per foot of burden resulted in blocky shots with poor fragmentation. Delays longer than 1 ms per foot had little effect on fragmentation, although blasthole cutoffs and misfires became a problem with delays of 8 ms per foot or more. Based on test results, the Bureau recommends delays between holes in a row of 1 to 5 ms per foot of burden.

Delays between rows of blastholes had little influence on fragmentation in the range between 4 and 20 ms per foot of burden. Both the within-row and between-row results are significant for blast design because they allow a wide selection of delays to enhance rock throw and control vibrations without adverse effects on fragmentation and safety.

For more information

Results of these studies have been published in proceedings of Society of Explosives Engineers conferences:

"Influence of Blast Delay Time on Rock Fragmentation in a 22-Foot Bench," by M. S. Stagg and S. A. Rholl, was published in the Proceedings of the 14th Conference on Explosives and Blasting Technique (Feb. 1-5, 1988, Anaheim, CA) and "The Effect of Explosive Type and Delay Between Rows on Fragmentation," by M. S. Stagg, S. A. Rholl, and R. E. Otterness, was published in the Proceedings of the 15th Conference on Explosives and Blasting Technique (Feb. 5-10, 1989, New Orleans, LA). Both proceedings are available from the Society of Explosives Engineers, 33610 Solon Road, Suite 4, Solon, OH 44139.

The article "Influence of Blast Delay Time on Rock Fragmentation: One-Tenth Scale Tests," by M. S. Stagg, was published in the International Journal of Surface Mining, v. 1, 1987, pp. 215-222.

To learn more about the study, contact:

Mark S. Stagg or David E. Siskind
Twin Cities Research Center
U.S. Bureau of Mines
5629 Minnehaha Avenue South
Minneapolis, MN 55417-3099
612-725-4574 or 612-725-4598

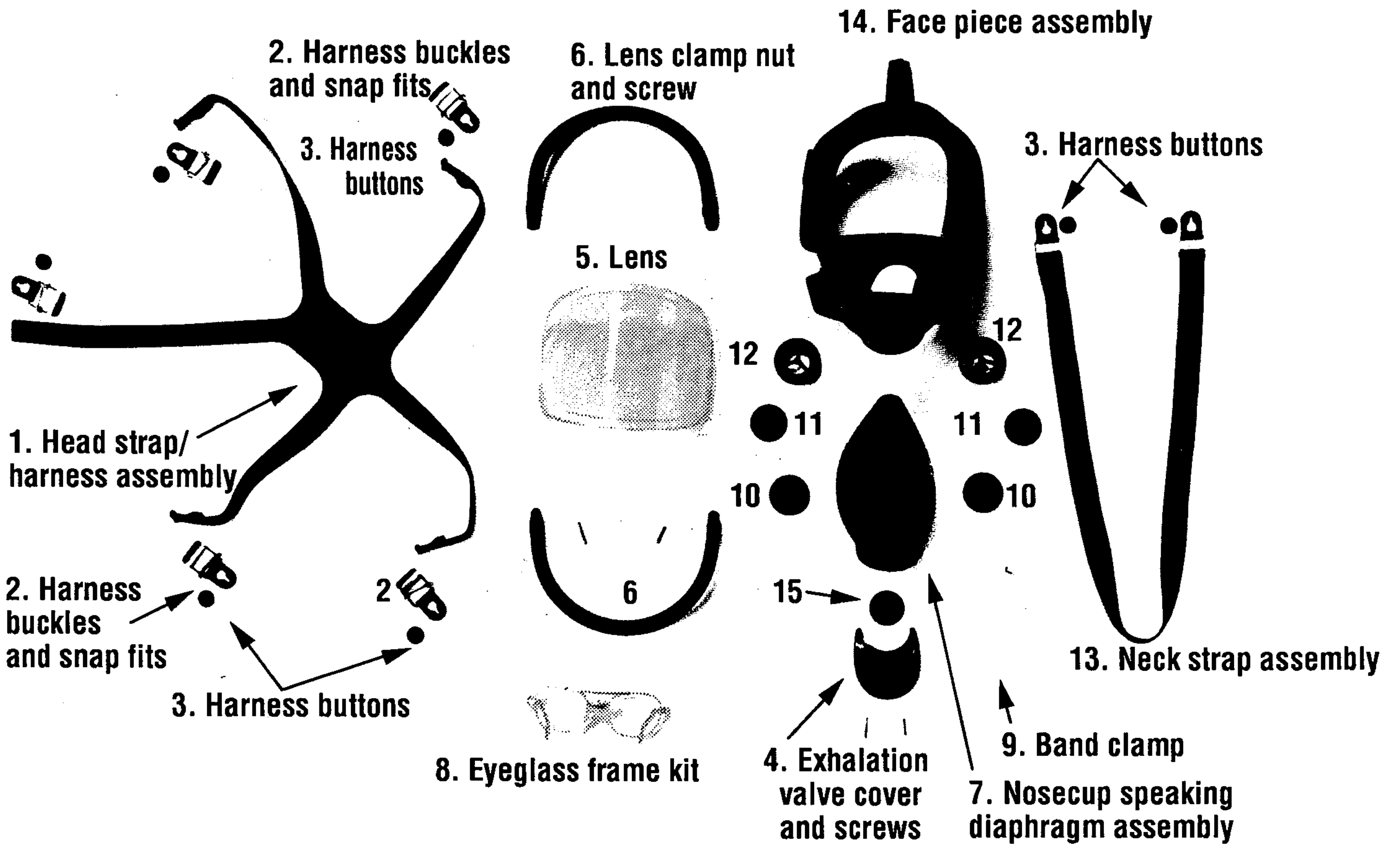
*Reprinted from the Bureau of Mines' **Technology News** of May 1989.*

