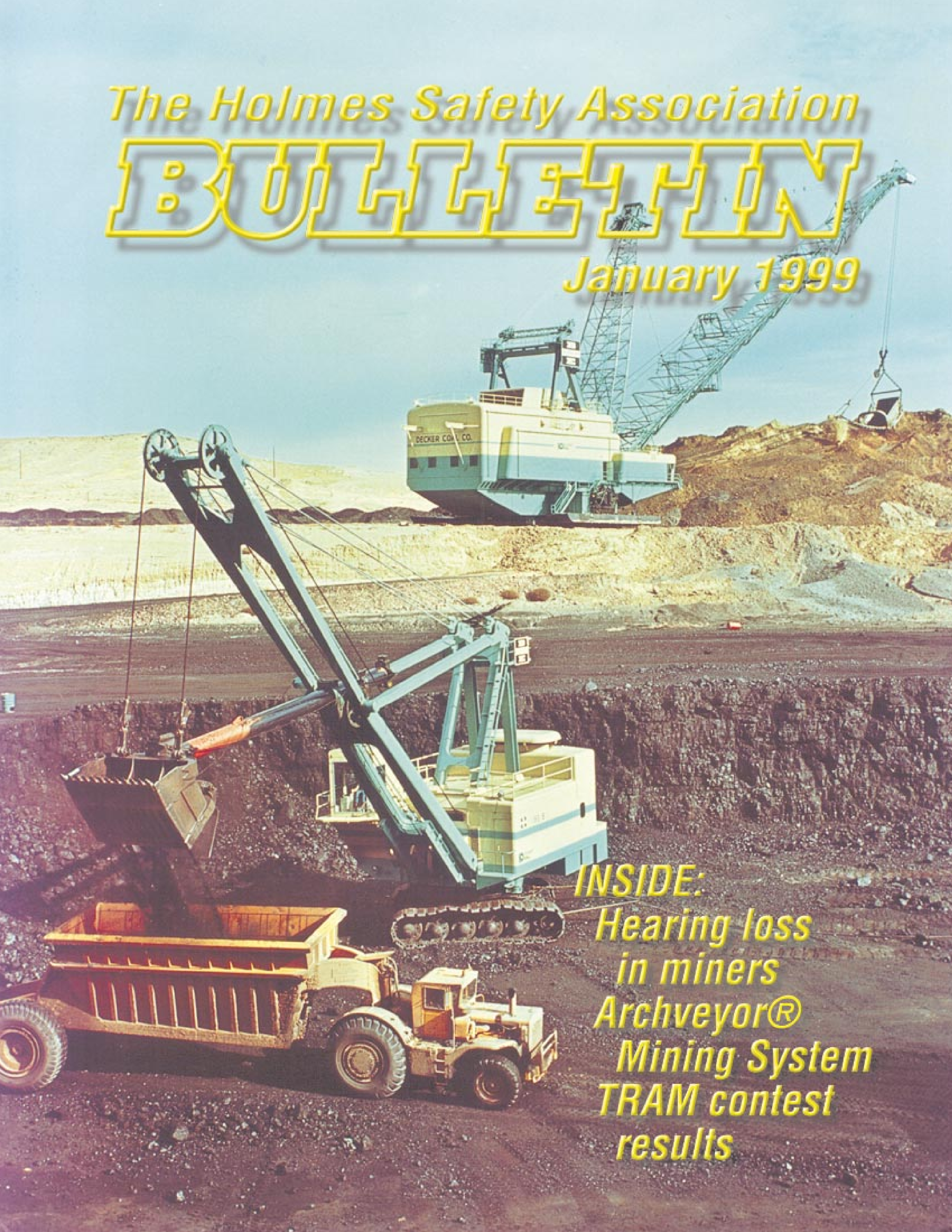
The Holmes Safety Association

BULLETIN

January 1999



INSIDE:
- Hearing loss in miners
- Archveyor® Mining System
- TRAM contest results

contents:

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***

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COVER: This month's cover comes from the editor's collection of old, outdated, and still older and even more outdated photos. The late 1970s photo depicts a coal stripping operation using a Bucyrus-Erie 1300-W walking dragline and a Bucyrus-Erie 195-B electric mining shovel at Decker Coal Co., Decker, Montana.

ERRATA—NOVEMBER'S MAGAZINE contained an article: *Diesel exhaust: A critical analysis of emissions* by Kathleen Nauss, Ph.D. This article was taken off the "DieselNet" web site under the presumption that this was a federal (Canadian)site and therefore, free (as are ALL federal U.S. web sites/publications) for everyone to use. In addition, when the article was translated from the web site to a WordPerfect document, the units of exposure were incorrectly translated to read "g/m^3" and should have read "$\mu g/m^3$". We deeply regret the errors and apologize to the author and to ***Ecopoint***—the original source for DieselNet.

If you have a potential cover photo, please send an 8" x 10" print to the editor, Fred Bigio, MSHA, 5th floor—EPD #535, 4015 Wilson Blvd., Arlington, VA 22203-1984

KEEP US IN CIRCULATION
PASS US ALONG

Effective prevention of hearing loss in miners

By R. Larry Grayson, Ph.D., P.E., National Institute for Occupational Safety and Health (NIOSH)/Centers for Disease Control and Prevention. Dr. Grayson is the Associate Director, Office for Mine Safety and Health Research, Washington, D.C.

In the October 1998 issue of the Holmes Safety Association Bulletin, NIOSH authors Mark Stephenson and Carol Merry wrote the article ***Hearing loss among miners and measures to protect hearing***, which focused on the extensiveness of hearing loss among miners and the use of hearing protection to prevent hearing loss. While the primary importance of engineering controls in preventing hearing loss was discussed, since miners do not generally have control over their work environment or assignments, the article focused on the importance of consistent use of hearing protection. In this article, all aspects of a comprehensive approach to the prevention of hearing loss in miners will be covered. The discussions will do the following:

- describe application of the hierarchy of controls in preventing hearing loss in miners,
- give an example for each type of control measure and its impact,
- explain the major provisions, beyond the hierarchy of controls, of the recent NIOSH document entitled ***Criteria for a Recommended Standard: Occupational Noise Exposure, Revised Criteria 1998*** relative to a hearing loss prevention program, and
- summarize important points on control of noise exposure for every miner to remember.

Noise in the work environment and miners' behaviors

Mining is a capital intensive industry which requires utilization of large equipment in most facets of operations. Miners are well aware of noisy areas in or around equipment, including extraction machinery such as draglines, power shovels, longwall shearers, and continuous mining machines; powered haulage equipment such as load-haul-dumps, shuttle cars, large trucks, and continuous haulage units; roof bolting machines; jackleg drills and stopers; auxiliary equipment such as compressors, fans, and pumps; size reduction equipment, etc. They are not well aware of the insidious nature of progressive hearing loss, which is permanent, but they are generally aware of what levels of noise are hazardous and what measures can be taken to reduce their personal noise exposure. Behaviorally, however, there are many reasons why miners choose not to use hearing protection faithfully.

There are many cues in mining workplaces on which miners depend to extract ore, load and haul it, process it for market, and provide operational support safely. Listening for important noises in machine components which may indicate potential malfunction, for low-pitch "groans" of strata above the immediate roof in retreat mining, and for important communications from co-workers are examples. Also, it is human nature to want to finish personal conversations even after equipment has restarted following a pause in operations. Additionally, some miners simply do not like to have plugs in their ears or extra weight from ear muffs on their caps.

Since it is very difficult to control human behavior continuously, and since short periods of exposure to high noise levels on a regular basis can cause hearing loss, it is important that noise, first and foremost, be engineered out of the workplace. In a mine with hazardous noises removed or with noise controlled at its source, it would not be important to wear hearing protection at all times to prevent hearing loss. It is not always possible to engineer all exposures out of the work environment though, and thus a hierarchy of control methods is used to successively address them.

Hierarchy of controls

In order to prevent occupational hearing loss effectively under many different work situations and conditions, a comprehensive program must be employed incorporating noise control measures based on a hierarchy of control. The most effective control is placed highest in the hierarchy. According to effectiveness, the hierarchy of control measures follows:

- engineering control,
- administrative control,
- control of work practices, and
- control by use of protective equipment.

Each of the different types of control will be described next, and an example of each, with its impact, will be given.

Engineering control—If potentially harmful noise levels can be engineered out of the workplace, then hazardous exposures to miners would be virtually eliminated and mine-related noise-induced hearing loss would be a thing of the past. That is why the use of control measures is given highest priority. Examples of engineering controls would be:

1. using equipment designed to operate quietly by use of materials which absorb acoustic energy,
2. using mufflers on tools like stopers,
3. using shock absorbers or vibration mounts to control vibration,
4. isolating the miner from the noise source using a cab or specially-constructed room,
5. construction of other barriers between the noise source and the miner, and
6. employing a maintenance system which maintains lubrication and tightens vibrating components on machines.

If the noise level near a machine where a miner works is reduced from 90 dBA to 84 dBA, then there is reduced exposure for the miner and the long-term impact is reduced occupational noise-induced hearing loss. If, however, the noise level can only be reduced from 100 dBA to 90 dBA using best engineering controls, then additional control measures can be invoked to further reduce the noise to less than the NIOSH Recommended Exposure Limit (85 dBA). The additional control measures will be described next.

Administrative control—Even when the best available engineering controls for a particular mining situation have been employed, miners may still be exposed to hazardous noise levels. The next most effective method to control exposure is administrative controls taken by management.

Under the NIOSH ***Criteria for a Recommended Standard: Occupational Noise Exposure, Revised Criteria 1998***, the maximum time a miner may be exposed to a given noise level above 85 dBA is specified. In applying administrative control, management may control the time of exposure for each miner over a full shift by switching miners among jobs or tasks. By doing so, however, management must ensure that multiple miners are not exposed beyond maximum time limits.

An example application follows using the NIOSH noise-exposure recommendations. If a miner works near a machine at a location that realizes 88 dBA, a maximum of four hours of exposure would be allowed. After four hours, the task could be suspended until the next shift or another miner could be assigned to finish the task during the last four hours of an eight-hour shift.

Control by changing work practices—If best available engineering and administrative controls have been implemented, then further control of noise exposure to a miner in a work situation may be attained by changing work practices. This could be accomplished by moving a miner farther from the noise source, under certain conditions, or by modifying job tasks such that the miner is not exposed to noise levels beyond time limitations.

Noise intensity diminishes as a person moves farther from the noise source (by a law of physics); but this relationship doesn't generally apply in a closed space near a large noise source. Thus in the underground mining environment, it would be difficult to achieve a substantial reduction of noise exposure even if, for example, remote control were used to operate a continuous mining machine. The situation is different in many work environments at surface mines or plants/mills. If a miner works in an open area, then significant reduction in noise exposure can be realized by moving farther from the noise source. In some settings, it may be possible to operate a machine remotely and place a transparent barrier between the miner and the noise source, which can be very effective in reducing noise exposure.

When a miner is exposed to multiple noise sources, a noise survey can be taken to determine which sources in his work cycle caused the exposure. Once the noise sources have been pinpointed, say in a coal preparation plant, then management can ensure that the miner does not perform tasks for too long a period near the sources. In this way, overall compliance can be achieved.

Control by use of hearing protection—After all other controls have been applied, if the work environment still exceeds noise standards, then the only remaining noise exposure control method is the use of hearing protection. Even if other controls have been implemented, miners should still wear hearing protection in noisy areas. Details on the selection and use of hearing protectors were covered in the October 1998 Holmes Safety Association Bulletin article by Drs. Stephenson and Merry.

Even if hearing protectors are available, important guidelines must be followed for miners to accept them and wear them consistently (also covered in the October article). Further, the effectiveness of a hearing protector depends on its characteristics and how the miner wears it. It is important to realize that noise reduction ratings (NRRs) of hearing protectors may differ substantially, a specified NRR for a given protector may be overstated for different conditions of use, and some protectors are much more effective than others.

