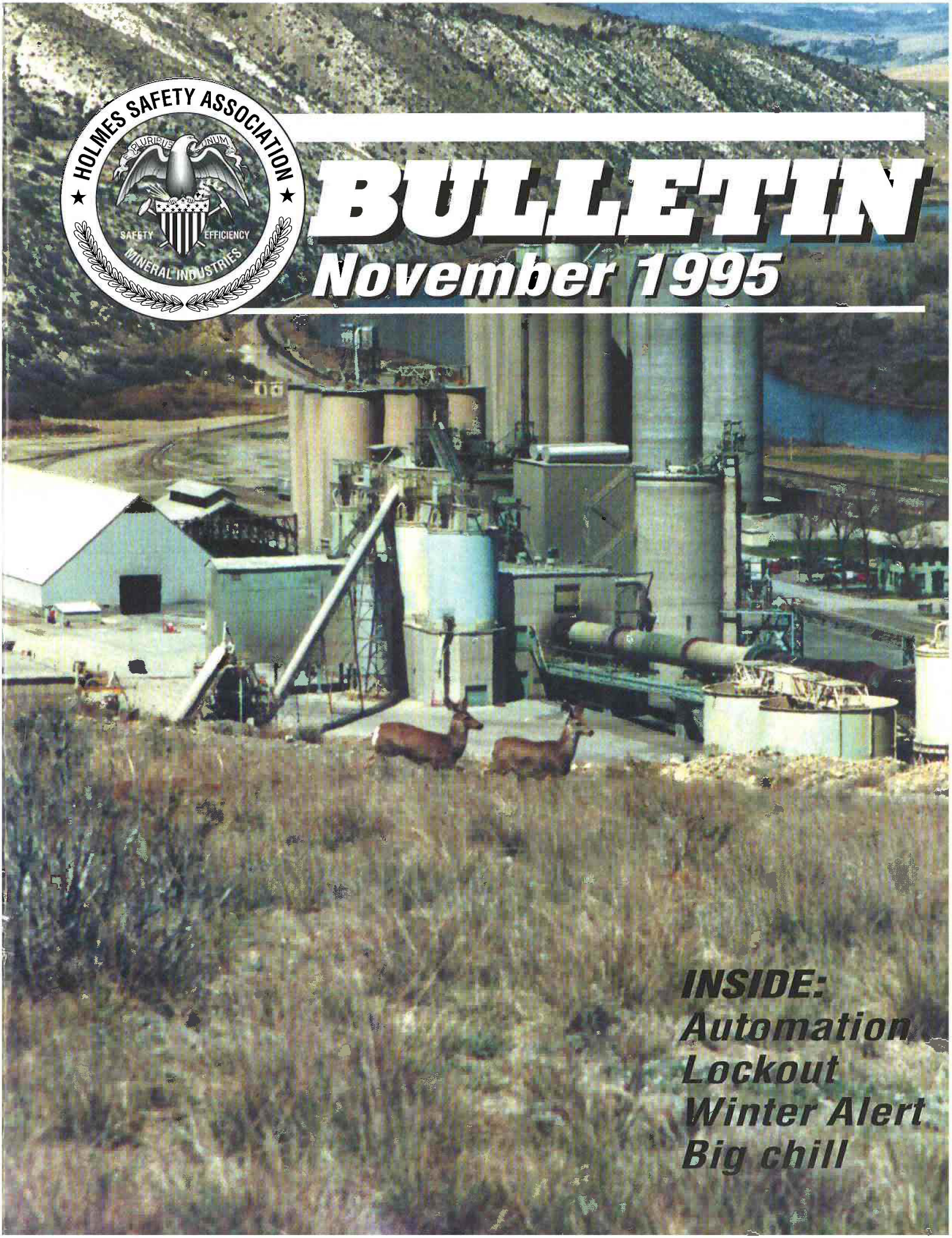

BULLETIN

November 1995

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Big chill

Joseph A. Holmes Safety Association
Awards Criteria

Type "A" Award – For Acts of Heroism
The award is a medal with a Medal of Honor Certificate.

Type "A" Award – For Acts of Heroic Assistance
The award is a Certificate of Honor.

Type B-l Award – For Individual Workers
(40 years continuous work experience without injury that resulted in lost workdays)
The award is a Certificate of Honor, a Gold Pin, and a Gold Decal.

Type B-2 Award – For Individual Officials
(For record of the group working under their supervision)
The award is a Certificate of Honor.

Type C Award – For Safety Records
(For all segments of the mineral extractive industries meeting adopted criteria)
The award is a Certificate of Honor.

Other Awards – For Individual Workers
(For 10, 20, or 30 years without injury resulting in lost workdays)
The awards are 30 years - Silver Pin and Decal, 20 years - Bronze Pin and Decal, 10 years - Decal bearing insignia.

Special Award – For Small Operators
(Mine operators with 25 employees or less with outstanding safety records)
The award is a Certificate of Honor.

For information contact: Secretary-Treasurer, Joseph A. Holmes Safety Association (703) 235-8264

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The *Holmes Safety Association Bulletin* contains safety articles on a variety of subjects: fatal accident abstracts, studies, posters, and other health and safety-related topics. This information is provided free of charge and is designed to assist in presentations to groups of mine and plant workers during on-the-job safety meetings.

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 of the Mine Safety and Health Administration.

KEEP US IN CIRCULATION—PASS US ALONG

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Machine automation and radio remote control systems; mining, talking boxes

By: Mark Whatley and Nigel Cottell

A radio control provides a means of remotely communicating instructions from an operator to a machine. The operator has a radio transmitter, fitted with buttons, switches or joysticks, which he uses to input machine commands. A radio receiver is mounted on the machine and responds to the commands sent from the transmitter by activating corresponding functions on the machine. In principle this is identical to the control of a model airplane or car. So why can't a model maker's radio be used to control a mining machine?

The main difference between radio systems used to control models and those used to control mining equipment is security and safety. Security and safety go hand in hand and are the most important features of a radio remote control system. The radio system must not respond to incorrectly transmitted or corrupted data. Noise or incorrect signals can be generated by other radio systems working in the neighborhood, or spurious radio emissions sent from "noisy" electrical equipment. To ensure that only correct radio data signals are accepted, Moog mining radio remote control systems incorporate a number of protective features.

Moog remote control radio systems transmit data in blocks. A new block of data is sent at regular intervals typically every 50-100 milli-seconds; each block of data is split into 3 sections.

a) The "address code" is a unique code that is set in the transmitter and receiver units. A receiver will only respond to radio signals that contain an address code that is identical to its own. If it is different, the receiver discards and ignores the data and does not implement the instructions.

b) The "data" portion of the block contains instructions relating to those outputs on the receiver to be operated. The information is received as a digital bit stream of "1"s and "0"s which has been encoded by the transmitter.

c) The check sum is a series of bits sent by the transmitter which are specific to the data in that block. On receipt of a block of data, the receiver performs a check sum of its own and compares this with the one sent from the transmitter. If these differ, the whole block of data is discarded and ignored. At least one acceptable block of data must be received within a specific time. If this time is exceeded or radio transmission signals cease completely the receiver automatically switches all outputs to a default condition. This ensures that in the event of a transmitter becoming damaged or inoperable, all outputs from the receiver will default to a known condition. By correctly interfacing the receiver outputs to the machine it can be ensured that a machine runaway cannot occur.

A Moog radio transmitter sends a frequency modulated carrier signal with the modulation levels representing the "0"s and "1"s of the data stream. There is a selection of well established techniques for modulating the carrier wave and Moog have adopted a number of these to suit specific applications. The choice of modulation system is concerned with minimizing the effects of noise and distortion of the transmitted signal in the underground environment. The choice of carrier frequency depends on the regulations of the country where the radio is to be used. In Britain it is in the unlicensed band 458.5 to 458.8 MHz. Drawing together the various protection techniques employed in the Moog system results in a radio control with a high level of integrity, security and safety.

Coal mining applications

The introduction of remote radio control equipment to the coal mining industry first occurred about 20 years ago and has steadily gained wider acceptance over the years. Radio control technology has been applied to both longwall shearers and continuous miner applications.

Longwall Shearers. On the most up-to-date longwall shearers radio remote control has been highly integrated with the whole machine control concept. On one of the most advanced machines, the Anderson Electra shearer, radio control is fundamental to the whole machine control.