Know your respirator *inside* and *out*

The anatomy of an air-purifying respirator

Understanding how your respirator works is important to a successful respiratory protection program. This diagram and corresponding detailed list of replacement parts and accessories identifies the common parts of most brand-name units. Remember—inspection before and after each wearing is required by OSHA and helps ensure the safety of respirator wearers by spotting any wear, breakage or deterioration of intricate parts. Replace defective parts immediately or issue a new respirator to guarantee wearer safety.

Reprinted from Lab Safety Supply Inc.'s April 1993 issue of Insights.



10. Nosecup valve assembly
11. Inhalation valve
12. Inhalation valve body/cartridge holder
15. Exhalation valve

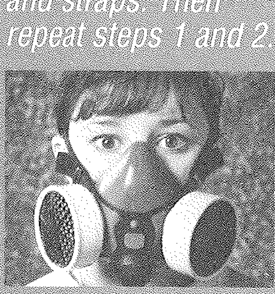
Daily fit check for negative-pressure respirators

Before you begin
Read manufacturer's instructions for fit-checking procedures

Step 1
Adjust straps to get a snug fit

Step 2
Cover the exhalation valve and exhale slowly

Step 3
If you feel any leaks, adjust the facepiece and straps. Then repeat steps 1 and 2.



Step 4
If you can't get a good seal, ask your trainer for help.

What is fit testing?

Your respirator—no matter what type or brand—is only as good as the face-to-mask seal. The integrity of that seal is the only thing between you and the contaminants in the air you breathe.

Fit testing, required annually for each wearer of negative-pressure respirators by OSHA, is the only way to know for sure.

There are two test methods to ensure the integrity of your respirator's facepiece-to-face seal: ***Qualitative and Quantitative Fit Testing.***

Qualitative Fit Testing

Qualitative fit testing provides pass/fail results of your respirator's performance. An aromatic substance, such as irritant smoke or banana oil, is introduced while the worker is wearing a negative-pressure respirator with cartridges to filter out the test agent. If the wearer cannot sense its presence inside the mask, the seal is satisfactory.

The ***Irritant Smoke Test*** can be used for air-purifying respirators (with HEPA cartridges) and supplied-air respirators (in the negative-pressure mode).

The smoke is produced with a commercially available smoke tube similar to those used to test airflow for ventilation systems.

The test operator instructs the wearer to keep both eyes closed and not to adjust the mask during the test. Then the operator directs smoke over the respirator, keeping the smoke tube about two feet from the respirator and watches the wearer's reaction.

If the wearer does not react to the smoke, the operator moves the smoke tube closer and observes again.

This process is repeated until the smoke is six inches from the respirator.

Once the smoke is within six inches of the mask and the wearer has not detected penetration, the operator instructs the wearer to begin a series of exercises to simulate job tasks. These exercises may include deep breathing, side-to-side head turns, nodding and talking.

Then, if the wearer still does not detect penetration of the irritant smoke, a satisfactory fit has been achieved.

The ***Odorous Vapor Test*** uses a test agent, such as isoamyl acetate (banana oil) saturated on a piece of fabric or a sponge. This test can also be used for air-purifying respirators (with an organic vapor cartridge for isoamyl acetate) and supplied-air respirators (in a negative-pressure mode).

The test operator moves the saturated fabric or sponge around the respirator, passing close to potential leakage points in the seal while the wearer carries out exercises similar to those performed in the irritant smoke test.

If the wearer is unable to detect the odor, a satisfactory fit has been achieved.

However, using isoamyl acetate as a test agent does have drawbacks.