Other major provisions of a hearing loss prevention

program

Besides the hierarchy of controls described above, the NIOSH noise criteria document recommends standards for a hearing loss prevention program including noise exposure assessment, medical surveillance, hazard communication, training, program evaluation criteria, and recordkeeping. Each is explained briefly next. NIOSH encourages miners to participate actively in hearing prevention programs, which can effectively monitor their hearing and ensure that timely preventive actions are taken to protect their hearing over a working career.

Noise exposure assessment—In the noise criteria document, NIOSH recommends that employers be required to conduct assessments of noise-exposed miners using a specific American National Standards Institute standard. Noise exposure is to be measured without regard to use of hearing protectors. Initial monitoring is required to determine miners who will be included in the hearing loss prevention program, while periodic monitoring of the noise, at least every two years, is required for those sources of hazardous noise.

Medical surveillance—In the noise criteria document, NIOSH recommends that "employers shall provide audiometry (hearing exams) for all workers whose exposures equal or exceed 85 dBA as an 8-hour" time-weighted average, which places them in a hearing loss prevention program. The audiometry includes the following:

- a baseline audiogram before employment or within 30 days after employment for all workers who must be enrolled in the hearing loss prevention program,
- annual audiometric monitoring tests for all miners enrolled in the hearing loss prevention program, with an optional retest when the monitoring audiogram detects a change in a hearing threshold level in either ear that equals or exceeds 15 dB at 500, 1000, 2000, 3000, 4000, or 6000 Hz,
- a confirmation audiogram within 30 days after a monitoring audiogram detects a threshold shift in hearing,
- a review by an audiologist or a physician if a persistent threshold shift has occurred,
- the recording of the threshold shift as a significant threshold shift if the review validates it, along with establishment of a new baseline audiogram,
- employer action to protect the affected miner from further hearing loss, and
- an exit audiogram for a miner who is leaving employment or whose job no longer involves noise exposure.

During the above-described process, miners shall be notified of findings. During review, in cases where hearing loss is found to be not occupationally related, miners shall receive counseling for future actions.

Hazard communication—In the noise criteria document, NIOSH recommends that clearly-visible warning signs be placed at the entrance to or near work areas where noise exposures exist. It also recommends that all miners who are exposed will be informed of the potential consequences of noise exposure and the methods to prevent noise-induced hearing loss.

Training—The NIOSH noise criteria document recommends that employers shall institute a training program in occupational hearing loss prevention for all noise-exposed miners. The employer must also ensure miner participation in the program, and the training program must be provided annually for each miner in the hearing loss prevention program.

Program evaluation criteria—Also recommended is a requirement for the effectiveness of the hearing loss prevention program to be evaluated at the individual miner level and annually on a programmatic level.

Recordkeeping—NIOSH further recommended that employers establish and maintain records on exposure assessment and medical surveillance.

Remember:

- **With hazardous noise exposures engineered out of the work place, there is little likelihood that occupational hearing loss will occur.**
- **If hazardous noise exposures persist after best available engineering controls have been implemented, then occupational hearing loss can be minimized by limiting the time of exposure to noise in the workplace.**
- **If engineering and administrative controls are not effective or are unfeasible, the next most effective measure to control hearing loss is change of work practices to reduce the time of exposure.**
- **Finally, properly-fitted, correctly-worn, and appropriately-selected hearing protection should always be used in the presence of a hazardous-noise workplace. Wear hearing protection: They're your ears!**

Automated Archveyor® mining system

With annual production exceeding 100 million tons, Arch Coal, Inc. is the second largest US coal producer. Arch is head-quartered in Saint Louis, Missouri and operates mines in Utah, Colorado, Wyoming, Illinois, Virginia, Kentucky, and West Virginia.

In late 1990 Arch established Arch Technology, a small group of mechanical and electrical designers and engineers to begin work on an automated highwall mining system. The Arch automated highwall mining system, known today as the Archveyor® (AAMS), was designed, built and subsequently installed in the Hanna basin of southern Wyoming in June 1992.

The AAMS automated highwall mining system is made up of three major components:

- Automated continuous miner,
- 720 ft long armored chain conveyor (capable of being extended to over 1,000 feet) and
- Loadout vehicle for loading 150 ton haul trucks.

The chain conveyor utilizes the same chain for both tramming the machine and conveying the coal. The conveyor is raised up off of the ground by hydraulic lift cylinders in the convey mode. The sides of the conveyor can be programmed to raise simultaneously or independently depending on conditions such as seam pitch. For tramming the hydraulic cylinders are retracted, dropping the conveyor to the ground. This places the entire length of the return side of the chain conveyor in contact with the floor providing tremendous tractive effort for moving the machine either forward or reverse.

The conveyor is equipped with two speed drives, slow for tramming at 56 ft./min. and fast for conveying at 173 ft./min.

Ventilation to the face is maintained by using an auxiliary fan located at the outby end of the conveyor. The fan blows air through a flexible ventilation tube housed within covers on the conveyor.

The 720 ft. long conveyor is equipped with 28 evenly distributed, 1000 volt 40 hp drive motors. This provides the tractive effort that enables the machine to maneuver in steeply pitching seam conditions. At Arch of Wyoming we experience difficult mining conditions with the seams generally dipping over 18%.The conveyor has had very little difficulty with these grades even when pulling a disabled continuous miner out of the hole.

The loadout vehicle transfers the coal from the chain conveyor to the 100 and 150 ton haul trucks. It serves as the main control center for the AAMS. It houses the computer controls, the main power center, the hydraulic pump station, the power cable reel and the operating technician station. Arch of Wyoming uses a 7,200 volt primary power feed to the AAMS transformer. The AAMS voltage is 1,000 volts.

Each piece of equipment in the AAMS is linked by the computer controls. To start the mining process, the AAMS is placed in manual, a ground man starts the continuous miner using conventional remote control. Once the ground man has the machine positioned on the correct heading he turns the controls over to the operating technician. The operating technician then initiates the computer controls to fully computer automate the mining system. The computer is programmed to cut, load and convey the coal automatically. The AAMS mining system is designed to be a truly automated continuous mining system as opposed to a remote control mining system.

The miner is programmed to advance a set distance before the chain conveyor moves up behind it. The continuous miner automatically sumps, shears down, sumps, and shears up in a continuous cycle. The miner's boom position and distance from the conveyor are monitored by computer so that coal is transferred without spillage.

Machine navigation and coal quality are maintained by the gamma detectors, inclinometers and a gyroscope on board the miner. Although they are seldom used the machine is also equipped with video cameras. Data from the gamma detectors, inclinometers and gyroscope is fed to the computer where it is analyzed. The computer then automatically signals the continuous miner if any adjustments are needed to keep the machine in seam and on azimuth. If for some reason there is an extreme adjustment required, for example due to a geologic anomaly, the operator can at any time override the automated controls.

The horizon and azimuth controls have proven to be very reliable and accurate. They have enabled Arch of Wyoming to maximize reserve recovery through multiple pass mining. By split loading or segregating high ash material the AAMS coal quality consistently surpasses that of the surface mine.

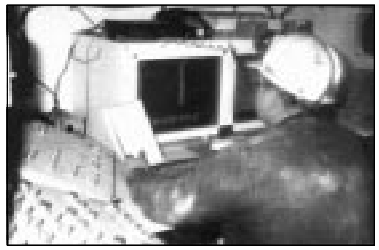
In auto mine mode the continuous miner repeats the shear and sump cycle until the tip of the miner discharge boom is at the front edge of the conveyor hopper. At this point the computer commands the conveyor to be advanced to the miner. During the conveyor advance sequence the miner is programmed to be in the shear up cycle. This utilizes the area below the drum and in front of the miner pan as bunker space so it can continue to cut coal while the miner conveyor is off during the advance. This assures maximum utilization and efficiency of the continuous miner.

The conveyor advance cycle takes approximately 30 seconds. When the computer commands the chain conveyor to advance, the miner conveyor is automatically turned off to clear enough top chain at the chain conveyor hopper end to prevent spillage behind the miner. The computer then commands the chain conveyor to lower to the ground, advance to the miner and raise to enable material to be conveyed again. When the return side chain is off the ground, the chain conveyor and miner conveyor are both started and the mining cycle resumes.

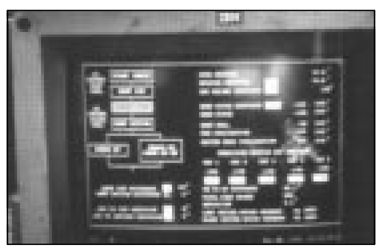
The operator station provides the operating technician critical feed back on the status of the AAMS. Allen Bradley controls are used to sequence the miner, conveyor and loadout vehicle. Information generated by the ring laser gyro, gamma detectors and inclinometers is monitored by the operating technician to maintain horizon and azimuth control. Self diagnostics have been integrated into the controls to improve speed of trouble shooting and system protection.

Hydraulic system pressure and temperature as well as the electrical control box temperatures are monitored to assure machine safety. Motor currents are monitored for all conveyor drive motors and the cutter head motors on the miner. System current is monitored on the loadout vehicle power center. Critical mining sequence functions such as miner heading, pitch, sump distance, shear up, shear down and system move ups are displayed for the operating technician.

A data acquisition system located in the control cab, provides a history of key operating parameters for the AAMS. The data acquisition system is in essence an automated real time generated time study for the entire system. The data can be periodically downloaded so that hard copy reports may be generated.



The Archveyor system operator is positioned in a non-hazardous location away from the highwall and underground face area. The highwall mining system has operated in Wyoming without a lost-time injury since it began in 1992.

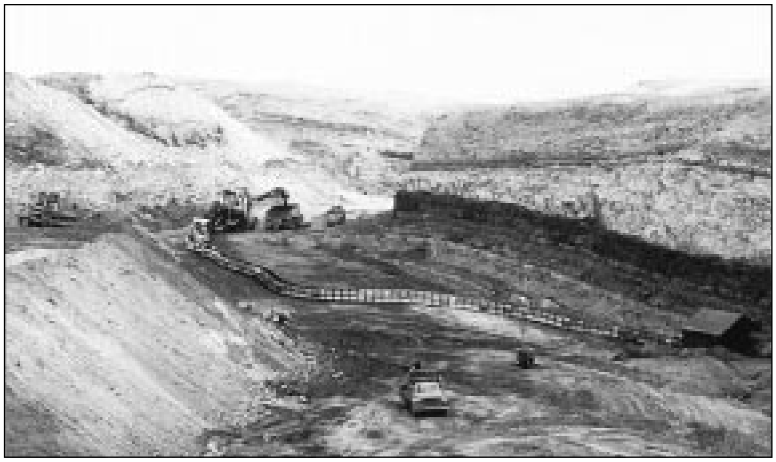


Computer automation—Totally autonomous mining through user-friendly PLC controls minimizes the need for technical specialists.

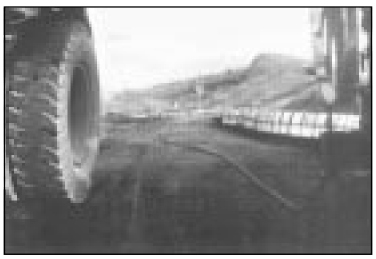
Every step that the system takes is controlled by the computer. Therefore, every move can be timed and recorded. For example, the data acquisition records the number of shear downs and shear ups and the average time and maximum time it takes for those cycles. Those times, plus the recording of the sump distances for both top and bottom sumps can give the operator an instantaneous view of the current machine performance to compare it to established standards.

If something is wrong in some part of the mining cycle, the data acquisition system gives us up-to-date information to flag the problem. We can quickly start narrowing down a problem area as soon as we see the machine performance beginning to

Arch coal's mining complex in Wyoming has operated the Archveyor system in the Hanna Basin since 1992.



Steep pitch mining— Currently mining 30 percent dip seams while operating well under maximum available power. If required, the modular design enables an increase in power per unit length for steeper pitched seams.



deviate from established standards. The data acquisition system is one of the tools available to our operators to keep the machine at peak performance.