The radio receiver directly controls functions on the machine such as the haulage speed,

direction, cutter height and water control etc. The miner controls the shearer machine with a small, intrinsically safe, handheld radio transmitter which has a number of membrane push buttons. Operation of the push buttons on the transmitter activate or de-activate functions in the receiver which in turn operate the machine.

In a typical radio system used for control of a longwall shearer, speed control of the machine is accomplished via the push buttons and an integrator. This monitors the time that a button is held depressed, and via a ramp function converts this to an analog speed command. Various power sources are available for the transmitter, including throwaway batteries, re-chargeable NiCad batteries, or power from the miner's cap lamp battery. The radio receiver on the Electra machine not only receives and acts on information that has originated from the transmitter, but also communicates with the machine control computer. This computer, known as IMPACT, communicates with the receiver via a high speed digital serial link. The IMPACT computer has overall control of the machine and collects data from sub-systems and sensors located around the machine. It also communicates with other mine-wide equipment and can receive instructions from the surface. Using and interpreting this information the IMPACT computer instructs the radio receiver to control certain functions to protect the machine or regulate coal production. For example, should the machine encounter hard ground, the IMPACT computer will recognize a change in the cutting motor current and will instruct the radio receiver to limit the maximum machine haulage speed. This ensures that the machine is always working within its design envelope and is not being abused. Similarly, it is possible to produce too much coal and overwhelm the transport system. If this occurs IMPACT can be informed and in turn the receiver is instructed to reduce the amount of coal being produced. From the operator's point of view, remote radio control allows the miner to oversee the machine's operation from the best possible position. This allows accurate and easy control of the cutting drum and ensures that a high quality product is produced with a minimum of spoil. On double-ended shearers the radio system is configured to provide independent control of each end of the machine by two separate miners each with his own radio transmitter. Interlocks are built into the receiver to ensure that the same machine function cannot be controlled by both miners simultaneously. This further enhances machine operation and improves productivity. Remote radio control also allows the miner to move along the face at a rate that is variable to suit the conditions and is not tied directly to the speed of the machine. On a difficult section the miner may allow the machine to move slightly ahead of him, knowing that he still has full control and can catch up on an easier section ahead. Radio remote control enhances safety as the miner can stand back from the machine under the roof supports.

Continuous Miners

On continuous miners the application of remote radio control occurred as a result of a drive to improve safety, productivity and ease of operation in low seams. Radio applications on continuous miners fall into two categories; retrofits to refurbished machines and applications to new designs.

In general, radio systems used for retrofits to older continuous miner designs are not integrated with a machine control system. On most machines the radio system simply allows the miner to manually control the machine from a safer or more advantageous viewing position.

Many of these machines have a constant displacement hydraulic system with open center manual control valves. One of the problems in retrofitting a radio control system to this type of machine is how remote actuation of these valves can be achieved with the minimum of alteration to the existing hydraulic system. Moog Controls Limited, in conjunction with Caledonian Mining Company Limited, has developed an intrinsically safe electrically operated proportional control valve that can interface to a standard open center manual control valve and will allow remote actuation of the manual valves. This has the advantage that the machine can still be driven manually if required, or can be used under remote control. An added benefit of fitting remote radio control to continuous miners is that where roof conditions and mining inspectors allow, machines are performing deep advance cuts in unsupported ground. This has significantly improved productivity without compromising safety.

Newer designs of continuous miners and bolter miners such as the Dosco TB2500 machine, the Voest Alpine ABM20 machine and the Anderson KBII machine have been designed to use radio remote control from inception. In these machines the design of the hydraulic system reflects the higher technology that is incorporated. The machines use a constant pressure hydraulic system and utilize both analog and digital Moog mining servo valves to control machine functions. They are very much

"State of the Art" machines and have highly integrated machine control systems to sequence the cutting, bolting, cleaning up and advance process.

Hardrock and tunneling

In hardrock applications the mining method often dictates that for safety reasons it is necessary to use radio remote control. Many underground mining applications in hardrock use a mining method known as pillar and stope mining. In this process a room or stope is produced in the ore bearing rock. The roof of the stope is successively blasted from above and the rock removed from the floor of the stope. To facilitate removal of the rock it is necessary for a mobile loading machine i.e. a scoop or LHD to enter the stope and remove the fallen rock. In this position the machine has to work under an unsupported roof and safety considerations do not permit manually driven machines to operate.

A mine where this method of extraction is successfully used is the Tara Lead and Zinc Mine in Ireland. In this mine, which is operated by Outokumpu Oy of Finland, Moog radio control systems have been fitted to Tamrock Toro scoops to allow remote control of the loading process. The radio receivers fitted to the machines have been specially designed for hardrock use and have high power outputs. These outputs are used to directly drive hydraulic control valves that operate functions such as the steering, bucket, and engine control, eliminating the need for extra interface units.

The transmitter used for this application is designed for use with mobile machines. The unit is a harness or belt-mounted device that can accommodate two 4-position joysticks and up to 25 two- or three-position switches. Although initially designed for use in the hardrock environment the unit has been designed to be intrinsically safe. It has been submitted for international approval and will be used in this form later this year. Power for the transmitter is supplied from a separate battery or from the miner's cap lamp battery.

Civil tunneling

In civil tunneling, remote radio control has been applied to the control of the segment erector head in tunnel boring machines (TBMs). When a civil tunnel such as a sewer or transport tunnel is bored it is usually necessary to line the inside of the tunnel with a pre-cast concrete lining. This lining is built from a number of interlocking segments that fit together to form a complete ring. As the tunnel progresses it is necessary to continually build new rings inside the machine.

When the machine advances these are fitted inside the tunnel and are bonded into position with a grout compound. Segment erection has always been recognized as one of the most dangerous aspects of tunneling, because the manhandling of the large heavy segments can easily trap and injure people. The drive to improve safety and reduce manpower involved in the tunneling process has led to the application of radio equipment for control of the segment erector.

Traditionally, control of the erector is achieved by fixed manual control valves or by a fixed pendant. In the restricted environment of a tunnel boring machine this can lead to a situation where the operator cannot directly see to position and place the segment. Radio remote control allows the operator to control the erector from a safe position and provides the best possible view of the process involved. Applications of radio to tunnel boring machines use a radio transmitter that is derived from the unit used to control longwall coal shearing machines. A number of different receivers is available to complement the transmitter, the exact choice depending on the specific application and the complexity of the TBM machine. The receivers available range from a simple 16 function unit to a microprocessor-based model that has 36 outputs and can communicate with a host computer.

Future developments

Machine sophistication is on the increase. It is inevitable that radio remote control systems will develop to provide additional functionality. This will certainly include two-way communications where machine data can be sent back to the operator. This has already been developed by Moog and is being applied to advanced applications in the USA. It may include a visual video link to allow the operator a better view when working over large distances, or it may develop to a point where the machine is fully controlled from the surface.

All of these developments are technically possible. The extent to which these features are developed and implemented will depend on the economic returns and safety legislation. Short distance radio remote control can lead to immediate and tangible productivity and safety improvements. The benefits of long distance or surface control are more difficult to quantify. It is quite possible that safety legislation will be required before further technical advances can be implemented into production systems.

Reprinted from the July 1994 Information Access Co., a division of Ziff Communications Co.; issue of ***Metal Bulletin*** *(UK)* ***World Mining Equipment,*** *Vol. 18, No. 7-8, Pg. 11.*

Phelps Dodge's Mechanical/ Electrical Division centers talk on safety importance, new ideas

Editor's Note: This article will focus on the importance of safety at Phelps Dodge Morenci, Inc.

How important is Safety at Morenci? How do safety practices affect the employee and PDMI's productivity? These and other questions were posed to Mechanical & Electrical Manager Jim Armbrust, who opened his discussion by identifying three reasons for safety in the work place.

"First and foremost is the humanitarian side; to me that's the most important reason for safety," Armbrust said. "In addition, there are production reasons and economic reasons. On the humanitarian side, of course, we are all concerned for the well-being of all the employees that work with us and feel a responsibility to them and their families." Safety is also vitally important for production because "we realize that a safe employee is a more productive employee," he said. "In the Mechanical & Electrical Division, one of our functions is to perform maintenance with the least interruption to operations, and that requires good planning. So, if we are doing a safe job, thinking ahead, and planning real well, it just makes us a lot more efficient."