Because the odor threshold for the irritant varies from person to person, it may be difficult to get a true reading. Before performing this test, ANSI recommends all people be tested to determine their ability to sense the isoamyl vapor in the air.

Quantitative fit testing

Quantitative fit testing uses precise measuring equipment inside a special test chamber to provide an exact reading of face-seal performance. It actually produces a numerical measurement of the fit.

Like both Qualitative tests, this one can be used for air-purifying respirators (with HEPA filters when using an aerosol as a testing agent) and supplied-air respirators (in the negative-pressure mode).

To perform this test, you'll need a probed respirator and a test chamber. They allow you to measure the contaminant level inside the wearer's face mask and then compare it to the concentration outside.

The wearer is outfitted with a respirator equipped with a sampling probe connected by flexible tubing to an instrument which measures the penetration of the test agent inside the mask.

The wearer is then placed in a test chamber and exposed to a test atmosphere containing an easily detectable, relatively nontoxic aerosol, vapor or gas.

In compliance with ANSI standards, the wearer is asked to perform a series of exercises simulating work tasks.

If the concentration of the contaminant inside the facepiece is at an acceptable level, a satisfactory fit has been achieved.

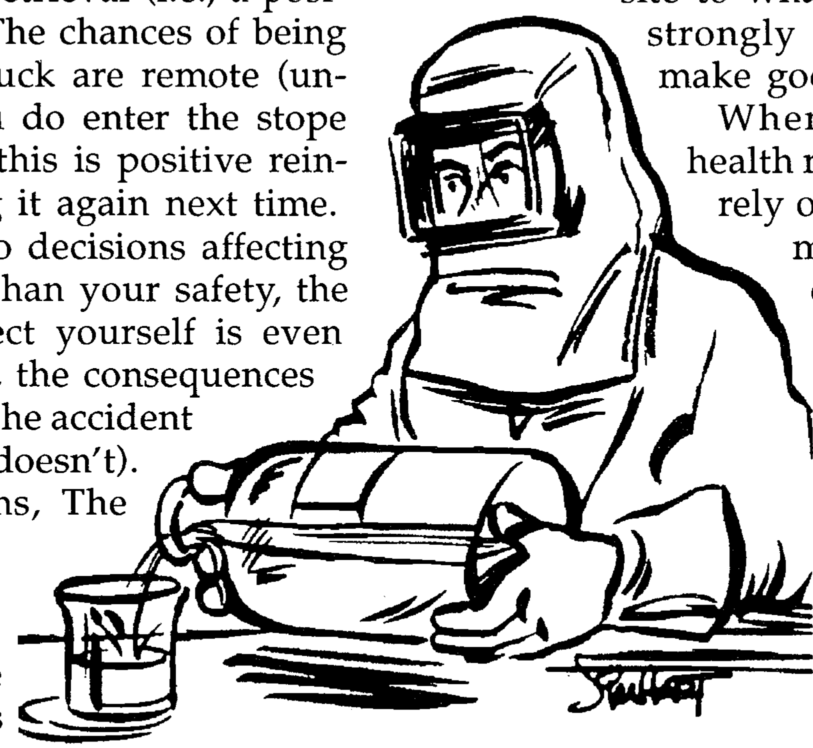
Fit testing is an integral part of your respiratory protection program. Remember to keep a written record of all results. And although OSHA only requires yearly testing, more frequent monitoring is suggested.

*Reprinted from the April 1993 issue of Lab Safety Supply's newsletter **Insights**.*

Protecting your health

People who study human behavior tell us that when we are deciding upon an action. we are motivated by what we think the consequences of that action will be. The most powerful motivation occurs when the consequences are **immediate, certain,** and **positive.** For example, your remote scoop stalls in an open stope. You are certain that if you go into the stope, you can restart it and save a lot of time compared to following standard operating procedures for retrieval (i.e., a positive consequence). The chances of being struck by falling muck are remote (uncertain). And if you do enter the stope and don't get hurt this is positive reinforcement for doing it again next time.

When it comes to decisions affecting your health rather than your safety, the motivation to protect yourself is even weaker. With safety, the consequences are immediate (i.e., the accident either happens or it doesn't). For health decisions, The consequences are most often remote. Cancers take years to develop, as do the nervous disorders that come with exposure to heavy metals, or the liver damage from over-exposure to many common solvents. And this doesn't just apply to chemicals. Physical stressors, such as noise and vibration, over a period of time, produce hearing loss and vibration-induced white finger. Ergonomic stressors, usually involving repetitive motions and or awkward positions, gradually result in conditions such as carpal tunnel syndrome or lower back pain. None of these consequences are immediate.