Our automated highwall machine requires just two operating employees per eight hour shift. The machine is hands off PLC computer controlled and consistently achieves 94% of the machine length of penetration in severely undulating seams dipping up to 26%.

The AAMS controls and automation have proven to be very accurate and reliable. Navigation is achieved by feedback from a ring laser gyro, inclinometers and natural gamma radiation sensors. These instruments provide data to the computer and machine operating technician to assure that the machine mines on a predetermined course or heading. Because of the accuracy and reliability of the navigational system, we have been able to mine parallel holes, make double passes in a single hole and even superimpose holes for maximum reserve recovery.

Our highwall mining system has achieved monthly production of 135,000 tons. Fully loaded productivity and operating cost has approached 240 tons per eight hour employee shift and less than $5.00 per ton respectively. However, this performance is not at the sake of the safety of our employees. We are very proud of our AAMS safety record. The AAMS automation inherently improves safety and minimizes employee exposure.

The entire AAMS is designed with safety in mind. The control scheme is designed and programmed with the number one goal being to recover the machine without sending anyone into the hole. Redundant communication systems and computer programming along with the ability of the chain conveyor to pull a disabled continuous miner greatly minimizes exposure of employees to typical mining hazards.

The high degree of automation and use of PLC controls on the AAMS reduces the number of employees exposed to normal mining conditions. The highwall system does not require anyone to be located in front of an active entry or near the highwall. Should a ground control failure or a methane or coal dust ignition occur there is no one exposed to the hazard. Even during routine maintenance no one is required to be located in front of the hole or near the highwall.

The low operating cost, high productivity and an outstanding safety record achieved by our automated highwall mining system has stimulated an interest in advancing the Archveyor® technology underground. From the beginning, it was anticipated that our automated highwall technology could eventually be applied underground.

In December 1994 the Arch Board of Directors approved funds for Arch Technology to design and build our first underground version of the AAMS. Design of the system began in January of 1995 and commissioning of the underground prototype Archveyor®was held at our Arch of Illinois Conant mine March 11th, 1997.

The underground Archveyor® system is made up of five major components.

- Automated continuous miner
- 506 ft long armored chain conveyor
- Stageloader
- Feederbreaker
- Automated extensible belt conveyor

The automated continuous miner is a hybrid machine consisting of a 12HM12 chassis with a 44 inch diameter, 14 ft wide, 12 CM style hard head that can be hydraulically retracted 6 inches on each side for maneuverability. The chassis is mounted on a 14CM crawler assembly to provide 15 inches of ground clearance while maintaining a 61 inch minimum cutting height. It has a wet bed scrubber system that can be exhausted from either side of the machine. The continuous miner is equipped with a ring laser gyro, inclinometers, and natural gamma radiation sensors for navigational monitoring and control similar to that on our highwall system. It can be operated by radio remote control, remote PLC control, or by total hands off PLC automation.

The continuous miner is also equipped with an Atmospheric Detecting System or ADS to measure air quantity and quality in the face. Arch Technology has obtained MSHA certification of the ADS as a methane detector. The ADS will enable us to comply with twenty minute methane tests at the face during secondary mining. In addition to methane detection the system can be utilized to detect Carbon Monoxide, as well as measure oxygen levels and air quantity in the face.

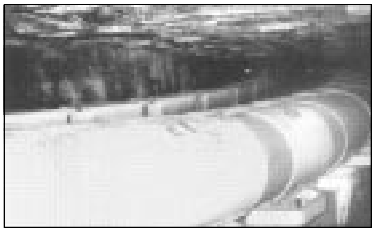
Coal is cascaded from the continuous miner into the AAMS continuous haulage chain conveyor hopper. The chain conveyor is a 506 foot long armored pan machine that is self tracking and is steered from either end. The conveyor is driven by multiple two speed 40 HP tangential drives spaced approximately 27 feet apart. The same chain that is used for conveying the coal is also used to tram the machine. In the convey mode, the chain conveyor is lifted approximately five inches off the ground by hydraulic lift cylinders located every other pan on either side of the machine. In the tram mode the hydraulic cylinders are retracted and the machine drops to the ground to place the bottom chain into contact with the floor. Tram and convey speeds of the conveyor are approximately 50 and 170 feet per minute respectively.

The continuous haulage chain conveyor is controlled through onboard PLC's. It is a rugged and robust machine designed for arduous mine duty and capable of pulling the boltercar or continuous miner. The machine has a total of 720 installed horsepower available for convey or tram. Hydraulics are provided to the system by a separate onboard 300 HP, 300 GPM pump station located at the outby car.

The continuous haulage chain conveyor is trapped along side the stageloader by a tongue and groove arrangement so that the two machines remain parallel. The tongue and groove arrangement works similar to trapping shoes on a longwall shearer or plow. The stageloader remains stationary as the continuous haulage chain conveyor moves forward and reverses during mining and place changing. Alignment of the continuous haulage chain conveyor, as it remounts the stageloader on the inby end, is maintained by a special alignment shoe. The outby end of the continuous haulage chain conveyor always remains trapped and parallel to the side of the stageloader and the special alignment shoe forces the continuous haulage chain conveyor to remount the stageloader in the correct position.

Coal is cascaded from the continuous haulage chain conveyor onto the side of the stageloader. The stageloader is a 560 ft long, extremely heavy duty, rigid structure made up of 13-1/2 ft long pan sections. The pan sections form a rigid beam in the horizontal axis but are flexible in the vertical axis through a pinned hinge joint. The machine is similar to an extra heavy duty low-low structure used with most continuous haulage systems. The stageloader is driven from the head section by a single 75 HP motor and a dual drive pulley arrangement. The two drive pulleys are made tandem through bull gears. Tension in the stageloader belt is maintained by a static hydraulic take up built as part of the drive frame. The tail section is also equipped with a static hydraulic take up to facilitate belt training, splicing, and maintenance. The belt itself is 42 inches wide and runs at 560 feet per minute. Operation of the stageloader is also controlled through a PLC.

Coal flows from the stageloader into a modified feeder breaker. The feeder breaker chain speed was increased to handle the high volumes of coal flow

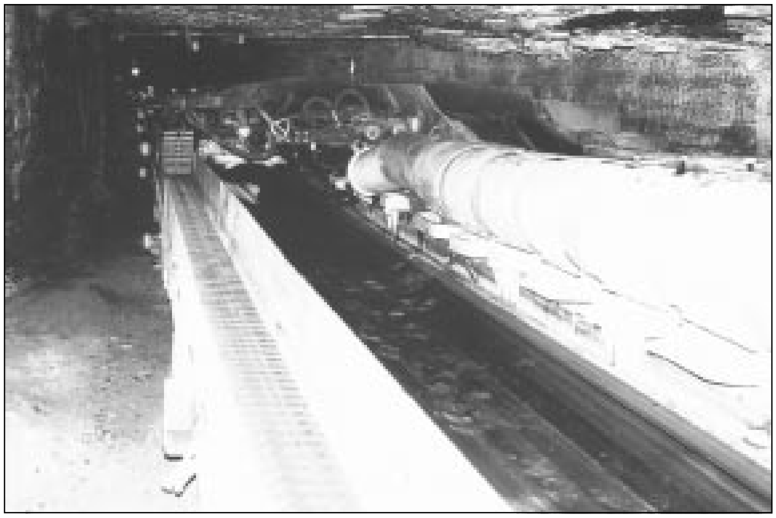


Flexibility— The Archveyor routinely mines through severe seam undulations. Underground, the conveyor's tight turning radius allows the system to turn right angles even off a narrow entry.

Diagnostics— A multitude of status and troubleshooting screens allows for more up-time. Predictive and preventive maintenance schedules can be automatically alarmed. Production data can be collected through real-time data sampling.

Archveyor systems use continuous, flexible, haulage conveyors that are computer controlled and monitored by a single operator.

Durable—The rugged mine duty design for both the mechanical and electrical systems have been proven and refined through years of operating experience.



from the stageloader. Onboard the feeder is a high volume water booster pump. Both the feeder breaker and water pump are PLC controlled and are part of the auto mine sequence.

Coal is loaded from the feeder breaker onto a 48 inch wide section belt. The section belt is an automated extensible belt system that uses multiple cassettes stored on a sled. This arrangement enables us to make up to 200 ft belt moves without handling any structure by hand. The cassettes are pre-loaded into the sled by a CLA scoop and automatically unfold as the sled is advanced by hydraulic stakker props. A belt storage unit is used at the head end of the section belt to expedite the belt moves. Advancing the belt requires only two people and a 100 ft belt move can be made in less than 30 minutes.

The underground AAMS has incorporated several additional safety measures. The AAMS is equipped with a ventilation system that minimizes the hazards of methane and coal dust ignitions. Ventilation to the working face is provided by a variable pitch auxiliary ventilation fan located on the outby end of the continuous haulage chain conveyor. The auxiliary fan blows air from the outby end to the inby end of the continuous haulage chain conveyor through a 22 inch diameter flexible wire reinforced vent tube. At the inby end of the continuous haulage chain conveyor a velocity sensor is used to provide the operating technician continuous air quantity readings.

In addition to the Atmospheric Detecting System on the miner and armored chain conveyor we have installed standard MSA methane detectors on the miner, boltercar and armored chain conveyor.

Fire suppression on the miner and continuous haulage chain conveyor is comprised of a heat sensitive thermal water valve system. The thermal water valves when opened due to excessive heat allow water to flow to a series of water spray nozzles strategically located on the machine. We are able to monitor when a valve has been activated through the PLC system. Arch Technology has applied for a patent on this system.

Rockdusting at the face is provided by a slurry dusting system. A hose reel similar to a shuttlecar cable reel is mounted on the outby end of the continuous haulage chain conveyor to keep the hose out of the travelway. Slurry is mixed and pumped from an outby location through a 1-1/2 inch hose up the chain conveyor to the boltercar where it is sprayed on the roof and ribs. The slurry dusting can be operated automatically by the PLC or manually.

The section power center is located just outby the Archveyor® system control cab in the entry adjacent to the belt. The primary mine power feed is 13,800 volts and the AAMS transformer steps it down to a system voltage of 1000 volts. All of the AAMS operates on 1000 volts.

The operating technician is positioned in a control cab located in the entry adjacent to the belt entry. The control cab at times is as far as 1200 feet outby the active face area. It houses the computer controls, Atmospheric Monitoring System display, video cameras and mine and AAMS communication. It serves as the main control center for the AAMS.

Although the AAMS can be operated manually, it is designed to be a truly automated continuous mining system. Each piece of equipment in the system is linked by the computer controls. Once the machine is positioned on the correct heading, the operating technician at the control cab initiates the computer controls to fully automate the mining system. The computer is programmed to cut, load and convey the coal automatically.

Machine navigation and coal quality are maintained by natural gamma radiation detectors, inclinometers, a gyroscope and several strategically located video cameras. Data from the gamma detectors, inclinometers and gyroscope is fed to the computer where it is analyzed. The computer then automatically signals the continuous miner if any adjustments are needed to keep the machine in seam and on azimuth. If for some reason there is an extreme adjustment required, for example due to a geologic anomaly, the operating technician can at any time override the automated controls.

The continuous miner automatically sumps, shears down, sumps, and shears up in a continuous cycle. The miner's boom position and distance from the chain conveyor are monitored by the computer so that coal is transferred without spillage.

In the auto mine mode the continuous miner repeats the shear and sump cycle unless the tip of the miner discharge boom reaches the front edge of the chain conveyor hopper. At this point the computer commands the miner to stop conveying coal until the chain conveyor is advanced enough to prevent spillage. During the chain conveyor advance sequence the miner is programmed to be in the shear up cycle. This utilizes the area below the drum and in front of the miner pan as bunker space so it can continue to cut coal while the miner conveyor is off. This assures maximum utilization and efficiency of the continuous miner.