PDMI's Albert Chavarria

In addition, he said a safe environment promotes good morale, and with good morale comes the result of increased productivity.

A third reason for safety relates to economic factors. "An employee off the job is of no productive value to us," Armbrust said. If the employee is off the job on disability, he receives less compensation to support his family. If injured off the job, the employee has lost all wages to support his family, he added.

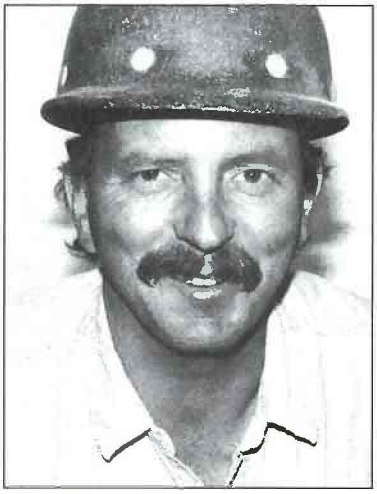
PDMI's Bruce Bingham

Another economic aspect of safety relates to the cost of accidents. According to PDMI's Safety Department, a no lost-time accident can generate a $400-$500 expense for a hospital visit, and for those employees losing time for a serious accident, the cost per accident often approaches $40,000, Armbrust said. Within the Mechanical & Electrical Division, "we crew 'lean and mean' so to speak and don't crew for absenteeism or someone being off the job with an injury," he said. Consequently, "we have to make up for that employee who is off the job," and it is accomplished in one of two ways: (a) double someone over from a prior shift, effectively having that employee work 16 hours or (b) ask an employee on his/her day off to fill in for the injured employee. Ultimately, both solutions lessen productivity, Armbrust said.

The present expansion at the Morenci Branch has placed new employees in both operations and maintenance. "When we receive these new employees, it is important that they get the proper safety training to avoid an accident," he said. "Generally, you really have to invest more effort into the new employees to make sure that they become aware of the potential natural hazards out there."

Because of the division's vast working area, "we challenge hourly employees to supervise themselves and increase their own safety awareness," he said. "If employees should come into an area that looks peculiar to them, or they are a little skeptical whether it's safe to do what they are about to do, we encourage them to stop and talk to their coworkers about the situation."

PDMI's Jose Vega



PDMI's Rick Stock

Implementing new ideas to improve safety is also an ongoing effort of the Mechanical & Electrical Division. Armbrust said several changes are being made on the walkways of the new shovels to provide increased safety for the employees. "We are suggesting our modifications to the manufacturer so that these changes benefit other mines as well. I think we are making the new equipment safer."

Employees also share their ideas for improving safety by participating in safety talks before each shift begins work. "There is no one more qualified to come up with new and creative ideas for improving safety than the employee," he said. "This involvement is reflected positively in the employees' safety performance."

Field Electrician Ed Montierth says it is important to have a good safety program because "as part of our human nature, we have a tendency to work ahead of our reflexes a lot of the time. Our attention is diverted and that's what causes most of our accidents."

He also stresses the urgency and importance of safety around electricity: "You need to think twice, and work once; measure twice and cut once," Montierth said. "Pay attention and concentrate on the job and leave your family and your personal thoughts at home."

To provide additional support for Morenci's safety program, Field Electrician Alex Polanco stresses the importance of safety talks each morning and the interaction of employees with their coworkers to promote a safer working environment.

"When you and your coworker are working together, you both depend on each other and watch out for each other; he may catch something you may have overlooked," Polanco said. "Watching out for each other helps to prevent accidents." He said the greatest benefit of PDMI's Safety Program is "being able to work safely and return home to your loved ones."

PDMI's Anthony Escobedo

Why is it sometimes difficult to maintain a constant safety awareness? Mechanic Frank Reyes says "we are human and just because we got away with doing it the wrong way once or twice, we think we can keep doing it that way. But all it takes is one slip; you won't have a second chance."

Reyes believes everyone at Morenci has to continue to push harder to stay at the forefront of good safety practices. "It is a constant challenge for all of us."

Reprinted from the January 1995 issue of Phelps Dodge Morenci's ***Copper Today****.*

Capsule pipeline technology one step closer to reality

Columbia, MO—The dream of a commercial capsule pipeline that can transport coal logs over long distances came one step closer to reality recently after a successful test by the University of Missouri-Columbia's Capsule Pipeline Research Center.

In the test, conducted in September in Conway, KS, researchers found that coal logs performed better than expected when repeatedly injected into a 4.6-mile-long pipe. The pipeline is owned by the Mid-America Pipeline Co. and was constructed for conveying water for industrial purposes and fire-fighting.

The results of the test—the first ever of coal logs in a commercial pipeline—are a milestone in the development of coal log pipeline technology and give researchers confidence that they are near their goal of seeing the process go commercial. "I have always been optimistic, but I am more sure now that we should be able to finish our task of developing the coal log pipeline technology to the point suitable for commercial use in another year or two," says Dr. Henry Liu director of the CPRC and a professor of civil engineering at the University of Missouri.

Meanwhile, the CPRC has been renewed for a second four-year term by the National Science Foundation. The center, which began operating in fall 1991, is the only NSF-sponsored research center in Missouri and one of only 10 such centers in the United States. "NSF funding is very important because we can't do this on a year-to-year basis; we need a long-term commitment," Liu says. "We are very pleased to have gotten that from NSF."

The success of the Conway test allows the center to actively pursue a three-prong commercialization plan, which includes a full-scale pilot plant facility, a commercial demonstration project, and formation of a capsule pipeline company to pursue commercial projects. "NSF funding and success of the test in Conway have enhanced our chances of getting one of the three," Liu says. "Those three prongs are totally independent. If any one of the three is successful, the pipeline will become commercialized."

The CPRC has submitted a $400,000 proposal to the U.S. Department of Energy for planning and design of a pilot-plant facility at the Thomas Hill site, 60 miles north of Columbia. The site is an abandoned coal mine owned by the Associated Electric Cooperative, a principal sponsor of the center's research. The estimated cost for building and operating the facility for five years is $12 million. "It will give us the opportunity to learn things we cannot learn in the lab," Liu says of the proposal. "If we can build a large pipeline and test it under similar conditions as a commercial pipeline, we not only win avoid a lot of mistakes, but it will enable us to attract potential users' attention. They will not hesitate to use it."

The center also has begun the screening process for the commercial demonstration site. Questionnaires have been sent to more than 100 companies, asking them to submit sites for evaluation. Two have already responded and several more are expected before the deadline. Based on the results of the survey, five sites will be selected for in-depth investigation, after which negotiations will begin with the companies with the most promising sites. A prospectus has been drafted for the proposed coal log pipeline company. Potential investors for the $30 million company include existing pipeline companies.

Coal log pipeline (CLP) technology involves continuously injecting cylindrical coal logs into a water-filled pipeline for transport. Studies have shown that CLP could compete with rail rates over distances greater than 100 miles and with truck rates over distances greater than 30 miles. "It would cost you $5 to buy a ton of coal at a Wyoming mine, but to have it transported to Missouri, the cost is about $15 a ton," Liu says. "This means that two-thirds of the cost of coal is in transportation. We believe we can do better than that." Once the technology is developed for transporting coal, it will be relatively easy to adapt it to other materials, such as solid wastes and grain, Liu says. "Those are among the areas we'll be examining during the next four years," he adds.

Reprinted from the January 1995 edition of Acquire's Coal Today.

Improving mine safety through reduced exposure mining systems

Current methods

Two mining methods predominate in U.S. underground coal mines—room-and-pillar and longwall. Both are reliant on the same three pieces of equipment—the continuous mining machine, the roof bolting machine and a haulage system. With a continuous mining machine the operator either rides in a compartment on the machine or stands close by using radio remote control. There may be an assistant on hand to adjust power cables and hoses when the machine backs out of a newly mined area. Two more workers will drive the shuttle cars which carry coal won by the continuous miner to the main mine conveyor system, which may be some considerable distance away. Some mines now have a single worker controlling the front end of a continuous haulage system that is used in place of shuttle cars.