And to further weaken your motivation, there is no certainty that many of these negative health effects will ever develop. Not **all** smokers get lung cancer; not **all** typists develop carpal tunnel syndrome. The consequences of unhealthy behavior are therefore remote, uncertain and negative—exactly the opposite to what is required to strongly motivate us to make good choices.

When it comes to health risks, you cannot rely on individuals to make good choices. Proactive programs must be in place to reduce or eliminate the risks. Training and other methods of trying to alter behavior are important; but they are no substitute for ergonomic initiatives, good ventilation, substitution of less dangerous chemicals, engineering controls, and so on. If you would like more information on reducing health risks in your workplace, call our Resource Center.

Reprinted from Ontario, Canada's Mines Accident Prevention Association's August 1993 issue of ***Safety Reminder.***

Holmes Safety Association Monthly safety topic

Fatal powered haulage accident

GENERAL INFORMATION: A 21-year-old truck driver, with one month of mining experience, was fatally injured while attempting to clean up a build-up of limestone material from the interior walls of a metal surge bin.

The operation was an open pit limestone mine and operated a single 10-1/2 hour shift, five days a week. Total employment at the mine was 13 persons who were all present the day of the accident.

DESCRIPTION OF ACCIDENT: The victim reported for work at 7:00 a.m., his normal starting time. It had rained during the night and was still raining when the employees arrived at the mine that morning. Because of the weather conditions, the superintendent postponed plant start-up until he could determine what the weather was going to do.

In the interim, the foreman assigned the victim and the plant operator the task of cleaning the beds of the haul trucks. The wet weather conditions had caused the limestone material to stick and accumulate in the beds of the trucks reducing the load capacity. The two employees cleaned three truck beds at the equipment parking area which was located north of the crushing plant.

At 8:45 a.m., the planned detonation on the production ledge at the quarry occurred and the crushing plant was started up at 8:50 a.m. The plant operator started the crushing plant while the victim began hauling waste dust from the No. 4 surge bin to a water-filled depression at the production ledge in the quarry. The material was dumped into the depression in an attempt to dry up the water. After it was determined a sufficient amount of waste dust had been dumped at the production ledge, the victim began hauling the waste material from the bin to the waste dust stockpile area. Work progressed routinely for the next few hours.

A driller and another employee had completed loading the drill holes in the quarry and were ready to blast. At approximately 11:35 a.m., the driller drove to the quarry office located next to the screening plant and informed the foreman that the loading of the round had been completed and was ready to be blasted. After his conversation the driller drove to the No. 4 surge bin and stopped to talk to the victim. The driller located the victim inside the bin. Noticing that the discharge and feed belts were operating and that the victim was not secured in any manner, he informed him that what he was doing was a good way to get himself killed. He instructed him to get out of the bin. The victim put the shovel he was using out through the inspection window onto the work platform and started to climb out. Assuming that the victim had climbed out, the driller turned and walked down the stairway, got back into his truck and drove back to the quarry.

At 11:58 a.m., the plant operator went to the crusher control station and shut the crushing plant down. From that location, he was able to see the No. 4 surge bin, the conveyor coming from the finish screens that supplied material to the bin, the bin discharge belt conveyor and the victim's haul truck that was located under the bin. He did not notice anything unusual in the area after the shutdown and went to lunch at the equipment parking area.

When he shut the plant down, the plantman also left for lunch. The plant was not locked-out during the lunch break shutdown. The method and manner in the way the plant was shutdown was a daily routine at lunch break and coincided with the noon blast in the quarry.

At 12:05 p.m., another driver noticed that the victim was standing on the outside work platform at the No. 4 surge bin.

After the noon blast was initiated at 12:15 p.m., the driller stopped by the truck parking area and asked the loader operator and a truck driver if they had seen the victim. They all informed him they did not know where the victim was. He drove to the No. 4 surge bin and saw the discharge belt conveyor operating and a trickle of dust coming off the belt into the haul truck below. He got out of the truck and called for the victim. When he received no answer, he started up the stairs to the elevated work platform on the bin and saw feet sticking out of the bin discharge chute onto the discharge belt below the bin. He immediately turned the discharge belt conveyor off and went to the pickup and radioed the scale house requesting assistance. The scale house employee received the message and began notifying mine personnel.

The foreman and the driller cut the 36-inch wide rubber discharge belt above the point where the chute discharged onto the belt and attempted to free the victim. When they realized they could not free him, they removed the flow adjuster on the chute by removing two bolts that secured the adjuster flap to the chute. The victim was removed and placed on the ground next to the surge bin and cardiopulmonary resuscitation (CPR) was administered until rescue personnel arrived and took over.