When the tail of the continuous miner reaches the front of the continuous haulage chain conveyor hopper, the computer commands the continuous haulage chain conveyor to advance, the miner conveyor is automatically turned off to clear enough top chain at the continuous haulage chain conveyor hopper end to prevent spillage. The computer then commands the continuous haulage chain conveyor to lower to the ground, advance to the boltercar and raise to enable material to be conveyed again. When the return side of the continuous haulage chain conveyor is off the ground, the chain conveyor, boltercar, and miner conveyors are all started and the mining cycle resumes.

The operator station provides the operating technician critical feed back on the status of the AAMS. Allen Bradley controls are used to sequence the miner and continuous haulage chain conveyor. Information generated by the ring laser gyro, gamma detectors and inclinometers is monitored by the operating technician to maintain horizon and azimuth control. Self diagnostics have been integrated into the controls to improve speed of trouble shooting and system protection. Hydraulic system pressure and temperature as well as the electrical control box temperatures are monitored to assure machine safety. Motor currents are monitored for all conveyor drive motors and the cutter head motors on the miner. System current is monitored at the power-center. Critical mining sequence functions such as miner heading, pitch, sump distance, shear up, shear down and system move ups are displayed for the operating technician.

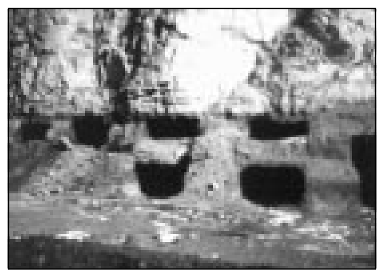
The ultimate mining concept for the AAMS includes development of gateroads and bleeder entries similar to a longwall panel. The block of coal between the headgate and tailgate will be approximately 480 feet wide. The AAMS will cut or wing mine from headgate to tailgate leaving approximately 4 ft wing blocks between successive holes. The underground mining plan is much like our highwall mining plan except that belts will be the primary haulage rather than trucks.

Once gateroad development is completed wing mining can begin. Wing mining is very similar to highwall mining with the belt entry rib analogous to the pit highwall. As with highwall mining no roof support will be installed. Mobile roof supports will be used in the belt entry for breaker support at the intersection of the wing cut and the belt entry.

Because of the high degree of automation the manning required for the AAMS is minimized. The highwall mining system manning consists of just two employees per shift. Manning utilized for the underground AAMS depends on what mode of operation we are in:

Adaptable—Archveyors have the ability to incorporate a variety of subsystems for safe, cost-effective mining, including atmospheric monitoring and ventilation systems.

	Gate development	Wing mining
Operating technician	1	1
Boltercar operators	2	
Scoop	1	
Electrician/ Rep airman	1	2
Ventilation	1	
Outby/Belts	2	2
Supervisor	1	1
Total	9	6



Navigation—A Honeywell Ring Laser Gyroscope (RLG) has been used for automatic steering control since 1992.

Within Arch, the AAMS is no longer considered a prototype machine. As a highwall machine it has become the safest, most productive, and lowest cost producer within Arch. In 1998 Arch decided to make the technology available to other mining companies by offering contract mining services through Arch Technology. Arch Technology has already secured one highwall mining contract in the US and is close to securing another in Australia. Arch Technology believes that the AAMS will eventually become the standard for safety, productivity and cost for the mining industry just as it has within Arch.

Reprinted from an article supplied to the Bulletin by Danny Stickle, Vice President and Director of Mining, Arch Technology Corporation, (304) 534-4413, ext. 15

New training standards coincide with surge in jobs at rock and sand and gravel quarries

Anticipating a wave of new highwvay projects that will greatly increase demand for crushed stone, the Labor Department's Mine Safiety and Health Administration (MSHA) is reaching out to miners at rock quarries and sand and gravel operations to help develop safer training programs.

The first of seven public meetings was held Monday, December 7, at the Hilton Hotel, 2855 N. Milwaukee Ave., Northbrook, Ill., from 8 am to 5 pm. Congress has directed MSHA to develop final training regula1ions by next Sept. 30.

J. Davitt McAteer, assistant secretary of labor for mine safety and health underscored the urgency of providing safety training for these miners.

"With passage of the $217 billion highway construction bill, the demand for crushed stone used in building new roads may increase by about 40 percent," McAteer said. "This means a surge in jobs, many of them going to new, inexperienced miners. These miners deserve effective safety training program." The highway bill was passed by Congress this year.

The Federal Mine Safety and Health Act of 1977 requires each mine operator to have a health and safety program for its miners. Since 1980, however, language in the appropriations bills prohibited MSHA from enforcing miner training in sand, gravel, and surface stone operations

"This is a major step forward," said McAteer. "Congress has given us the green light, and we plan to move ahead to create training standards designed for all of these miners. I encourage anyone in tbese industries—miners as well as mine operators—to attend the meetings and give us thelr thoughts on what should be included in the new regulations." About 10,000 mines and 125,000 miners nationwide will be affected.

Reprinted from a Dec. 4, 1998 News release—No. V-321, U.S. Department of Labor, Office of Information, Chicago, IL 60604, Mine Safety and Health Administration, Contact: Amy Louviere, Te1: 703-235-1452.

New refresher training for coal truck drivers

Once in a while something new comes along in the field of mine safety that makes good sense. Such was the case recently when Safety Associates, Inc. of Charlotte, N.C. developed a safety training program exclusively for coal truck drivers. At first this may not sound like a big deal, but let's take a closer look at what we have here.

Under MSHA regulations, (30 CFR 48.28), all miners are required to have 8 hours of safety refresher training annually in order to be allowed to continue working. Until now, this refresher training has always been aimed mostly at those miners whose jobs involve the extraction of coal and has not been exactly meaningful to those who drive the trucks and haul the coal. Drivers have been categorized by MSHA as "miners" and have had to take the same refresher training as all other miners, even though their jobs were quite different.

When Safety Associates became aware of the need for refresher training that met MSHA requirements and was, at the same time, relevant to coal truck drivers, they contacted Wayne Maxwell, Training Director in MSHA District 6 in Pikeville, Ky. and with his advice and assistance, devloped the end result which is a safety refresher program for coal truck drivers.

In order to meet the overall MSHA requirements for annual refresher training, the 8-hour program includes such things as emergency action, ground control, electrical hazards, first aid, and explosives but here's what makes this training program different from the others. Of the eight hours of instruction time, Safety Associates has devoted a two-hour segment to "Transportation Control" featuring a video filmed in and around Whitesburg, Ky. This video contains typical scenes of surface mines, underground mines, finishing plants, haulage roads, dumping and stockpiling. These scenes show many potentially hazardous conditions that drivers face on a daily basis. The video is entitled "Safety Training for Coal Truck Drivers" and it is part of a more comprehensive program called "Accident-Free Truck Driving".

Here is the way this "Transportation Control" segment will be conducted in the refresher. Each driver/participant will receive a workbook in which to answer questions as they

appear in the video. The video has six basic parts:

- Your Truck and Your Safety Zone
- Loading and Leaving the Mine
- Traveling Secondary Roads
- Driving on Primary Roads
- Hazardous Conditions
- Dumping and Stockpiling

After each part in the video, the instructor stops the tape and the drivers answer the questions in their workbooks. When the instructor restarts the tape, the narrator answers the questions and the drivers check their own answers. This way, there are no papers to grade and the drivers have the opportunity to discuss the questions and answers if they want to. This method of instruction has proved to be superior to just a lecture and possibly some handouts.

All drivers who complete this segment of the training receive an attractive "Accident-Free Truck Driving" lapel pin and a wallet-size certification card.

Safety Associates has applied for, and received, MSHA approval of this training course for use in all, MSHA coal districts.

There are a number of benefits to be gained by the use of a specialized refresher training course for coal truck drivers. (1**) A class will con sist of drivers only.** Everyone in the class will share common interests, problems, and concerns. They speak the same language. They will be more likely to participate since they will not be in the minority among other miners. (2) The **sub ject matter is relevant to drivers.** For most refresher training, the material should be as "mine specific" as possible but with truck drivers, it is a different matter. Most drivers will visit many mines, and other facilities as well, during the course of a year, so their training will be enhanced by being more "job specific" rather than "mine specific". (3) **Everyone will benefit by distinguishing between "miners" and truck drivers.** By providing separate training for truck drivers, it allows the regular refreshers to be even more attuned to mine-site employees and thereby raise the level of effectiveness for everyone concerned.

While safety in coal hauling is the primary focus of this refresher, it is by no means the only subject covered. For example, a substantial portion of the day's training is devoted to first aid. No one questions the advisability of this because a coal truck driver who is knowledgeable in first aid is a valuable asset whether he is at a mine site, on a highway, or loading a railcar somewhere. As one miner said recently, "If I suffer an injury on the job, I want to be **sur rounded** by people who know first aid."

The question naturally arises as to whether a coal truck driver really needs to know anything about explosives, respiratory devices or some of the other refresher subjects in order to be a good truck driver. The answer is that it may not help him with the actual task of driving but it will certainly raise his awareness of the conditions and the environment in which he operates. A coal truck driver's working life is built around coal mining and related activities. The more he knows about the total field of mine safety, the more valuable he becomes.

This new MSHA-approved refresher training for coal truck drivers makes sense in a lot of ways. Not only does it provide good safety information, it re-emphasizes to the drivers, the importance of the work they do. This element of training has not been present in the existing refresher format.

With this new approach, the quality of safety training will be elevated and mine safety in general will have taken another step forward.

Ron Sullivan, Safety Associates, Inc.
Charlotte, NC 28204 704-334-8690

Miners escape coal fire, but jobs in limbo

By Hilary Groutage and John Heilprin

A half-hour after leaving the Willow Creek Coal Mine to eat lunch in his truck, Doug Gardner noticed smoke pouring from the mine portal.

Soon afterward, dozens of Gardner's co-workers streamed out of the burning mine.

"There were some tense moments," recalled Gardner on Thursday. ''There were about three guys who were unaccounted for for about 20 minutes. We eventually were able to contact them."

In fact, all the miners—about 100—escaped Wednesday evening's blaze at the Cyprus Plateau mine just north of Helper, 110 miles southeast of Salt Lake City.

The blaze apparently originated from a long-wall section of the mine, said Gardner, a 39-year-old miner with 20 years' experience. ''You could see smoke just coming out of the portal."

Portals to the mine were sealed by 3 am Thanksgiving Day. They will remain closed to allow the fire to burn out.

"The situation is being continuously monitored to determine when re-entry can be safely executed," said Nadine Crabtree, a receptionist with Cyprus who was assigned to handle news-media inquiries.

Officials from the Mine Safety and Health Administration spent Thursday at the scene, and the smoke prompted the closure of Utah [route] 191 between [the towns of] Duchesne and Helper.

For Carbon County Sheriff, Jim Robertson, the flames were a grim reminder of the winter day in 1984 when a massive fire erupted in the Wilberg Mine in neighboring Emery County, killing 27 miners. "I thought, 'Oh no. Not again,'" Robertson said by phone Thursday.

But death was avoided this time. As smoke spread through the Helper area, emergency crews from neighboring towns mobilized and alerted residents that an evacuation center had been set up at an elementary school in Wellington.

The school, about 20 miles south of Helper, was set up to handle 250 people, but only 100, mostly elderly people with respiratory problems, showed up. Of those, less than two dozen spent the night on cots provided by the Elks club.

"The young really pitched in to help the old," Robertson said.

Stella Gigliotti lives with her husband, Ross, near the burning mine. The couple stayed put with their dog because the smoke seemed to blow around the mountain and miss their home.

"I could smell it, but not in the house," she said. "The Fire Department stopped by our place and said we could go on to Wellington, but we were OK."

Carbon County Commissioner Neil Breinholt helped oversee operations at the emergency dispatch center. While no lives were lost, Breinholt fears the economic fallout from the fire could be devastating.

"The fire can have some quite negative consequences on our community," he said. "The impact of this is hanging in the wings. If that mine isn't healthy, the impact could be vast."