Coal is mined by advancing the cutting drum of the continuous mining machine into the coal in a series of sump and shear actions to create a tunnel or entry. At present the haulage operator cannot go under unsupported ground and this limits the advance of a continuous mining machine, generally to no more than 12 m before it must withdraw from the entry to allow roof-bolting. While the mining of an entry progresses, two other operators will be simultaneously engaged in roof-bolting. This involves the use of a dual-boom machine which will have to be maneuvered into an area of unsupported roof in a nearby freshly mined entry. Roof support is provided temporarily by hydraulic jacks. A worker at each boom then drills a deep hole upwards to accommodate a bolt which is tensioned to hold the roof strata together. The jacks are then released and the process repeated.

For the operator of the continuous mining machine the main risk is that of being pinched between the equipment and the mine walls. There is a similar hazard for roof-bolting workers although they are more susceptible to cave-ins. Shuttle-car drivers are injured less frequently but their equipment provides a hazard to other persons.

Research and development into automation is, of course, being carried out constantly within the mining industry but the Bureau of Mines (USBM) is convinced that its own research efforts will ensure that REMS technology is introduced more promptly than if left to the industry itself.

Using REMS, a typical scenario would comprise moving the continuous mining machine and haulage system into place manually, the miners then returning to a control hut, sitting down and turning the operations over to computers. The miners would monitor progress of the machines on a video display terminal. As and when difficulties arose the computer would alert the operator and request manual intervention and control from the operator. The roof-bolting machine would be controlled in a similar manner. Machine maintenance/servicing would be done under a safe root between mining activities as is the current practice. Most ventilation at the working face would be provided by an additional system mounted on the continuous haulage system.

Traditional research into improving mine safety has focused on identifying methods, procedures, protective equipment and preventive techniques that will allow mining personnel to work in relative safety but without removing the worker from the hazardous face area. REMS is a dramatic yet logical shift away from this approach in that it separates humans from the hazard rather than minimizing the hazard itself.

Itemizing the benefits of REMS, the USBM calculates that in U.S. underground coal mines the simple act of relocating face workers to a control room could prevent the annual loss of 15 lives. It would also reduce exposure to respirable coal and quartz dust, and noise. Coal cutting by continuous mining machines would be better controlled and deviations out of the coal seam and into floor or roof rock should be greatly reduced. At present, only the most experienced machine operator can accomplish this, the USBM says. The result would be cleaner coal and improved recovery with a proportionate reduction in waste and the cost of washing coal prior to shipment. Greater accuracy in cutting entries would also minimize the amount of coal seam not mined, by eliminating the practice of leaving larger than necessary pillars.

Reprinted from the Mining Journal Ltd's. January 27, 1995 issue of ***The Mining Journal,*** *Focus and Comment Section; Pg. 66.*

Lockout: A comprehensive program

From amputated body parts to death by electrocution, failure to lock out machinery and equipment often results in some of the most serious accidents in our industry—accidents that could be prevented with a comprehensive lockout program. "Comprehensive" means more than giving everyone their own lock and an occasional safety talk. A lockout program that is serious about preventing this type of accident should include the following elements:

Identify all tasks and equipment that require lockout. A physical conditions audit of the entire workplace should be conducted by a team that includes the expertise of electricians, mechanics and millwrights. All processes and equipment that require lockout, including hydraulic and pneumatic systems, should be posted with warning signs wherever feasible.

Develop detailed policy and procedures. Lockout policy should identify who, what, where, why and when lockout is required. Step-by-step procedures should be written describing how each process and machine is to be locked out.

Educate and train all personnel in the procedures that apply to their specific tasks. The level of training will naturally vary greatly between office workers and millwrights; but everyone who has any reason to be on the worksite needs some training.

Enforce the written policy and procedures. No excuses, no exceptions, no shortcuts, ever! Reinforce with refresher training on a regularly scheduled basis.

Reduce the occasions when lockout is required Engineering and administrative controls should be in place to prevent situations requiring lockout. Routine maintenance can prevent equipment malfunctions. Skirts can prevent spills from conveyors at transfer points. Readily available backup equipment can reduce the temptation to keep up production by making a "quick-fix" adjustment while the equipment is still operating.

When it comes to establishing an effective lockout program, there are no shortcuts.

Reprinted from the July/August 1995 issue of Ontario [Canada's] Natural Resources Safety Association's ***Health & Safety RESOURCE****.*

Safety notebook

By: Carl Metzgar

Pre-shift inspections Part I: Clean, well-maintained equipment ensures safety and productivity.

It is personally frustrating that the Mine Safety and Health Administration (MSHA) has to have standards and has to enforce standards in areas that are in the selfish best interest of miners and operators.

MSHA standards

56.18002—A competent person designated by the operator shall examine each working place at least once each shift for conditions which may adversely affect safety or health. The operator shall promptly initiate appropriate action to correct such conditions.

56.14100—Self-propelled mobile equipment to be used during a shift shall be inspected by the equipment operator before being placed in operation on that shift.

These two standards cover place and equipment to be used in place. The requirement exists so miners and others at the plant site are not exposed to uncontrolled energy and the hazards that go with it.

Place standards

Consider how energy can be transferred and cause injury. A welding rod stub or a short piece of reinforcing bar, a screw or a bolt on a concrete floor under a shoe makes a real good roller bearing. A person walking and stepping on a piece of welding rod can have a foot slip out of control and 130 to 230 pounds hit the floor. The weight of the person falling is enough so that when the floor is hit, there can be injury. Falls often happen just inside doors. When people go from the light to the dark, it is hard to see the floor and what is on it. The lack of light is part of the problem and the fact that the person is not looking is another part.

That is why there has to be a deliberate effort to inspect the floor so it is safe to walk.

Equipment standards

Mobile equipment is also a challenge. A 12 cubic yard loader or a 50 st truck represents a lot of energy. In normal driving, the mass and speed can do a lot of damage. To prevent that damage, the brakes are checked before the equipment is used. The hydraulic lines are checked so the risk of fire is reduced. The fire extinguisher or fire suppression system has to be checked and functional.

The inspection of the equipment has to be systematic and complete. How does that get done? It is obvious--a checklist is used. When the checklist has the space for negative answers in a line and all the blocks are checked off with the same pen and the same mark, there is a question. Has the inspection been made or has the form just been marked off? This situation calls for follow-up on the part of a supervisor to make certain that the inspection has been done.

Back to place

Not all catwalks and walk-ways are equal. Some are new and some are old. Some are wide and some are narrow. The plant inspector has been easing past a steel box installed to protect a switch box for 15 years. It is necessary to turn sideways and take a deep breath to get past.

Is it safe or unsafe? The inspector is okay. Suppose an idler has to be carried past the same box. Is it safe or unsafe? It is probably unsafe. Remember back injuries occur during lifting and twisting.

The catwalk was installed at one width. It is now a lot narrower because the box was added. A worker can't safely carry a load past the box. It may be 15 years late, but the pre-shift inspection should turn up the unsafe condition. Get the box moved even if it has to be rewired.

Since the first hazard mentioned was a cylinder represented by re-bar or welding rod and it was on a shop floor, the example was for place. Consider a drink can in the cab of a piece of equipment. We now have either a hazard or a distraction. Either could be part of some uncontrolled energy transfer if the can keeps a pedal from functioning the right way.

Cab floors and shop floors both have to be clean.

Clean work places and well-maintained equipment are keys to safety and productivity. It shouldn't take an MSHA standard to cause miners and operators to take care of themselves and their own selfish interest.

Carl R. Metzgar is the safety and health manager of Vulcan Materials Co.-Mideast Division.

Reprinted from Information Access Co., a division of Ziff Communications Co.; Copyright Advanstar Communication's June, 1994 edition of ***Pit & Quarry****, Vol. 86, No. 12, Pg. 50.*

The big chill

Do you work outside? Like to snowmobile, ski, snowshoe or ice fish? Anyone who spends much time outdoors in our winter climate should be concerned about hypothermia. This potentially life-threatening condition occurs when the body loses heat faster than it can produce it, resulting in an overall drop in core (head, chest and abdomen) temperature.

You don't have to be lost in the bush for days or fall through the ice to be in danger. Keeping dry is vital and since sweating makes you damp, a day outside doing strenuous work or other exercise can lead to hypothermia. So can a few hours in even moderate cold (up to 54°F) when accompanied by high wind or dampness. It is therefore important that anyone who spends much time outside in winter be knowledgeable about the signs, treatment, and prevention of hypothermia.