The victim was flown by helicopter to the medical center. He had a pulse but was not breathing on his own. He died a short time later with the cause of death attributed to suffocation.

CONCLUSION: The direct cause of the accident was the victim entering a 35-ton capacity surge bin without wearing a safety belt and having a second person attending the lifeline. The discharge conveyor belt was operating and the victim was either engulfed by the material sloughing off the bin sides or fell onto the moving conveyor belt and was subsequently covered with material. He was trapped between the adjuster flap on the discharge end of the bin and the belt and the upper part of his body was covered with material inside the bin.

Twelfth Annual South Central District joint mine health and safety conference

March 16-17, 1994

The planning committee invites you to participate in the promotion of Safety and Health, and in creating an environment of greater cooperation among industry, labor and government. Operators, supervisors, inspectors, miners representatives, safety and health professionals alike will benefit from this conference.

Highlights of the conference include:

Opening session—Outstanding Motivational Speaker Lewis Timberlake and a Memorial Service.

Luncheon—Keynote Address By Bill Powell & Sentinel Awards.

Discussion Group Session—Sand & Gravel, Underground, Mill, Crush Stone, Open Pit, Coal, & Contractor Group Sessions.

Workshops on—Electrical Safety, Developing a Wellness Program, Physiological Effects of Exposure To Hazardous Material, Heavy Equipment Safety Inspections, Preparing For A Health & Safety Conference, Participative Training Techniques, Welding Safety, Blood-borne Pathogen, Accident Investigation Procedures, Back Safety, How To Participate In An MSHA Inspection, Ergonomics, Supervisory Responsibilities Under 110 of the Federal Mine Act, Part 48 Training Requirements, Self-Evaluation of your Safety Program, Confined Spaces and Environmental Noise Controls.

The conference will be held at the HILTON HOTEL, 925 South University, Little Rock, AR, where a block of rooms have been reserved at a special rate of $46.50 plus tax for single or double occupancy. To assure the special rate, reservations must be made by March 1, 1994. The phone number is (501) 664-5020.

The conference is limited to 250 persons. There is a $60 registration fee, which includes cost of the Thursday Luncheon. Registration form is attached. Call Dan Haupt at (214) 767-8401 for additional information.

Agenda

Tuesday March 15, 1994

2-4 pm Registration

Wednesday March 16, 1994

7:30 am Registration

8:00 am Opening Address and Memorial

10:00 am Workshops

1:00 pm Workshops

3:00 pm Workshops

Thursday March 17, 1994

8:00 am Discussion Groups

11:30 am Luncheon with keynote address

1:00 pm Workshops

3:00 pm Workshops

Registration fee: $60.00

Mail fee to: Joint Mine Health and Safety Conference - UTA, P.O. Box 7518, Austin, Texas 78713-7518

Makes check payable to: Joint Mine Health and Safety Conference

The Discussion Groups are:

For Metal Nonmetal Mines: Crushed Stone, Sand and Gravel, Mill, Open Pit, Underground.

For Coal Mines: Coal

For Mining Contractors: Contractors

Workshop on the use of personal protective technology in hazardous occupations

A workshop on the use of highly specialized personal protective technology (PPT) in emergency situations where the risks to the rescuers are severe was held at the National Mine Health and Safety Academy in Beckley, West Virginia, August 30-September 1, 1993. The Workshop was jointly sponsored by the Mine Health and Safety Administration, the National Institute for Occupational Safety and Health, the U. S. Bureau of Mines, and the College of West Virginia. For two days the approximately 80 participants were led in discussion by panels of experts in the areas of Fire Service, Hazardous Materials, and Special Applications (i.e. confined spaces, explosives, radiation). Representatives of the OSHA Office of Standards Development, the Explosives Unit of the FBI Laboratory, the U.S. Fire Administration, the EPA, the UMWA Department of Occupational Health and Safety, and other related agencies led sessions focusing on protective clothing, breathing apparatus, human factors and training, and research in each of these special interest areas.

Demonstrations of confined space rescues, decontamination procedures, and selection of appropriate protection were presented by the National Hazmat Program of the International Union of Operating Engineers. REMOTEC Inc., a division of Westinghouse which produces remote robotics technology for hazardous operations, demonstrated several different robots with capabilities including obstacle crossing and stair climbing. Daily tours of the Mine Simulation Laboratory, which is used for mine emergency training and training in prevention and fighting of underground mine fires, were also available. Information gained from this workshop will aid the agencies in setting research and regulatory goals as well as set an agenda for the international PPT workshop planned for October 1994.

Doris Cash, MSHA Technical Support

Announcement

Mark your calendar now!