Breinholt said mine officials hope to re-enter the mine in three or four weeks to assess the damage and see if the mine can be reopened. In the meantime, some workers will return to work today, while others may be on call for weeks. A statement from Cyprus offered no details.

Cyprus employee Albert Lodeserto has worked in coal mines for 18 years. He will resume his work today at the mine's tipple, where the coal emerges on a conveyor belt. "I'll work on surface operations with a Cat to do maintenance," he said.

Crews probably will be cleaning up for days, Breinholt said, although Crabtree would not comment any further than to read a brief statement from Cyprus officials, who praised the quick work of emergency crews.

"Cyprus is extremely pleased with the response from Willow Crcek employees, local and state law enforcement, fire departments, local emergency-response teams and mine emergency-response teams and the local telephone company for their effective response to this situation," the statement said.

Though he was never in danger, the ordeal left Gardner in an appropriately thankful mood on Thanksgiving.

"It could have been much worse. We didn't have an explosion or anything," the miner said. "We're all out of work now, but at least we're all safe."

Reprinted from the Friday, November 21, 1998 edition of the ***Salt Lake City Tribune.***

TRAM conference/national mine instructors seminar

Annual materials competition

An important feature of the annual TRAM Conference/National Mine Instructors Seminar is the training materials competition—now in its third year. This 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. Seventeen organizations entered a total of 31 separate items this year. The materials were judged by a panel of safety experts prior to the conference. 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 is 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 years winners included:

- Academia (coal): The Pennsylvania State Univ. for “Lifting and Industrial Slings”.
- Academia (metal/nonmetal): The Pennsylvania State Univ. for “Guarding” and “Slips and Falls”.
- Academia (general): Michigan Technological Univ. for “Jepardy”, a version similar to the popular TV show.
- Industry (coal): Pittston Co.—Steam Division for “Life and Death”, a book of safety materials along with 2 video tapes.
- Industry (coal): Special recognition for second place: Texas Utilities Mining Co. for “Monticello Mine Presentation”, a videotape on escape/evacuation/firefighting/burns.
- Industry (metal/nonmetal): TIC Industrial Co. for “Properties of H_2S”
- Industry (general): Cargill Salt Division for “Hearing Protection”
- States (coal): Virginia Dept. of Mines and Minerals for “Halt Program”, a series of books addressing various health and safety issues.
- States (metal and nonmetal): Kansas Dept. of Mines for “Silica/Silicosis Flipcharts”, and
- State of New Jersey for “Accident Reduction”, a computer Powerpoint presentation. (Tied for first place in this category).
- States (general): Illinois Dept. of Natural Resources for “Surface Powered Haulage Accidents”, a video presentation.

Grand Prize Award: The traveling trophy went to Pittston Co. for their “Life and Death” program.

In addition to the winners, some very good materials were received and should be recognized. In the industry category, CNA Risk Management submitted an excellent manual on “Accident Investigation”; Marrowbone Development Co. entered two outstanding videotapes on their “Pathways to Safety” series; American Electric Power entered material on “Roof and Rib” and “Annual Retraining”; The U.S. Gypsum Co. entered a “Front-End Loader Training” booklet; and the Drummond Co. entered a “Belt Fire Exercise” using a variation of the latent image program.

In the states category, West Virginia entered programs for “Surface Mine Contractors”, and “Remote Control Continuous Miner”; and Colorado entered their innovative “Internet Home Page”, which enables computer users to access a wealth of information.

In the academia category the Pennsylvania State Univ. entered several video tapes and booklets.

Submitted by John Hymes, MSHA Academy

In the photo at left: from left-to-right: Asst. Labor Commissioner Leonard Katz; Dep. Commissioner Fred Lopez; Commissioner Mel Gelade; Mine Safety Educ. Tech. James Corey; and Director Louis Lento

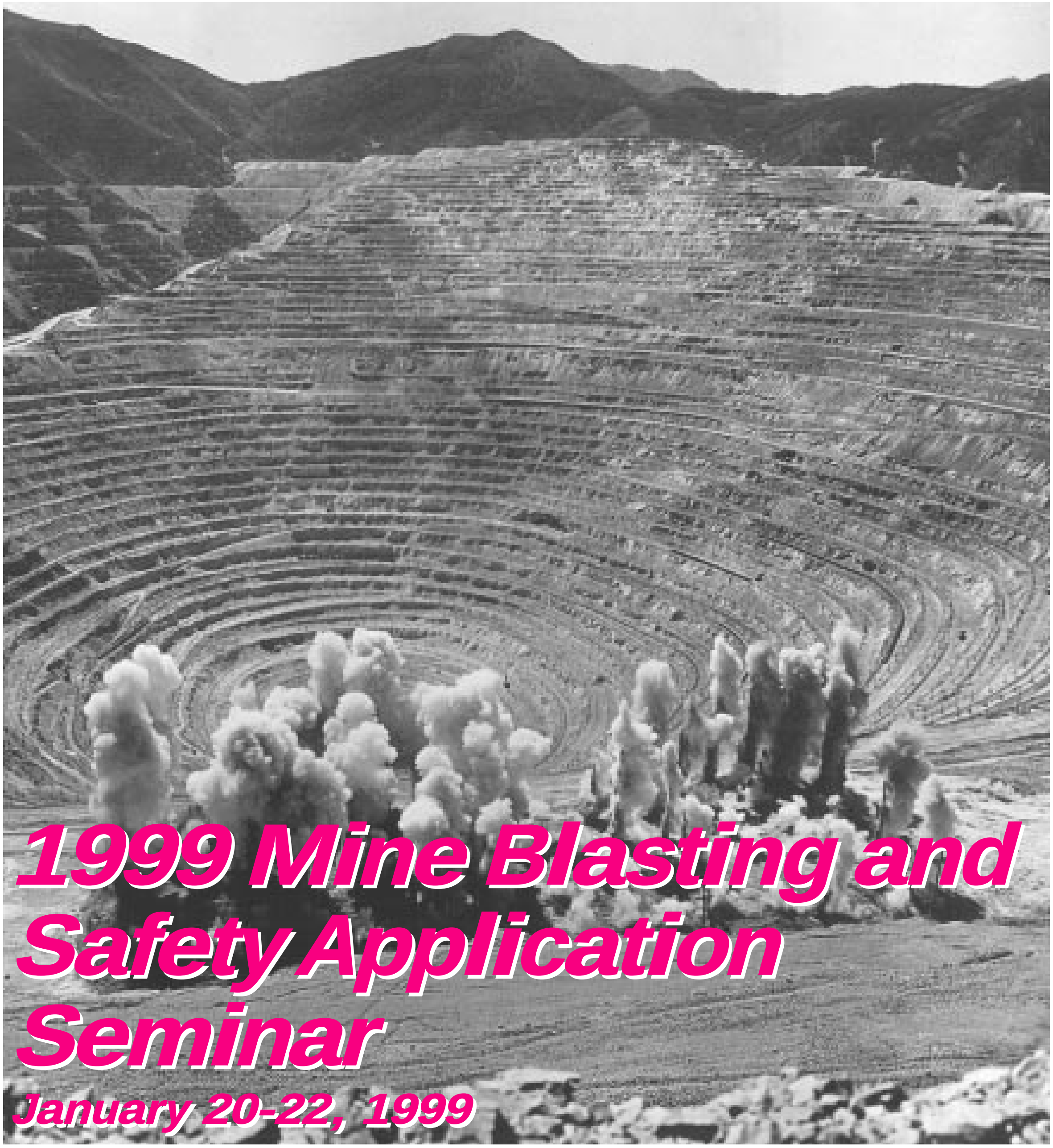
NJ man winner in TRAM contest

On November 23, 1998 James Corey, New Jersey Dept. of Labor, Mine Safety Education Technician, presented a plaque to New Jersey’s Dept. of Labor Commissioner Mel Gelade.

James entered MSHA’s Annual Training Materials Competition and won first place in “State-Metal/Nonmetal Mining” for his program entitled “Accident Reduction.”

We at the New Jersey Dept. of Labor wish to congratulate Jim for his excellent work and look forward to his continued input in the coming year.

Submitted by Joyce Crea, New Jersey Dept. of Labor



1999 Mine Blasting and Safety Application Seminar

January 20-22, 1999

Response and participation from the previous 12 blasting seminars held at the National Mine Health and Safety Academy indicate that MSHA, state agencies, industry, and other related groups believe our seminar to be an excellent medium at which to exchange blasting related information. These seminars establish good basic methods that can be used to develop effective safety programs. These programs will affect not only industry accidents, but provide avenues of information exchange to make blasting practices more efficient and productive for coal mining, metal/nonmetal mining, and the construction industries.

To expand this medium and exchange, the National Mine Health and Safety Academy will again hold a Mine Blasting and Safety Application Seminar on January 20-22, 1999. The Seminar will concentrate on the most recent blasting techniques, trends, and developments, and will be geared toward mining company managers, blasting engineers, blasters, construction personnel, and others involved with the planning, design, and use of explosives.

Presentations will be made by the most qualified persons in industry. They will be offered several times throughout the day so participants can attend as many presentations as possible.

Your input and participation in these events are welcome.

Metal/Nonmetal fatal accident summary

Fatal exploding vessel under pressure accident

General information

A 44-year-old shift manager was fatally injured at about 5:10 a.m. on August 23, 1998 when a pneumatic pipe plug ruptured. He had a total of 22 years mining experience, all as a supervisor at this operation.

The operation is a surface taconite mill located in Minnesota. The mill was normally operated three, 8-hour shifts a day, seven days a week. A total of 753 persons was employed.

Taconite ore was drilled and blasted from multiple benches in a company-owned pit located several miles away. Broken material was loaded into trucks or rail cars by shovels and front-end loaders, then transported to the mill for processing. The finished product was iron ore pellets.

A private contractor had been enlisted to clear an obstructed waterline and had worked at the mine on August 21, 1998, when they initially installed the plug in the waterline. The mining company had enlisted the services of this contractor on previous occasions.

Description of accident

On the day of the accident, the victim reported for work at 3:00 am. His normal work shift started at 7:00 am, but the night shift team leader was absent and the victim and another shift manager split the night shift, each working an additional four hours.

A short time after the victim arrived, he and the other shift manager, went to the excavation nearest the agglomerator building where they found that the plug, which had been installed two days prior by a contractor had deflated and was floating in about 3 feet of water. The equipment tender and two attendants, were assigned to help the shift managers reinstall the plug.

At about 4:50 am, after the water in the excavation had gone down, the plug was reinstalled in the pipe. However, it was not inserted at least 30" into the pipe in accordance with the manufacturer's installation instructions. The plug installed in the opening was a large multi-size Muniball pneumatic plug. The deflated plug was about 22" in diameter and 58" in length and could be used in pipes from 24 to 42" in diameter. The rubber sides of the plug were tapered, leaving an opening over which inner and outer cast iron plates were bolted together to seal the ends. The cap on the front end plate had been modified with two short extensions. One extension served as a water and air relief outlet and the other was used to introduce compressed air into the plug. Both extensions were equipped with quarter-turn ball valves and the air inlet extension was equipped with a pressure gauge. Both outer plates were stamped with a notice "***Must inflate to maximum of 25 P.S.I.G. (1.7 Bar.)***". A 3/4-inch air hose connector had been attached to the air inlet extension on the front cap with a quick-coupler fitting. The plug showed signs of deterioration as characterized by cracks in the elastomers throughout its outer surface. Cracks had split into the polyester cords in the middle ply of the three-ply wall of the plug.

Air was supplied from a 3/4-inch hose attached to a truck-mounted Ingersoll Rand compressor. This compressor had a starting pressure of 45 p.s.i. and was equipped with a load button which, when activated, allowed the discharge pressure to reach 109 p.s.i. The pressure could not be regulated down to 25 p.s.i., as required by the plug manufacturer.

The victim operated the compressor and the shift manager attached the air hose and inflated the plug. The pressure gauge on the plug was under water and could not be seen. After the plug was inflated, the victim shut off the compressor and checked for leaks. He and the shift manager saw air bubbles indicating a leak and water was seeping around the plug. The shift manager opened the relief valve and bled some air out of the plug. The victim restarted the compressor, then returned to the pipe and knelt down over the opening with a flashlight to check for seepage. He then turned the air hose on to further inflate the plug.