All of us have experienced being cold during prolonged outside winter activity. But we should learn to recognize when it is time to get out of the cold, before the more serious condition—hypothermia—develops.

Pay attention to what your body is telling you. The first signal is often cold arms and legs, as the blood is diverted to the vital organs. If this is followed by muscle tension, fatigue or uncontrollable shivering, it is time to get to shelter and warm up.

Danger signs to watch for in yourself and your companions include excessive shivering, blue lips and fingertips, slurred speech and poor coordination. As soon as you notice these danger signs, get out of the cold and get warm. Once a person reaches the later stages, actual hypothermia, the resulting confusion and irrationality may prevent them from taking the necessary action. If you see anyone in this state, get them to shelter and seek medical aid.

Prevention is always better than treatment. The simplest and perhaps most effective measure is to consider the weather conditions, including wind chill and humidity, and dress accordingly. Loose layers of breathable material with wind protection that you can take on and off as needed work best.

Reprinted from the January/February 1995 issue of Ontario, [Canada's] Natural Resources Safety Association's ***Health & Safety RESOURCE.***

Coal to continue as dominant utility fuel

Coal will remain as the nation's dominant fuel for electricity generation between now and 2004, says data in *Electricity Supply and Demand 1995-2004,* recently published by the North American Electric Reliability Council (NERC). According to the report, coal's share of generating capacity for 1995 will be 41 percent—compared to 28 percent for oil/gas, 14 percent for nuclear, 9.5 percent for hydro, and 4.6 percent for independent power producers (IPPs).

By 2004, coal will still dominate, though its share will decline to 37.5 percent. Oil/gas will increase to 31 percent, with nuclear at 12.8 percent, hydro at 8.6 percent, IPPs at 5.6 percent, and other sources at 4.4 percent.

In terms of electricity production, coal will provide 57 percent of the U.S. total in 1995, compared with 22.4 percent for nuclear, 11.5 percent for oil/gas, 8.7 percent for hydro, and 7.4 percent for IPPs. Pennsylvania utilities produce nearly 60 percent of their electricity with coal.

By 2004, coal's U.S. share of the electricity market drops slightly to 55.8 percent, compared with 20.1 percent for nuclear, 14.6 percent for oil/ gas, 8 percent for IPPs, 7.6 percent for hydro, and 1.9 percent for other sources. The report says utility coal tonnage will increase from 828.7 million tons in 1995 to 923.7 million tons in 2004.

Reprinted from the August 1995 issue of the ***Pennsylvania Coal Monthly.***

Hit back at kickback!!

By David Dehaas, ONRSA Senior Education Specialist

"Kickback" is one of the worst accidents that can happen to a person working with a chainsaw. There is no warning and there is no time to react: one instant the saw is cutting normally, the next instant it throws itself back at the person holding it with stunning force and blinding speed. The whole accident, from start to finish, can take less than three-tenths of a second, and the results can range from cuts and scrapes to gaping wounds, amputations, and sudden death.

Today's saws and training for cutters are much better than they were even twenty years ago, but the accidents, the injuries and even the fatalities are still happening. The latest kickback death in Ontario, [Canada] came last November when an experienced, 28-year-old logger died seconds after his saw kicked back and cut through major arteries in his neck. While this was the first workplace fatality caused by kickback in three years, serious injuries are still happening at a rate of three and four per month. In the five years from 1989-93, for example, there were 168 lost-time injuries from chainsaw cuts in Ontario logging, 10 in the mining industry, and a further 9 reported from the sawmill and veneer industries (the number of off-the-job injuries is even higher).

What is kickback?

"Kickback" is what happens to a chainsaw when the motion of the saw and the chain are suddenly reversed When it is cutting normally, the saw is stationary while the chain is moving around the bar. But when something happens suddenly to stop the chain, that relationship is reversed. Then, instead of a moving chain rotating around the bar, the bar starts to rotate inside the suddenly stationary chain, and the saw pushes itself off from the point where the chain is held up. This "transfer of inertia" happens instantly, with all of the energy of the saw—and in the opposite direction.

What this means in practical terms is that if you are cutting and something happens to bind, freeze or stop the chain, the saw will kick back. Kickbacks are quite common, and any person working with a chainsaw will experience them almost every day. Most of those kickbacks are very mild and easy to control. Some are more serious, and cause the saw to buck violently or to rebound out of the cut. But it is the "high energy" kickbacks that happen when the person holding the saw is off balance or standing in an awkward position that often result in the worst injuries.

The direction that the saw will move when it kicks back is hard to predict. It all depends on how you were holding the saw and in which direction the chain was moving at the point where it was stopped. The saw could be pulled forward, out of your hands, or it could be pushed straight back and hit your hand and arm; it could move down and back to cut your foot or swing around and cut into your leg; but in the worst cases it could kick up and back, turn as it swings, and strike your face, neck and chest with the tip of the bar.

How does kickback happen?

There are two ways that the chain can be stopped suddenly to cause a kickback. The most common kickback situation happens when the chain at the upper "corner" of the bar accidentally touches a log or tree trunk. A cutting link of the chain, just starting to turn around the bar tip and pointing into the wood at an angle, goes in too deep and gets buried in the wood. The chain is slammed to a sudden stop and the saw pushes itself off from the point where the chain is stuck.

The other way kickbacks can happen is if the saw is cutting a log from below with the top of the bar. When the log breaks, the cut starts to open wider at the bottom and close at the top. This is like a pair of pliers closing, and it can pinch the chain and hold it. The saw kicks straight backwards, often with enough force to tear itself from the operator's hands and knock him or her over.

There are many things that you can do to protect yourself from getting hurt in a kickback. The first is to choose the right saw: an up-to-date model with all of the safety features available. The second thing is to make sure that your saw is properly maintained and that the chain is sharpened to exactly the right specifications. Third, your personal protective equipment—especially your chainsaw boots and pants—will give you very real protection if the saw does kick back and hit you. But the fourth and most important part of kick back prevention has to be your safe working habits—the everyday, all-the-time details of how you hold the saw, how you stand, how you cut and how you handle problem situations.

Safe working habits

Understanding how kickback works is the first step in protecting yourself (and people you may be responsible for); knowing all of the things that can be done to cut down on kickback is the second step; but the third and hardest step is applying what you know and making it work for you on the job.

How do you make chainsaw safety work for you? How do you apply what you know about preventing kickback? Kickback prevention is not a matter of a single choice, a single precaution, or a single procedure. It requires that a whole range of measures be used, and be used all the time. To make this work, we need standards.

The standards for equipment choice and saw maintenance are very important; but they are also well defined, easy to apply and easy to check. Operating technique—how the job is actually done—that's the hard part.

With operating technique as the critical factor in safety, the standard has to go beyond knowledge and beyond ability to describe actual behavior. We cannot accept a standard of "know how to do it right" or even one of "demonstrate that you can do it right." To be useful, and to provide the day-in, day-out protection chainsaw users need, the standard has to be *"show that you have developed the habit of automatically doing it right every time without thinking about it."*

Chainsaw operators have to acquire *safe working habits so* that they will automatically use the right footing, the right stance, the right grip on the saw, and the right cutting technique each and every time without having to think about it. That, and that alone, is the bottom line in kickback prevention and chainsaw safety.

Developing "safe working habits" is another issue that will have to wait for another *HSA* article. But the short answer is this: you develop safe working habits by consciously making yourself do it right every time until you start to do it that way automatically. That's when knowledge and ability become behavior—and that's when you have the highest degree of protection against kickback.

Reprinted from the March-April 1995 issue of Ontario [Canada's] Natural Resources Safety Association's ***Health & Safety RESOURCE.***

How to prevent kickback

Here are some of the things you have to do to prevent kickback while you are cutting with the saw, and to prevent yourself from being hurt if the saw *does* kick back.

• **Stand off slightly to the left of what you are cutting.** Unless you are using a specially designed left-handed chainsaw, the saw must be held with the left hand on the forward handle and the right hand operating the throttle. Stand at a slight angle to the work with your left foot forward. This is not only the easiest and most comfortable position, it is also the safest. If the saw kicks back, it will swing up and away from your body on the right. *Never* use a righthanded saw "left handed" and *never stand directly behind the saw.*

• **Hold the saw firmly in two hands** any time the engine is running and the brake is not on. This gives you more control, both to avoid letting the bar tip stray into a kickback situation and to control the saw if it does suddenly kick back. .