The Mines Accident Prevention Association of Ontario, Canada, will hold its Mining Health and Safety Conference and 63rd Annual Meeting in Toronto at L'Hotel on May 5th and 6th, 1994.

Complimentary passes are available to media personnel by contacting Cindy Trnka or Doug Bennett at (705) 474-7233.

Mines Accident Prevention Association Ontario

MAPAO, P.O. Bag 2050, 690 McKeown Ave., North Bay, Ontario, Canada P1 B 9P1
Telephone: (705) 474-SAFE
Fax: (705) 472-5800

Vibration testing of off-road vehicle seats

Objective: Perform laboratory tests to measure the vibration attenuation characteristics of off-road vehicle operator seats for various types of seat suspensions, cushions, and seat adjustment settings.

Background: A study was conducted by the U.S. Bureau of Mines to determine the probability of whole-body vibration (WBV) exposure for a large class of off-road machinery operating in surface coal mines. The study determined that more than 40 pct of off-road equipment operators were exposed to WBV exceeding the standard fatigue decreased-proficiency (FDP) level defined by the International Standards Organization in its guideline ISO standard 2631. The tire-terrain interaction of a moving vehicle generates vibrations that are transmitted through the vehicle suspension, cab mounting, and seat. The final point of transmission of vehicle vibration to the operator is through the seat. A seat that provides good vibration isolation and allows good vehicle control is of prime importance to operator safety and health.

Approach: The Bureau conducted vibration tests of four off-road vehicle seats. The study determined the optimal adjustment settings (air pressure, preload setting, etc.) for each seat tested. Two seats employed mechanical suspensions and two seats employed air spring suspensions. The seats were tested using a 22241-N (5,OOO-pound-force) electrodynamic shaker. The seats were subjected to a swept sine acceleration input. The frequency range tested for the seats was from 0.7 to 10 hertz. Laboratory tests were constructed to simulate the mining vibration environment within the limitations of the test equipment. The seats were tested at maximum vibration levels that never exceeded the 4-hour, FDP exposure time defined in ISO 2631. Mechanical suspension seats were tested with varying seat cushion densities and preload-to-mass ratios (preload settings). Air suspension seats were tested with varying seat cushion densities and air pressure levels.

Results: Reported results were transmissibility and the root mean square of the peak accelerations of the seat, with the transmissibility being the ratio of vibrations at the seat cushion to cab floor. Air suspension seats pressurized greater than 552 kilopascal (80 pounds per square inch) provided vibration attenuation over the frequency range tested (0.7 to 10 hertz). Air pressures below 552 kilopascal produced two large transmissibility peaks.

The seats employing mechanical suspensions had larger transmissibilities than air suspension seats. In addition, if the mechanical seats' preload adjustment was set greater than the operator's weight, increased vibration transmissibility resulted.

The effect of seat cushion density was that greater density cushion material resulted in lower transmissibility peaks but poorer frequency attenuation ability, while lower density material produced greater transmissibility peaks but better frequency attenuation.

For more information: For a free single copy of Report of Investigation (RI) 9454 write to the Bureau's Publication Distribution Section, Building 149, P.O. Box 18070, Cochrans Mill Road, Pittsburgh, PA 15236-0070. Additional information may be obtained by contacting:

J. C. Gagliardi, Twin Cities Research Center, U.S. Bureau of Mines, 5629 Minnehaha Avenue South, Minneapolis, MN 55417-3099, telephone (612) 725-4583, or W. K. Utt, Twin Cities Research Center, U.S. Bureau of Mines, 5629 Minnehaha Avenue South, Minneapolis, MN 55417-3099, telephone (612) 725-4582.

Reprinted from the Bureau of Mines' May 1993 issue of ***Technology News.***

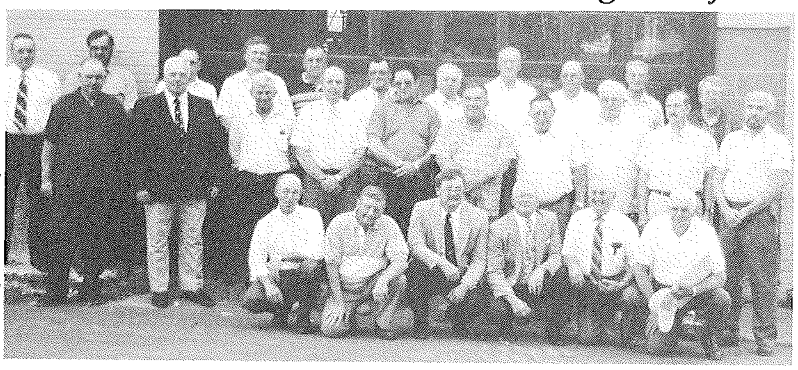
Twenty-seven honored

Twenty-seven employees of Buffalo Coal Company, Bayard, West Virginia, were recently recognized by the Western Maryland council of the Holmes Safety Association for achieving twenty or more years of service in the mining industry without a lost-time injury.