About 30 seconds after the victim opened the air valve, the plug ruptured violently. He was thrown several feet by the force of the blast. The victim was unconscious and first-aid treatment was administered immediately by co-workers.

The local 911 emergency assistance number was called and an ambulance arrived a short time later. The victim was transported to a local hospital where he was pronounced dead. The four other employees were not seriously injured.

Conclusion

The accident was caused by failure to follow the manufacturer's recommendations. The plug was not positioned to the prescribed depth in the pipe and the maximum inflation pressure was exceeded. The deteriorated condition of the plug was a possible contributing factor. The lack of task training was also a contributing factor.

Extracted and edited from an MSHA accident investigation abstract by Fred Bigio.

Coal accident summary

Fatal fall of rock accident (surface coal mine)

General information

The mine consists of two pits with one spread of equipment used for both pit areas. The mine produces coal from six coal seams. The mining process involves drilling holes, inserting and detonating of explosives, and removing overburden and coal from each seam as the process is repeated. Coal is then transported by truck to loadout facilities at a processing plant 13 miles away.

A private contractor was contracted to mark drill hole locations, insert explosives into drill holes, and detonate these explosives.

The mine employs 34 persons. Four production crews are used by the company. A 12-hour day-shift and 12-hour night-shift operate on four consecutive days. Another set (day- and night-shift) of crews operate the next four days. The crews alternate working every four days. Maintenance is conducted as scheduled and needed. The mine normally operates seven days-per-week, producing an average of 1,300 tons of coal per day.

Description of accident

On October 5, 1998 at about 6:00 pm, the night-shift crew consisting of 12 employees entered the mine for the regularly scheduled production shift. The night-shift foreman assigned the employees their duties.

Prior to the start of the second shift, three contract employees, loaded drill holes and blasted overburden material from the No. 1 Pit, located about 20 feet from the No. 2 Pit. Detonation of the explosives occurred at about 5:30 pm. After detonation of the explosives, the certified blaster examined the No. 1 and No. 2 pit areas for hazards. He examined the highwall before marking hole locations to be drilled and found no hazards.

Soon after the detonation of explosives and the post-blasting examination, night-shift personnel resumed the mining cycle. One of two bulldozer operators began removing overburden opposite the No. 1 pit. The other bulldozer operator was operating a bulldozer at the No. 1 Pit. The victim trammed an Ingersoll-Rand Model DML-45 highwall drill onto the Hazard #4 Rider bench, while three contract employees were at the bench marking drill hole locations. The contract employees finished marking the hole locations and left the bench site. The victim started to drill holes in the bench, beginning with marked locations adjacent to the No. 1 Pit. The victim drilled one hole in the pattern directly under the highwall and began to drill a second hole. At about 7:00 pm, while moving overburden material, the other bulldozer operator observed the mast of the highwall drill operated by the victim shake violently and a large cloud of dust encompass the highwall drill. The other bulldozer operator attempted to contact the victim via a citizens band radio, but there was no response. The bulldozer operator, who was removing overburden adjacent to the highwall drill, overheard the other bulldozer operator attempt to contact the victim and looked in the direction of the highwall drill. He stated that he could see a cloud of dust in the area where the drill was located. He left his bulldozer and proceeded to the highwall drill where he observed that the operator's cab had been severely damaged by rock. He could only see the victim's arm extending from the operator's cab. The other bulldozer operator also went to the drill site. The mine emergency technician located on mine property, heard the attempt to contact the victim via citizens-band radio and traveled to the scene. The mine emergency technician checked the victim for vital signs but was unable to detect a pulse.

The three blasting contractor employees that had previously marked the drill hole pattern were about 600 feet from the bench area. They noticed a dust cloud from the location of the drill, and informed the night-shift foreman, who was traveling to meet with them about another blast area. The night-shift foreman then went to the accident site.

At 7:06 pm, the night-shift foreman called for emergency assistance. The rescue squad and the Kentucky Department of Mines and Minerals Rescue Team from Pikeville, Kentucky, were dispatched to the scene. Company personnel attempted to rescue the victim using equipment on mine property. At 9:45 pm, enough rock had been removed from the cab to allow the county coroner, to check the victim for signs of life. None were found and the coroner pronounced the victim dead. Recovery activities continued until 10:30 pm, when the victim's body was recovered from the cab of the highwall drill. The victim was transported from the mine site by the coroner.

Conclusion

The accident occurred because loose, unconsolidated material was allowed to exist on the highwall above the No. 2 Pit while drilling operations were in progress. Contributing factors to the accident included inadequate examinations for hazardous conditions on the highwall and the failure to comply with the company's ground control plan. The drill was positioned in close proximity to the highwall which substantially increased the victim's exposure to hazardous highwall conditions.

Extracted and edited from an MSHA accident investigation abstract by Fred Bigio.

DANGER IN AND AROUND MINES

Cold stress, hypothermia, wind chill, and frostbite

Cold stress: Preventive measures

Miners can more easily protect themselves from the effects of cold stress than heat stress. Exposure to a cold environment, however, can cause health problems and serious injury.

The body mainly uses two protective mechanisms to limit the impact of cold stress. A reduction of over 5 percent blood flow occurs in the fingers and toes. This vasoconstriction results in a marked drop in the skin temperature to help prevent heat loss. When the vasoconstriction is no longer adequate to maintain a balance of the body's heat, an increase in metabolic heat production by shivering becomes important.

A worker's body temperature can be maintained with the proper insulation obtained from clothing. However, the cold insulating properties will greatly diminish when the clothes become wet from water or sweat during intensive physical work.

To prevent cold stress, several factors have to be considered—from the individual worker to the environment. Cold stress injuries can be limited or prevented by acclimatization, water replacement, medical supervision, proper clothing, and training. The cold environment can be controlled through engineering controls, work practices, work/rest schedules, environmental monitoring, and consideration of the wind-chill temperatures.

Acclimatization

Some degree of acclimatization may be achieved, but the physiological changes are usually too minor and require repeated exposure to uncomfortable cold environment to induce them. Miners at greater risk are obese workers, older workers, workers with circulation problems, and workers using certain medications and drugs.

Dehydration

Working in cold air causes significant water loss through the skin and the lungs. Warm, nonalcoholic drinks or soup should be available to replace calories and fluids. A well balanced diet and sensible intake of salt are needed.

Control Measures

General spot heating, warm air jets, and radiant heaters can be used in certain work areas. Shielding the work area should be considered if the wind-chill factor at the job site falls below 30˚F. Miners should be encouraged to use shelters regularly. Metal handles of tools and control bars need to be covered with thermal insulating materials.

Administrative Controls

Schedule work during the warmest part of the day with a work/rest schedule to help reduce cold stress. In many cases the work can be moved to a warmer area. Work should also be arranged to minimize sitting still for long periods of time. An adequate amount of breaks for intake of liquids should be allowed.

Protective Clothing

It is important to preserve the air space between the body and the outer layer of clothing in order to retain heat. The more air pockets, the better the insulation. The most important parts of the body to protect are the head, face, and feet. When the head is exposed, 40 percent of the body heat can be lost. Recommended clothing includes a cotton T-shirt, shorts or underpants worn under cotton or wool thermal underwear. Socks with a high wool content are best with a second inner pair made of cotton. Insulated boots should be waterproofed and socks changed when they become wet. A wool shirt or wool sweater over a cotton shirt should be worn. A wool knit cap provides the best protection. Hard hats are available with winter liners. In cold winds a ski mask or scarf is vital. Wool mittens are more efficient for retaining heat than gloves. Several layers of clothing are better than a single heavy outer garment.

Hypothermia, wind chill index, and frostbite

Miners and mine operators need to plan ways to reduce the effects of a cold environment. With prolonged exposure to cold in a normal work day, health problems or injuries can occur.

General hypothermia is an extreme problem resulting from prolonged cold exposure and heat loss. The inner core of the body is chilled, and the body cannot generate enough heat to stay warm. The effects can be serious, with a combination of factors such as low temperatures, wind and rain at 30˚-50˚F, hunger, fatigue, and poor physical condition.

Frostbite is an actual freezing of the tissue. With added wind velocity, heat loss is greater and occurs rapidly. For example, at 30°F the body will feel cold, but at the same temperature with a 25 mph wind the air feels bitterly cold. (Several degrees of frostbite occur, ranging from superficial injury with redness and numbness, to deep tissue freezing, to deep cyanosis, to gangrene.)

General rules for treating frostbite

- Apply loose, soft, sterile dressings to affected area.
- Splint and elevate the extremity.
- Give the victim warm fluids containing sugar to drink if he or she does not have an altered level of consciousness.
- Do not rub, chafe, or manipulate frostbitten parts.
- Do not use hot water bottles or heat lamps.
- Do not place the victim near a stove or fire—excessive heat can cause further tissue damage.
- Do not allow the victim to drink coffee, tea, or hot chocolate—these substances will cause the blood vessels to constrict.
- Do not allow the victim to walk if the feet are frostbitten.

Wind chill index (the power of wind on exposed flesh expressed as an equivalent temperature)

The air temperature alone is not sufficient to judge the cold hazard because the workers' loss of body heat is deceptive. Threshold limit values on the wind chill index need to be reviewed for application to the particular work area. The wind chill index is a combination of temperature and wind velocity, or air movement. Using the index can be of value but does not take into account the body parts exposed, the level of activity, or the amount of proper clothing. The work practices of the miners and the control measures of the operators will significantly reduce the potential of injury and reduced production.

Hypothermia

Hypothermia is a general cooling of the entire body. The inner core of the body is chilled so the body cannot generate heat to stay warm. This condition can

be produced by exposure to low temperatures or to temperatures between 30 and 50 degrees Fahrenheit with wind and rain. Also contributing to hypothermia are fatigue, hunger, and poor physical condition.

Exposure begins when the body loses heat faster than it can be produced. When the body is chilled, it passes through several stages:

- The initial response of a victim exposed to cold is to build a fire and to voluntarily exercise in order to stay warm. The fire can also signal rescuers if the victim is lost.
- As the body tissues are cooled, the victim begins to shiver as a result of an involuntary adjustment by the body to preserve normal temperature in the vital organs. These responses drain the body's energy reserves.
- Cold reaches the brain and deprives the victim of judgment and reasoning powers.
- The victim experiences feelings of apathy, listlessness, indifference, and sleepiness.
- The victim does not realize what is happening.
- The victim loses muscle coordination.
- Cooling becomes more rapid as the internal body temperature is lowered. Eventually, hypothermia will result in a coma. The victim will have a slow pulse and very slow respirations. If cooling continues, the victim will die.
- The victim of hypothermia may not recognize the symptoms and deny that medical attention is needed.

Therefore, it is important to judge the symptoms rather than what the victim says. Even mild symptoms of hypothermia need immediate medical care.

First aid for hypothermia

- Get the victim out of the elements (wind, rain, snow, cold, etc.)
- Remove all wet clothing.
- Wrap the victim in blankets. Be certain the blankets are under as well as over the victim. Maintain the victim's body heat by building a fire or placing heat packs, electric heating pads, hot water bottles, or even another rescuer in the blanket with the victim. *(DO NOT WARM THE VICTIM TOO QUICKLY)*
- If the victim is conscious, give warm liquids to drink.
- If the victim is conscious, try to keep the victim awake.
- CPR is indicated if the victim stops breathing and the heart stops beating.
- Get the victim to a medical facility as soon as possible.
- Remember to handle the victim gently. In extreme cases rough handling may result in death.

Frostbite

FROSTBITE RESULTS FROM EXPOSURE TO SEVERE COLD. It is more likely to occur when the wind is blowing, rapidly taking heat from the body. The nose, cheeks, ears, toes, and fingers are the body parts most frequently frostbitten. As a result of exposure to cold, the blood vessels constrict. Thus, the blood supply to the chilled parts decreases, and the tissues do not get the warmth they need.