Keep the thumb of your left hand wrapped under the forward handle. This helps to prevent the saw from being pulled free from your grip and gives you much better control.

• **Keep the left arm straight when you are cutting.** Whenever possible, keep your left arm straight and do not bend the elbow; this is easier, and it can also save you from being hit by the saw in a kickback. If your arm is straight when a kickback happens, the saw will tend to swing away from your body.

• **Do not let the bar tip touch or dig into wood while you are cutting.** This applies especially during limbing and bucking when branches and the trunk of the tree can get in the way.

• **Make cuts from below in two stages.** Do not attempt to cut through a log with one cut from below. First, cut at least a third of the way through the log from the top. Then make a second cut to meet it from below. This way, the "pinch point', will be well above the chainsaw bar when the log starts to break and it won't freeze your chain and cause a kickback.

• **Start every cut at full power.** Just as you start the cut, run the engine up to operating speed and keep it at full power for the whole cut. A less than full-power start makes it much easier for the saw to bind in the wood instead of cutting through it.

• **Stay in control of the saw.** Hold it firmly in both hands any time the engine is running. Make sure you have solid footing before you start any cut. Keep the saw in balance and close to your body where you can control it. Do not reach out with the saw, or try to cut above shoulder level. Finally, do not try to work with a chainsaw when you are so tired that you don't have the strength to control the saw.

Maintenance factors

Proper maintenance and sharpening of the saw play a major role in preventing kickback. Here are the critical factors.

• **Set the depth gauges to the exact manufacturer's specification.** Use the right depth gauge tool, and never file a depth gauge "by eye". Depth gauges control how deep a cutting link can bite into the wood. If you file even a few thousandths of an inch too much off the depth gauge, then the cutter could bite too deep and it could get stuck and slam the chain to a stop.

• **Sharpen the cutters to the correct angles and keep them sharp.** The saw and the chain are designed to work with sharp cutters filed to exactly the right angles. When the cutters are "up to spec", they are less likely to bind in the wood and more likely to be able to cut their way through.

• **Keep the saw tuned and running right.** The saw has to accelerate smoothly, run at full power when cutting and not hesitate or lose power part way through a cut. Again, this allows the saw to cut through the wood rather than getting jammed in it.

• **Set the chain tension right.** Test your chain tension by taking the chain between your thumb and forefinger at the bottom of the bar (while wearing your gloves!) and pull the chain down as far as you can. You should be able to pull it down to expose about half of the drive link and no more. Proper tension means less slack and less chance of a cutter going in too deep at the bar tip.

• **Clean, maintain and adjust the brake properly.** If the brake is working right, it could prevent an injury. Make sure it is cleaned and adjusted regularly.

Personal protective equipment (PPE)

PPE does not, of course, prevent accidents; it is the last line of defense. Its job is to prevent injury once an accident has happened. Anyone using a chainsaw—even if it's only for a "small job"—needs all of the chainsaw PPE.

Chainsaw boots (as opposed to regular "safety" boots) provide cut-through protection.
Chainsaw pants have special pads of "ballistic nylon" or Kevlar sewn into the front, sides and lower rear of the pant legs. These pads are made to clog up the chain if you accidentally cut into them. This makes it harder to cut through and brings the chain to a stop.
Chainsaw gloves or mitts have special padding in the back of the left hand glove that gives you some protection if the saw kicks back, pulls free of your grip and hits the back of your hand. ***Hardhat:*** A hardhat can provide protection against kickback injury to the head if *it is still on your head when the saw hits.* In accidents in the past, hard hats have often been knocked off before impact.
Other chainsaw PPE not related to kickback includes: hearing protection (usually in the form of ear muffs that attach to the hardhat); a face shield to protect against flying sawdust and whiplash from small trees; safety glasses; and high-visibility clothing.

On the spot vise for chainsaw sharpening

By Paul André, ONRSA Consultant/Trainer

Proper chainsaw sharpening is crucial in reducing kickback, vibration and operator fatigue. Having cutters sharpened at the correct top plate and side plate angles, with depth gauges lowered according to the manufacturer's specifications, will result in faster, cleaner cuts, and ultimately, improved productivity. As professionals know, keeping the chainsaw sharp requires several touch-ups throughout the day. Most of these touch-ups are done right on the spot, either at a stump or at the landing where a good solid working surface, required for proper sharpening, is not always available.

Here's a quick and easy way to make a vise right on the spot that will hold the bar steady. First, take your chainsaw and make a bucking cut to about the depth of the bar on the butt of a felled tree that needs to be trimmed off. Then turn the saw off and lift the bar until about half of it is above your bucking cut, ensuring that the chain is not touching the bottom of the bucking cut. Push the chainsaw forward and drive the bucking spikes into the log. This will hold the chainsaw up. Then take your combination tool and wedge the screwdriver in the bucking cut beside the bar. It's as easy as that! You now have a solid working surface for sharpening. I'm sure you will agree, it makes the job a whole lot easier.

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Three miners receive medals of honor

Three miners have been honored with safety awards by the Joseph A. Holmes Safety Association. Jerry Maldonado, Dan Beam and Charlie Neece received this years Medals of Honor for distinguished service for attempting to save the lives of fellow miners while incurring risk to their own lives.

Maldonado, who works for Evans Construction Company in Evans, Wyoming, rescued co-worker Bob Myers on June 18, 1994, when the truck Myers was driving plunged into a pond. Maldonado dove into the pond, opened the truck's door and began rescue breathing while pulling Myers out and guiding him to shore.

He continued rescue breathing until the rescue squad arrived. Despite Maldonado's heroic efforts, Myers died shortly thereafter.

Neece and Beam were honored for successfully steering several other miners to safety when a coal seam in the Meigs 31 coal mine in Southern Ohio broke and icy, raging waters threatened to trap them underground on July 11, 1993. The rescue was chronicled in an article in the August 1994 issue of Reader's Digest magazine. J. Davitt McAteer, Assistant Secretary of Labor for Mine Safety and Health and president of the Joseph A. Holmes Safety Association, congratulated this year's honorees.

"Working in a mine presents extraordinary challenges every single day," he said. "These three miners rose to the challenges. Their willingness to risk their own lives is a testament to their skill and courage."

The Holmes Association Medal of Honor is awarded to an individual who saved or attempted to save a life while incurring some risk upon his or her own life. The heroic act may or may not occur in the line of duty by an active or inactive employee of any branch of the mining and related industries.

Anyone meeting these criteria may be nominated for a medal of honor. A review committee will make the final selection.

Dr. Joseph A. Holmes was the first director of the U.S. Bureau of Mines. The Joseph A. Holmes Safety Association was established in 1916 by leading national mining organizations to conserve the lives of those working in mining through safety education and by recognizing and rewarding safe-work achievers. The awards program has been in place since 1927.

Making safety a business for life

For almost 50 years, National Mine Service Company (NMS) has been a leading distributor of safety products to the mining industry. Approximately 50% of the company's revenues are generated through the sale of products related directly or indirectly to mine safety, so it is not a subject that is taken lightly. Since becoming the exclusive distributor to mining in the U.S. for the Draeger BG174A breathing apparatus 25 years ago, NMS has become well known to safety officials throughout the industry for their support of mine rescue efforts. Conducting training sessions for customers in the use and maintenance of breathing apparatus, gas detection instruments and self-contained self rescuers is an everyday occurrence for NMS sales and service representatives.

Quick to respond when mine emergencies occur, dedicated National Mine employees are among the first to show up on mine property to offer support in maintaining breathing apparatus, assist in obtaining necessary supplies or help calibrate gas monitoring instruments.

"I remember when the mine rescue team members showed up at the Ferret Mine explosion back in the 70s," recalls Kyle Dooley, a 28-year company veteran. "Several had beards (which may cause an air leak around the facemask of the apparatus) and did not want to shave. When I told them that Draeger detector tubes being used underground were indicating the presence of carbon monoxide in excess of 5%, several of the team members said in unison: "Give me your razor!"