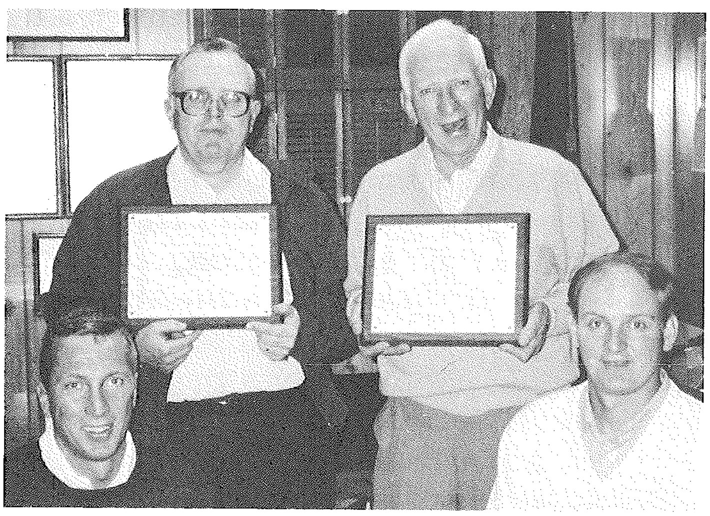
The awards were presented by Barry L. Ryan, Supervisor of the Oakland Office of the Mine Safety and Health Administration and R. Donald Cussins, president, Buffalo Coal Co. They were assisted by Arthur Guty, local MSHA Inspector. The awards ceremony and dinner was held at the Bayard Fire Hall in June 1993.

Cussins, stated "We are extremely proud of this prestigious achievement by these employees. Each award is an indication of the performance of their daily duties in an efficient and safe manner.

Also assisting in the ceremony was Edward Moss, Bituminous Safety Service, consulting Safety Director for Buffalo Coal Co.



Kneeling left-to-right): Allen Weimer, 27 years; Stanley Friend, 25 years; Barry Ryan, MSHA; Edward Moss, Bituminous Safety Services; Robert Hardman, 22 years; and Kurt Shaffer, 30 years.
Front row: Leonard Paugh, 23 years; R. Donald Cussins, President, Buffalo Coal Company; Perry Hebb, 27 years; Randy Deal, 21 years; Allen Harvey, 22 years; William Kessell, 27 years; Dewayne Hawk, 20 years; Daniel Knotts, 34 years; Gary Cooper, 22 years; and Roy Shillingburg, 24 years.
Back row: Kenneth Bittinger, 21 years; Jerry Shupp, 20 years; James Quattro, 30 years; John Rapp, 25 years; Charles Wolford, 27 years; Melvin Judy, 34 years; Ellsworth Harvey, 25 years; Delmer Snyder, 20 years; Kenneth Evans, 28 years; Delbert Elliott, 21 years; and James Collette 26 years.
Not pictured: Richard Cosner, 20 years; Raymond Lambruno, 25 years; and William Paugh, 23 years.



From left-to-right—Wayne Winner, 20 years; Donald P. Bennett, 20 years; Albert R. Winner, 33 years; and Albert L. Winner, 20 years. Not pictured—Leon Rush, 28 years.

Five recognized for outstanding safety records

On April 29, 1993, the Western Maryland Council recognized five members of Winner Brothers Coal Co., for outstanding safety records by working 20 or more years without having a lost-time accident. Award plackets were presented by Kerry George, MSHA Coal Mine Inspector and Council Secretary. Also assisting in the ceremony was Edward Moss, Bituminous Safety Service and Consulting Safety Director for Winner Brothers Coal Company.

Proposed changes in the Holmes Safety Association bylaws

In accordance with Section 15. of the Holmes Safety Association Bylaws, section 3. is herein proposed to be amended by the addition of paragraph (b) as follows:

SECTION 3. EXECUTIVE COMMITTEE (REPRESENTATIVES)

(a) The National Council officers, together with representatives of participating organizations and representatives from each mining area having active state councils, district councils or chapters, shall constitute the Executive Committee.

(b) Members of the Executive Committee who, in the interim of their membership, retire (in good standing) from their position as an authorized representative of an interest group as specified in Section 11.(a) shall retain their post as an Emeritus Member of the Executive Committee for the remainder of their elected term. Thereafter, such Emeritus Member's status of continued participation on the Executive Committee is welcomed and encouraged as an attendant and voting member and to serve in any capacity so appointed or assigned by the President, except for such post which explicitly calls for a duly authorized representative of an interest group as specified in Section 11.(a).