SIGNS AND SYMPTOMS of frostbite are not always apparent to the victim. Since frostbite has a numbing effect, the victim may not be aware of it until told by someone.

Frostnip

- The affected area will feel numb.
- The skin becomes red, then white during frostnip.

Superficial frostbite

- As exposure continues, the skin becomes white and waxy.
- The skin is firm to touch, but underlying tissues are soft.
- The exposed surface becomes numb.

Deep frostbite

- If freezing is allowed to continue, all sensation is lost, and the skin becomes a "dead" white, yellow-white, or mottled blue-white.
- The skin is firm to touch as are the underlying tissues.

First aid treatment

Frostnip

- Place hand over frost nipped part.
- Place frostnipped fingers in armpit.

Superficial frostbite

- Remove the victim from the environment.
- Apply a steady source of external warmth.
- DO NOT RUB AREA.
- Cover the area with a dry, sterile dressing (when dressing foot or hand, pad between toes and fingers).
- Splint if dealing with an extremity.
- Transport to the hospital. As area thaws, it may become a mottled blue and blisters will develop.

Deep frostbite

- Leave it frozen until victim reaches hospital.
- Dress, pad, and splint frostbitten extremities (when dressing injury, pad between fingers and toes).
- Transport the victim to a hospital.
- If a delay in transport, rewarming may be done at the site. Place the affected part in water bath of 100-105 degrees. Apply warm cloths to areas that cannot be submerged. An extreme amount of pain is associated with rewarming.
- Rewarming is complete when the area is warm and red or blue in color and remains so after removal from the bath. DO NOT REWARM IF THERE IS A POSSIBILITY OF REFREEZING.

The boys in the breakers

Originally published in 1904.

One of our superintendents said that the boys in the anthracite coal fields graduate from the breakers and the mines. It is appropriate then to add the breaker as a school where our boys are trained. Letourneau said that the Targui women knew how to read and write in greater numbers than the men. That is the case with those raised in our territory. The girls are better educated than the boys.

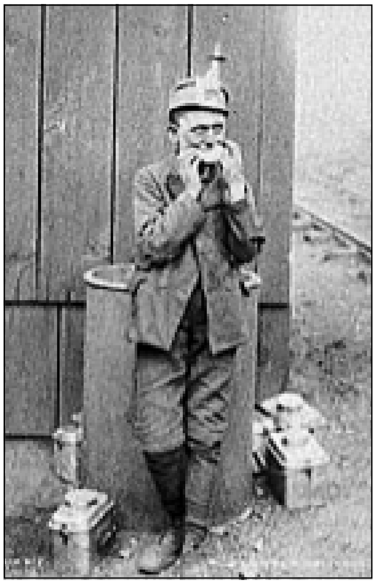
In the breakers of the anthracite coal industry there are nearly 18,000 persons employed as slate pickers. The majority of these are boys from the ages of 10 to 14 years. In an investigation conducted in an area where 4,131 persons wholly dependent on the mines lived, we found 64 children employed in and around the mines not 14 years of age. There were 24 boys employed in breakers before they were 12 years of age. In other sections of the coal fields the evil of employing children under age in breakers and mines is worse than in our limited area. But if the proportion above mentioned prevails in these coal fields, there are employed in the breakers about 2,400 boys under 12 years of age, and nearly 6,400 boys under 14 years of age working in and around the mines. The tabulated report of superintendents of public schools in Lackawanna county given above, shows how prevalent the evil of child labor is. Improved machinery for cleaning coal has displaced many boys. It is hoped that a still further improvement and utilization of such machinery will render unnecessary the labor of boys hardly in their teens in these breakers. No industry demands the service of boys whose bone and muscle are not hardened and whose brain has not been developed for continuous and effective thinking. Muscle without intelligence is annually depreciating, being displaced by machinery which does nearly all the rough work. To stunt the body and dull the brains of boys in breakers is to rob them of the mental equipment which is essential to enhance their social worth and enable them to adjust themselves to the requirements of modern life.

Boys at work in a coal breaker.

Boys employed in the mines. The presence of a cap lamp would indicate that these boys were probably not employed as breakers—but it is likely that they began their working life as breaker boys. *(Photo No. 4a07285r from the Library of Congress Americana photo collection)*

The laws of our State relative to child labor are an intricate mass of confusing statutes which well illustrate the legislative jobbery of our representatives who disregard both science and history in their eagerness to do something whereby their political prospects may be enhanced. The law requires every employer to keep a register of all boys employed under 16 years of age which may be seen by the inspectors. No employer does it. Certificates from the parents or guardians of the child, stating its age, are required before the child is employed. Employers secure these but they are not reliable. The employer is protected, the child sacrificed, and a premium is put on perjury.

No industry in the State is so demoralizing and injurious to boys as the anthracite coal industry. For the last half a century these breakers have been filled with boys who should have been in the public schools. They were put to work before they acquired the three "most essential parts of literary education—to read, write, and account," and



Boy eating a piece of fruit prior to going to work. *(Photo No. 4a16386r from the Library of Congress Americana photo collection)*

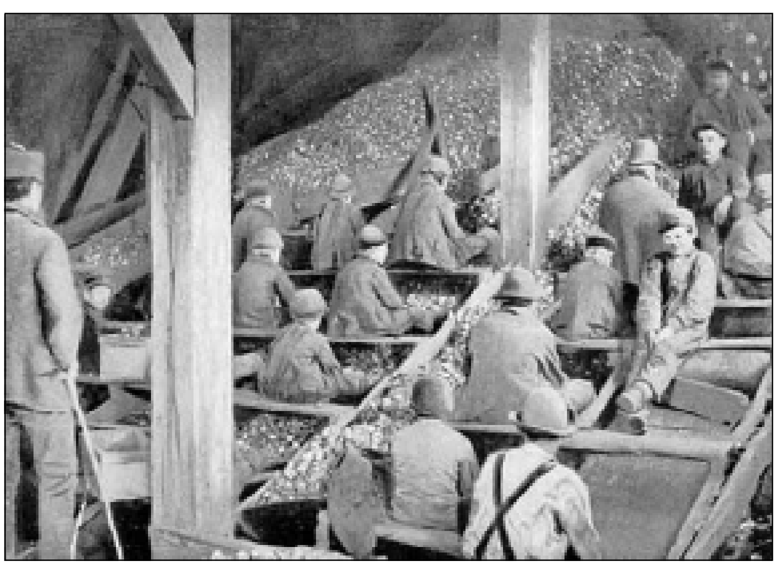
failing to acquire these to the degree in which it is necessary in order to derive pleasure and utility from them in daily life, they grow up in illiteracy, and by the time they are young men many of them cannot read or write their mother tongue. If society in anthracite communities is to be safeguarded against injuries, which can be avoided only by increased intelligence, greater attention must be given to the public education of the children.

Necessity often accounts for the presence of boys in the breakers or mines. Many of the advocates of reform lose sight of this. There are many widows and poor families in these coal fields that need the wages earned by these children and it would be well for kind-hearted people, who consider only the general desirability of fuller education of these boys to remember this. On the other hand there are many parents who exploit their children. Of the 64 children employed as above referred to, 35 of the parents owned their own homes. Of the nationalities represented the Slavs were in the lead, but the English, Irish, and Welsh followed closely, while 12 of the parents were native born. These parents do not see that a liberal education to the boys is a better investment than to build a house. Solon made a law which acquitted children from maintaining their parents in old age who had neglected to instruct them in some profitable trade or business. Some such law is necessary today in anthracite communities to force financially able parents to keep their children in school until they graduate the common branches.

The breaker, where most boys of mine employees begin their life as wage earners, is not favorable to the intellectual development of the lad, however bright his parts may be. Over the chute where the coal passes he stoops and with nimble fingers picks out the impurities. In breakers, where water is not used to wash the coal, the air is laden with coal dust; in winter the little fingers get cold and chap, and at all times when the machinery is in motion the noise from revolving wheels, crushers, screens, and the rushing coal is deafening. In such an environment there is nothing to quicken the talent or develop the aesthetic sense of a boy. All is depressing and the wonder is that so many boys who began life under such conditions have been able to rise to prominence in the various spheres of life.

The boy learns many things in the breakers and in the mines. The hard conditions do not dampen the ardor and crush the spirits of the average lad. Most of them are bright, cheerful and full of tricks. They have a good appetite and with dirty hands the contents of the dinner-pail generally disappears. They have their “spats” and fights, and woe betide the man who injures one of them. They are full of fun and frolic, but their curiosity sometimes leads them to injury and death. Many of them fall into the machinery and are mangled, or down the chutes and are smothered. Of all deaths in this risky business the death of one of these boys is the saddest. To witness a funeral procession of a boy hardly in his teens and the cortege made up of his companions in the breaker, is a sight sad enough to melt a heart of stone. Every humane soul asks: “Is this sacrifice of youth necessary for the prosperity of the mining industry?”

There are three things which boys learn in the breakers; they are chewing and smoking tobacco and swearing. Some indeed have learned these before they begin to work in the breaker. Old Abijah Smith said, in his reminiscences of the early days of anthracite mining, that no youth would think of using tobacco before he was 18 years of age. Times have changed in the Wyoming Valley and many lads now contract the habit before they are in their teens, while boys playing on the streets use profane language which horrifies the morally sensitive. Slav boys when irritated swear shamelessly and afford considerable mirth to their seniors. Many boys trained in a religious home resist



Breaker boys at work. Note the disciplining rod in the right hand of the overseer.

Does anyone know why the three boys, near right, were facing forward? Were they on a break? Did they even have breaks or were they being disciplined by being taken “off the clock?”

the temptations to obscenity and vicious practices so common in and around the mines, but it requires unusually strong moral qualities to develop moral character under conditions so unfavorable.

One of the greatest enemies of these boys is the cigarette. In a mining town where this curse of boyhood was sold in three stores, the consumption was 1,200 boxes or 12,000 cigarettes a month. Miners who smoke use the pipe or a cigar, so that these cigarettes were sold to boys from 8 to 16 years. There were 480 youths of that age in the borough, so that the consumption per capita was 25 cigarettes, providing all of them smoked. If half the youths—many novices and some veterans—only indulged the per capita consumption per month was double. This evil prevails extensively in mining towns. One of our public school principals was so convinced of the prevalence of the habit among his scholars, that he went to the stores selling cigarettes and asked the traders not to cut the boxes, for many tots came to buy two cigarettes for a penny. The practice of cutting the boxes still goes on. Careful observation of the physical, mental, and moral injury wrought by this habit upon boyhood ought to move every community to wage a war of extermination upon this foe which destroys so many boys. Antitobacco leagues are sadly needed here. But what hope is there of reforming the boys when the fathers are so addicted to the habit? A superintendent says: "Only one of our teachers uses tobacco; nearly all of the men in our town do use it, ministers, lawyers, doctors, Sabbath school superintendents, etc. Many of these men stand high in the community… What chance has a poor female teacher, not considered worth more than $28 per month, with her children who can go out and earn more picking slate than she?"

There are many other practices among these boys which sap their physical and moral powers. In Lackawanna county a practice known as the "knock down" prevails among the boys. They take regularly from their pay a certain amount before they give their wages to their parents. Some of the coal companies afford the boys an opportunity for this practice, by not issuing a statement of the wages earned by them. Few parents know the rate of wages paid the boys and the time worked by them. They can only find this out by asking the boss—a thing the average parent will not do. Fathers working in the same colliery as their children are so indifferent to the children's earnings, that they know not when the "knock-down" is practiced by the boys. The boys are exceedingly skillful at the business. Many of them live in the same neighborhood and know that their mothers compare notes at pay-day. In order to guard against detection which may arise from a discrepancy in the wages of boys rated alike, they meet and agree to take out the same amount. Boys take in this way from 50 cents to $1 out of their two weeks pay. In a local strike in 1900, some fathers complained that the boys did not get the regular rate of wages. When shown that they were paid the standard wage the parents were mortified to learn that they were victims of the "knock-down" habit. The revelation occasioned considerable comment and when a company of men discussed the question, one of them said: "It's an old trick: we used to do it ourselves." No one contradicted him, and some fathers practice it still—they hide a bill in the "bacca-box" before they hand the pay over to the wife.