Larry McCoy, branch manager of the company's Wise, Virginia and Jenkins, Kentucky branches adds: "When you think of the job that those "Draegermen" working underground have to do, risking their lives to save others, it's a good feeling to know that National

Mine Service Company is there to support their efforts. "McCoy, a 26-year NMS employee has assisted in several mine emergencies. From Sunshine to Southmountain, Wilberg to White County, he has been available when called upon to help. McCoy points out that mine rescue team members are a close-knit fraternity, one with which National Mine is proud to be associated. Every summer he, along with dozens of other NMS employees, can be seen lending their support to the local and regional mine rescue contests, where teams sharpen their skills by competing against teams from other companies.

As important as it is to escape safely from hazardous conditions, it is just as important to detect the presence of life threatening gases before a serious problem arises. In 1980, the Industrial Safety Division of National Mine Service Company began to manufacture gas detection instruments. That division was sold in 1984 and now exists as Industrial Scientific Corporation (ISC), a Pittsburgh-based manufacturer. National Mine still maintains close ties with ISC, acting as their exclusive distributor of instruments to the U.S. mining industry. Owning the major portion of the market share for multigas monitors used in the coal mines, ISC recently received certification as an ISO 9001 manufacturer. That, combined with the introduction of their latest family of MSHA-approved gas monitors, were just two of the highlights in an exciting year for ISC.

Gas detection in the mines has come a long way since the use of canaries!

Every breath you take

By Josef Sedlacek, ONSSA Ventilation Engineer

Everyone enjoys a breath of fresh air during outdoor leisure activities. There is no reason why we should not equally enjoy good air in our working environments. The working environments in our natural resource industries range from the open air of logging operations to the confined spaces of mines. In spite of this diversity, we have today the technology to provide everyone air that is not only safe, but also healthy. The only question is how much of this technology do we want to utilize.

Before we commit to large expenditures on ventilation technology, we have to realize that two things are of utmost importance in securing an adequate and continuous supply of fresh air. One is the proper design of the ventilation system, and the other is air monitoring coupled with appropriate and reliable ventilation controls. For proper design, several parameters must be considered. What is the primary reason for ventilation? Is it to control contaminants such as dust, gases, vapors or fumes; or is it to provide a tempered *(i.e.,* comfortable) environment? Further, is dilution ventilation needed (which can be quite expensive for large area plants); or would local exhaust or spot ventilation be sufficient?

Once these questions are answered, the selection of ventilation equipment can take place. Here it is very important to match the various components of the ventilation system to the task. For instance, unnecessarily large fans connected to small diameter ducts would not only place too much strain on the system, but would result in high operating costs.

Today, we should look not only at the quantity of ventilation, but at how efficient and effective the ventilation is. Increasing the efficiency and effectiveness of ventilation helps us to ventilate better at lower cost. To achieve this, we need good ventilation monitoring and controls. It is here that we can take the greatest advantage of new technology, namely, computer controlled ventilation systems.

Ventilation monitoring assures us of the quality of air we breath, while ventilation controls regulate the amount of air needed at a particular workplace. More and more ventilation systems are computer controlled. When the monitor, for example, indicates an elevated concentration of a particular contaminant, the system is able to respond either by increasing the supply of dilution air, or by temporarily curtailing some activity in the affected area. By doing so, workers can be assured that they are not exposed to any harmful contaminant concentrations. With computer controlled ventilation, a full amount of air can be directed to the active places only, while the idle places will receive a reduced air volume. Using this method, considerable savings can be realized.

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Starting an in-house safety program must begin at the top

Often mine owners, CEOs, and human resource people ask how a company gets started with an in-house safety program which is both protective of employees and at the same time company protective in terms of MSHA compliance and accident liability.

For any program to have any hope of succeeding, it has to begin at the top. Owners and top management must be supportive from the very beginning or the program will be useless and an exercise in futility.

This first step is very important not only for the success of the program but also for management credibility. Employees judge the viability of any program by the amount of management support. If safety receives only lip service, employees will quickly judge safety to be unimportant and not worthy of their support.

This is exactly the response of most employees in mines where safety concerns are given only token commitment often forced by workers' comp insurance companies or by regulatory agencies such as the state or MSHA.

The second step in building a positive and strong company-wide safety program is employee support and participation. Sometimes owners make the mistake of trying to superimpose a safety program on employees via a canned safety manual they have acquired from impersonal generalized safety programs.

Often these are good programs with excellent ideas and suggestions on general overall mine safety. But before purchasing any safety manual or program, employees need to be a part of the decision-making process. Employees are a valuable asset in any program that affects them—especially safety.

Safety committees should never be mandated. Management should have the opportunity to choose if they want a safety committee, and experience shows that safety committees when supported and cooperatively worked with by management are very successful.

Seldom does management know the whole story of what is happening in the mine especially when it comes to safety. But employees do! They know the problems involved. They know where the hazards are. They know about unsafe employees, and often have excellent solutions to remedying unsafe situations.

After you have management and employee involvement, then it is time to begin in earnest to assemble a safety program, or if you have an old one in need of change, then it is time for updating. There are all kinds of resources for free safety information, from your workers' comp insurance company to your state or MSHA itself.

After you have begun with your management and employee safety group to put together the basics of a safety program such as rules and standards to be maintained, the next major step is enforcement.

What happens when someone breaks the rules? (You can be assured that there will be at least one person, probably more, who will test the system.)

Before you publish your safety rules, decide on how you will enforce those rules—verbal warning, written warning, fine, suspension, termination?

This is where non-management employees can make their most valuable contribution to the process. They can judge what will work in terms of rules, and what cannot be enforced.

The whole enforcement process may have to be gradual and phased in over an extended period—six months or a year. A representative group of employees will be able to inform you on what will work and what won't work in regard to safety.

Usually employees will accept most safety rules and standards as long as they are fair to everyone—no exceptions—and fairly enforced—with no special exceptions.

You will probably not have nearly the problems with illegal drug rules and the enforcement of those rules as you will with smoking prohibitions. Most other safety related rules are readily accepted by all employees and therefore are easily enforced.

Your safety rules, standards and disciplines will become your own safety manual. Add to your manual the MSHA compliance written plans such as Hazard Communication, Lockout/Tagout, Personal Protective Equipment, Emergency Evacuation Plan, Spill Cleanup Procedure, Accident Procedures, etc.

Now you have a safety manual to which you are adding and subtracting from time to time via company memos. This is the manual you give to, and discuss with, all new employees.

The dividends of a positive safety program are fewer lost time accidents, lower workers' comp premiums, fewer regulatory fines, fewer complaints about unsafe conditions, a sense of achievement for both management and employees and better employee morale.

By Arthur H. Bishop, an OSHA/EPA compliance consultant/trainer and a principal with HazComm Inc. based in the Washington, D. C. area.

Lactose intolerance? Skip the milk!

Milk and cookies are a time-honored bedtime treat. But if you can't tolerate lactose, the pleasure of the snack isn't worth the price you'll pay later.

Lactose is the principal sugar found in milk and other dairy products. *Lactase is* the principal enzyme the body uses to digest lactose.

Babies make a lot of lactase to help them digest their mother's milk. As they grow older, there is a normal drop in lactase levels. This shortage of lactase can lead to lactose intolerance, an inability to digest milk and milk products.

It's a common problem, affecting 75% of African Americans and Native Americans, 50% of adult Hispanics and 90% of Asian Americans. Only those whose ancestors came from northern and central Europe seem able to digest milk easily.

A good reason to bellyache

Symptoms include bloating, gas, nausea, cramps and diarrhea. They usually begin 30 minutes to two hours after eating foods containing lactose. Severity depends on how little lactase is present.

Milk, ice cream and other dairy products are not the only offenders. Lactose can be found in chocolate, beer, instant coffee, bread, cereal, margarine, lunch meats, salad dressings, custards, cake, and cookies. It's also present in many processed foods, artificial sweeteners, and both prescription and over-the-counter medications.

If you suspect that you are lactose intolerant, try this test. Drink a glass or two of skim milk in the morning on an empty stomach. If you have any of the above symptoms within the next two or three hours, a shortage of lactase is probably to blame.

How to manage lactose intolerance

Help for people who are severely affected:

- Buy lactase treated non-fat or lowfat milk. It contains 70% less lactose than regular milk.
- Use lactase supplements—they're available over-thecounter. A few drops added to milk reduce the lactose content by 70%.