Supporting Rationale

The above proposal is simply based on the belief that members who retire from given interest groups should be recognized within the bylaws and that their continued participation on the Executive Committee is welcomed and encouraged. Given same, the bylaws should be clear on the scarce limitation of their continued participation.

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 6. is herein proposed to be amended by the addition of paragraph (b) as follows:

SECTION 6. VACANCIES AND MEETING ABSENCES

(a) All vacancies, occurring during the year through resignation, death, or removal of elected Officers, members of the Executive Committee, or representatives on the Board of Directors of the Joseph A. Holmes Safety Association, shall be filled by the President by appointment for the unexpired term.

(b) Except for the protocol of Officers as specified in Section 9., an Executive Committee member absent from an Executive Committee meeting called by the President may name an alternate from their respective interest group to serve in their absence. An alternate so named shall be given in writing to the Secretary/Treasurer in advance of each meeting of anticipated absence. Given the absence of an Executive Committee member or named alternate for a period of consecutive meetings, such member will be advised by the Secretary/Treasurer of such absence and that their absence or that of an alternate fromthe next meeting called will subject such member to review by the Executive Committee for continued Executive Committee member standing.

Supporting Rationale

This proposal is submitted on the basis that there are a few given members on the Executive Committee who are inordinately absent from meetings. It is believed that such members should have an opportunity within the bylaws to have an alternate serve in their place. Short of their attendance or that of an alternate for a given number of meetings should, at some point in time, subject such member's standing on the Executive Committee to review.

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 9. is herein proposed to be amended as follows:

SECTION 9. VICE PRESIDENTS

The four Vice Presidents shall represent each of the interest groups as specified in Section 11(a) other than that interest group represented by the President. Except for resignations or death, the Vice Presidents shall rotate from Fourth Vice President to President, one position each year. Persons elected to fill a vacancy as Vice President shall be assigned the Fourth Vice President's position regardless of the position vacated. The Fourth Vice President elected or otherwise appointed shall be filled by a person from a different state than that of the current Presidential and Vice Presidential officers. The Vice Presidents shall assist the President and other officers and committees in conducting the work of the National Council. In the absence of the President the highest ranking Vice President who is present at a meeting shall assume the duties of the President.

Supporting Rationale

Based on the expanse of our membership across these United States, it simply seems appropriate that the election and/or appointment of our Presidential and Vice Presidential officers should reflect such expanse by not having more than one given officer serve from any given state. It is further believed that the full committee would appreciate such diversity.

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 12. is herein proposed to be amended as follows:

SECTION 12. NOMINATING COMMITTEE

(a) FORMATION. The nominating committee shall consist of five members from the Executive Committee, one of whom shall serve as chairman: 1 from industry labor; 1 from industry management; 1 from a state enforcement agency; 1 from a federal agency; and 1 from manufacturers, suppliers or insurance groups. **With each being selected from respectively different states**, the President shall appoint the committee members and designate the Chairman. Membership on this committee shall be for one year.

Supporting Rationale

This proposal is simply based on the belief that while the President should retain the exclusive right of appointing the Nominating Committee and its chairman, the bylaws should guide the diversity of its membership among the states represented.

Harry Tuggle, 1st Vice President, Holmes Safety Association

Send your comments to:

Mr. Joseph Sbaffoni
%Pennsylvania Deep Mine Safety
100 New Salem Road, Room 167
Uniontown, PA 15401

The last word...

"There is more to life than increasing its speed."

"Living with a saint is more grueling than being one."

"In every fat book there is a thin one trying to get out."

"The man who doesn't read good books has no advantage over the man who can't read them."

"It takes the publishing industry so long to produce books it's no wonder so many are posthumous."

"Wit is educated insolence."

"He who laughs, lasts."

"The difference between genius and stupidity is that genius has its limits."

"The human mind treats a new idea the way a body treats a strange protein; it rejects it."

"Most people would sooner die than think; in fact, they do so."

"When you don't have any money, the problem is food. When you have money, it's sex. When you have both, it's health. If everything else is OK, then you're frightened of death."

NOTICE: We welcome any materials that you submit to the Holmes Safety Association Bulletin. 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.

REMINDER: The District Council Safety Competition for 1993 is underway – please remember that if you are participating this year, you need to mail your quarterly report to:

Mine Safety & Health Administration
Educational Policy and Development
Holmes Safety Association Bulletin
P.O. Box 4187
Falls Church, Virginia 22044-0187

Phone: (703) 235-1400