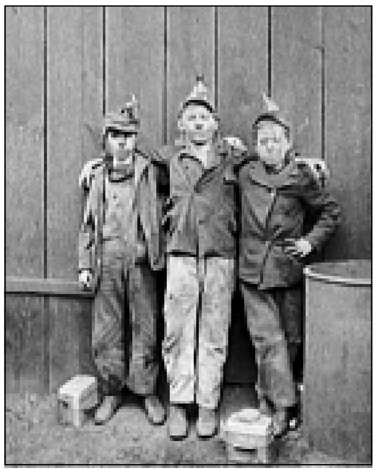
A few of the boys were rewarded for good work by being allowed a mule ride.

Many of the boys patronize the slot machine, while some of them follow with great zeal cock-fighting and stake 5 or 10 or 25 cents on the main. Most of the small boys, however, spend their money on luxuries, and to watch these boys on pay night in the candy shop is one of the most amusing sights imaginable. They compare their cash; they count their change; they boast how much ice cream, candy, peanuts and soda they consume. The small boy lays away his cigarette very stealthily, while the veteran puffs boldly into the air. The lad of 16 years is about to pass from the candy store, but still lingering where the younger boys are, he feels the dawn of independence, and smokes a cigar to the envy of the smaller lads. All the rivalry, the cunning, the shrewdness, the vanity, and the follies of life are seen here as in a microcosm. It is the drama of life in its pleasures, anxieties, and pains.

Boys from 12 to 14 years spend from $1 to $2 a month. Those limited to 50 cents or a $1 "blow it in" on pay-night. Those having $1.50 to $2 are "flush" the night after pay, but the evening following they are all on a par—every pocket is empty. The only time the economic vision of these boys is exercised is when the circus comes to town. Then close figuring is done. They come to the last 20 or 25 cents. That they stow away for the expected night, sacrificing the pleasures of the moment for the promise of a good show. Stores which give the boys “tick” soon get out of business. A boy that owes 25 cents steers clear of that bill. The small boy’s trade can only be held on a strictly cash basis.

When the lad reaches 16 or 17 years he leaves the candy shop. He feels himself above the small boys that congregate there and he hankers for something other than the “soft stuff” sold in them. It is the turning point in the young man’s career. From his early boyhood, every pay-night meant a dissipation after the manner of boys. He still craves for that excitement and dissipation and, forsaking the candy store, he finds only one place of welcome—the saloon. Candy is no longer the basis of his dissipation. It is beer and tobacco. When this hour comes many are the boys in mining towns who frequent saloons, for there is no other place provided to meet their requirements. Right here philanthropic efforts should be put forth in anthracite towns and villages. Money taken out of these rich coal deposits cannot find a better opportunity for good anywhere in the land. The founding and endowing of educational and social institutions on a grand scale is become the fashion of rich men of to-day, but it has not begun in these coal fields. For the last half century the sons of anthracite mine workers have been left to the saloon, the dancing hall and the theater, and lawlessness, irreverence, and crime have steadily increased. Is it not time for the leaders in our society to turn their attention to the degeneracy which has gone on apace, and plant institutions for the benefit of these youths whereby they may be helped to better manhood and find that there are higher pleasures in the world than those of sense?

Human nature in the boys of the anthracite coal fields is the same as that of any other crowd of boys. A group of them is equal in original talent to any group of children, but they are planted in hard, coarse soil, and their physical, intellectual, and moral parts are stunted. What we need is to give these boys a better environment. Raise the age at which they can begin work to 14 years as it is in most other states; arouse public sentiment to the rights of children to a liberal education and to the wrongs of greedy parents who perjure themselves and exploit their children; establish a system of public aid whereby widows will not be forced to send their tender boys to the mines or breakers; then possibly boys of tender years can be kept out of



A group of three—probably not employed as breakers. *(Photo No. 4a16385r from the Library of Congress Americana photo collection)*

breakers. Ignorance will necessarily lead to confusion and industrial crises, which bring disaster to all interests but which inflict greatest injury on the working classes.

1. The law of 1849 provides that no child under 13 years of age can be employed in any factory and all children under 16 years can only be employed for nine months and must attend school for three consecutive months each year. The law of 1899 says that any child between the ages of 13 and 16 years can be employed if he can read and write the English language intelligently. The law of 1849 says that no child can be employed for more than 10 hours each day and the law of 1893 gives permission to employ them for 12 hours a day. An act of 1891 gives permission to employ boys at 12 years in the breakers and boys of 14 years in anthracite mines. An act of 1887 makes it a misdemeanor to employ a child under 12 years of age in mills, factories, mines, etc. A law of 1885 permits the employment of boys 12 years of age in bituminous mines, while boys of 10 years can be employed outside bituminous collieries. In the last legislature (1903) a law was passed raising the age at which boys can be employed in breakers to 14 and in the mines to 16 years, but it is questionable whether this law applies to bituminous as well as anthracite mines.

2. The last legislature has made it a crime to sell cigarettes or cigarette paper to youths under 21 years of age. But of what good are laws unless they are enforced? The age limit was 16 years and tots of 8 years purchased cigarettes freely.

3. Near a barn in one of the alleys in Mahanoy City, two girls, neither of whom was 12 years of age, were seen stealthily smoking cigarettes. While laws are passed in Harrisburg against the sale of cigarettes to minors, the evil grows and shall our young girls fall victims to that which ruins so many of our boys?

4. This chapter was written in 1902, previous to the passage of the law raising the age at which boys can begin work in the breaker to 14 years. An inquiry into the effect of this law, made last October, leads us to believe that it is not enforced. When it was signed by the Governor, an effort was made in some localities to enforce it, but boys who were sent home this month returned the next with the new certificate from perjured parents. In some towns more boys aged 11 to 13 years are in school this year than last, but from most of our towns and boroughs the report comes: “No apparent effect that we can see.” With a worthless system of gathering birth statistics, with parents who regard their children as productive agents, and with politicians in control of all civic offices, what hope is there of keeping tender boys of 12 and 13 years from the breakers?

Taken from ***Anthracite Coal Communities****, by Peter Roberts, 1904, pp.174-181.*

THE LAST WORD...

"Eighty percent of success is showing up."—Woody Allen

"The trouble with class reunions is that old flames have become even older."—Doug Larson

"If I only had a little humility, I would be perfect."—Ted Turner

"Repartee is what you wish you'd said."—Heywood Broun

"If you haven't got anything nice to say about anybody, come sit next to me."—Alice Roosevelt Longworth

"Experience is the name everyone gives his mistakes."—Elbert Hubbard

"Truth is not exciting enough to those who depend on the characters and lives of their neighbors for all their amusement."—George Bancroft

"Kindness is a language the dumb can speak and the deaf can hear and understand."—Christian Nestell Bovee

"The best portion of a good man's life is his little, nameless, unremembered acts of kindness and of love."—William Wordsworth

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. We **DESPERATELY** need color photographs suitable for use on the front cover of the ***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 1999 is underway—please remember that if you are participating this year, you need to mail your quarterly report to:

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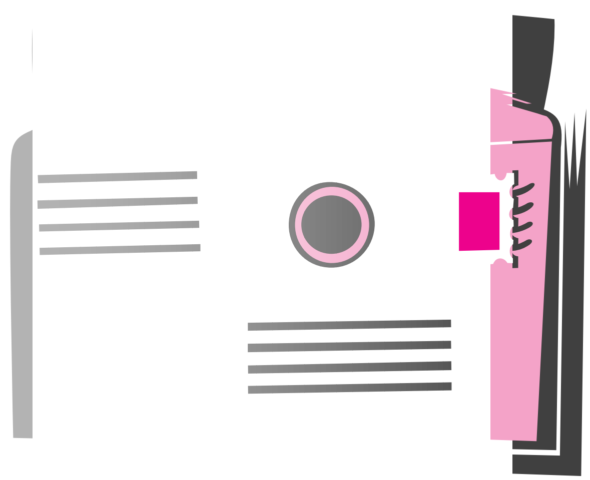
Educational Policy and Development
Holmes Safety Association Bulletin
P.O. Box 4187
Falls Church, Virginia 22044-0187

Please address any comments to the editor, Fred Bigio, at the above address or at: MSHA—US DOL, 5th floor—EPD #535A, 4015 Wilson Blvd., Arlington, VA 22203-1984.

Please phone us at (703-235-1400).



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*We are short of articles on metal/quarry safety and welcome **any** materials that you submit to the Holmes Safety Association Bulletin. We **DESPERATELY NEED** color photographs (8" x 10" glossy prints are preferred however, color negatives are acceptable—we will make the enlargements) for our covers. We **ALSO NEED** color or black and white photographs of general mining operations—underground or surface. We cannot guarantee that they will be published. If they are, we will credit the contributor(s) within the magazine. All submissions will be returned unless indicated.*

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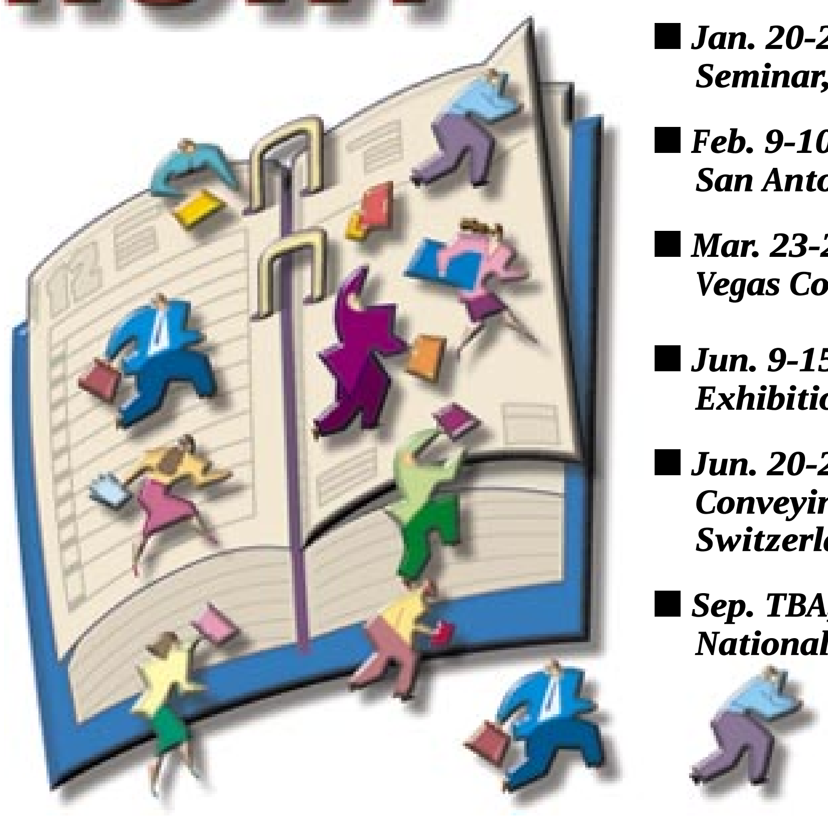

Upcoming events:

- *Jan. 20-22, Blasting and Safety Application Seminar, MSHA Academy, Beckley, WV*
- *Feb. 9-10, South Central Conference, San Antonio, TX*
- *Mar. 23-27, CONNEXPO-CON/AGG '99, Las Vegas Convention Ctr., Las Vegas, NV*
- *Jun. 9-15, 5th World Mining Technology Exhibition/Congress, Dusseldorf, Germany*
- *Jun. 20-25, Pneumatic and Hydraulic Conveying Systems Conference, Davos, Switzerland*
- *Sep. TBA, Bluefield Coal Show, Brushfork National Guard Armory, Bluefield, WV*