People who are only mildly affected may be able to tolerate some milk and dairy products. Some tips:

- Drink small amounts of milk throughout the day instead of several glasses at one sitting.
- When you do consume dairy products, eat other foods along with them. This will slow digestion and give lactase more time to act.
- Eat yogurt often—daily if possible. Yogurt contains bacteria that help break down lactose. Be sure the label says "live and active cultures."
- Non-fat yogurt is also a super source of calcium for those people who cannot tolerate milk products—eight ounces contains more calcium than eight ounces of skim milk! Other good sources of calcium for people who can't drink milk are tofu, molasses, kale, broccoli, turnip greens, canned salmon, shrimp, sardines and raw oysters.

Reprinted from the Fall 1995 issue of Georgetwon University Medical Center's Healthy Decisions.

Veggies can protect your vision

Macular degeneration is the leading cause of blindness. People who consume large amounts of green, leafy vegetables appear to cut their risk by 43%.

Journal of the American Medical Association, November 9, 1994

Minor head injuries need time to heal

Approximately 20% of high school football players suffer head injuries each season. Adequate recovery time following a concussion is the most important factor in preventing serious after-effects.

Journal of Pediatrics, February 1995

Women over 65 are wise to have regular mammograms

In this study, the cancer detection rate was 9.2 per 1,000 in women 65 and over and 5.7 in women ages 50 to 64. The cancers discovered in older women were also less advanced.

Radiology, January 1995

Reprinted from the Fall 1995 issue of Georgetwon University Medical Center's ***Healthy Decisions.***

Brain attack! The warning signs of a stroke

A stroke should be considered a brain attack. Warning signs to pay attention to:

- Weakness, numbness or paralysis of the face, an arm or a leg—especially on one side.
- Sudden blurred vision in one or both eyes.
- Difficulty speaking or understanding statements.
- Loss of balance or coordination, especially when combined with another symptom.
- Sudden, severe and unexplained headache.
- Extremely sudden nausea, fever and vomiting.
- Brief loss of consciousness or fainting.

One or more of these symptoms may appear briefly and then disappear. Such "mini-strokes" are a powerful warning that a full stroke may soon follow.

Who's at risk for stroke? People with high blood pressure, diabetes mellitus, heart disease, elevated cholesterol, the heart rhythm disturbance called atrial fibrillation, and people who smoke or who have had a heart attack. "But you can reduce your chances of stroke by making modest lifestyle changes," says Stanley Cohan, MD, professor of neurology at Georgetown University Medical Center. That means:

- Don't smoke.
- Have blood pressure and cholesterol checked.
- Limit dietary fats.

Work with your doctor if you are a diabetic to control your diet and medication.

"Call your doctor immediately at the first sign or suggestion of stroke," says Dr. Cohan. "Your quick response may reduce serious injury."

Reprinted from the Fall 1995 issue of Georgetown University Medical Center's ***Healthy Decisions****.*

Knee sprains: accidents waiting to happen

Knee sprains are a common injury. The ligaments that support the knee stretch, 3 sometimes so far that they tear. They happen quickly and are usually the result of a sudden movement. A fast change of direction on the basketball court will do it.

But you don't have to be a jock to sprain your knee. Tripping on the stairs, twisting on the dance floor or slipping on the ice will do it, too.

You'll hear a pop or feel a tearing sensation. Your knee will hurt and start to swell. The level of pain is your first clue to the amount of damage done. As a rule, the more pain, the worse the sprain.

First-aid for sprained knees

Apply ice immediately to minimize pain and swelling. Over-the-counter analgesics help, too. If the injury seems mild, begin to treat at home:

- Rest the injured knee and keep it immobile.
- Ice—applied hourly for the first 24 to 72 hours.
- Compress—wrap the knee with an elastic bandage.
- Elevate the injured knee.

If the pain doesn't subside quickly, or the knee turns black and blue and swells up like a balloon, it's time to call the doctor.

Bad sprains require medical attention

Doctors classify knee sprains according to the extent of the injury:

- Grade 1: The ligament is stretched, but not pulled out of shape.
- Grade 2: The ligament is stretched and lengthened like a piece of taffy. It may be partially torn.
- Grade 3: The ligament has been stretched and torn.

In many cases, mild sprains heal themselves. With limited activity, the ligament gradually resumes its normal shape. Physicians often prescribe physical therapy to restore strength and mobility.

Torn ligaments are another matter—they usually require surgery. New surgical techniques reduce the trauma of knee surgery, but time, patience and rehabilitation therapy are vital in order to regain full use of an injured knee.

Reprinted from the Fall 1995 issue of Georgetwon University Medical Center's ***Healthy Decisions****.*

Hand protection

Robert C. Peterson, PE, Lone Star Industries

The opposing thumb—the ability to touch any finger tip to the thumb—has made man the most successful of all animals. We can use it to build a wagon and a space shuttle, tie a shoelace and a suture in surgery or feed ourselves and the world. But not often do we stop to think what our lives would be without our hands?

Almost any occupation requires the use of our hands. Without them, a computer operator could not input data, a carpenter could not build a house or a physician could not perform surgery. In fact, many people could not earn an adequate living without their hands. Yet we take them for granted. So much so that Americans suffer about 180,000 serious injuries to their hands every year.

To protect our hands we need to remember a few simple rules. Never use worn or broken tools. Repair or replace them. Use the right tool for the job (wrenches are not hammers; screwdrivers are not pry bars or chisels). Put tools away when not in use. Wear gloves to protect against physical or chemical agents (there is no "universal" glove—use the right one for the hazard). Keep hands out of machinery while it is operating—shut it down and disconnect/lock out the power. Injuries to the hand should be treated immediately to prevent infection. If chemicals are contacted, wash them off with plenty of running water.

Our hands are one of the most important avenues of contact with our world. If would be hard to pick up a child or hold hands with a loved one without them.

Article written by Robert C. Peterson, PE, Safety/Engineering, Lone Star Industries, Inc., Cement and Construction Materials Group, Maryneal Plant, Sweetwater, Texas.

Verotoxigenic E. Coli—hamburger disease!

You've invited your mom and dad over for a summer barbecue. While they're playing with their grandchildren, you bring the patties out on a platter. When they're done (medium rare for you and your wife, well done for everyone else), you put them back on the platter and take them in the house. (Too bad the bugs are so bad you can't eat outside). Oh well: it's a great meal—a perfect end to a perfect summer day!

Two days later, your wife and son have a flu-like illness, with severe stomach cramps. Ten days later, your mother is in the] hospital with kidney failure. Everyone else is fine; so it couldn't be the food since you all ate the same thing. Right?

Wrong! "Hamburger disease" can have little or no effect on some people. Others fully recover in 7 to 10 days. In rare instances, it can be fatal. It is caused by the verotoxigenic E. Coli bacteria which is found in the intestines of cattle primarily, but also in pigs and sheep. It can come into contact with meat during butchering and spreads most rapidly in minced meats as the bacteria can multiply and spread while the meat is being ground. Hence the nickname.

Symptoms appear in from 2 to 10 days, and thus may not be associated with their cause. That's why there are probably far more than the approximately 2,400 cases that are reported each year in Canada.

In addition to those mentioned above, symptoms can include vomiting, mild fever and watery diarrhea which eventually becomes bloody.

Prevention is relatively easy:

- refrigerate meat as soon as possible and thaw in the refrigerator;
- eat foods while they are hot and return leftovers to the fridge as soon as possible;
- wash all dishes, counters, utensils and other surfaces that have come in contact with raw meat in hot, soapy water and bleach. Do **not** carry the cooked meat on the same platter you used for the raw meat without washing it;
- in restaurants, if the food served is not well cooked and hot, send it back;
- and yes, the bad news for those of us who like our meat medium rare is that ground meats, rolled roasts and poultry must be cooked until there is no pink left. Most roasts, steaks and chops can be eaten a little rare as long as the outside is well cooked. But hamburgers, **never.**

Oh well—steaks taste better anyway.

Reprinted from the July/August 1995 issue of Ontario [Canada's] Natural Resources Safety Association's ***Health & Safety RESOURCE.***

Don't learn to live with pain—learn to manage it

Acute pain serves a useful purpose. It keeps you from walking around on a broken leg. It forces you off your feet, giving your leg time to heal and preventing further injury. Acute pain can also be a warning, urging you to get help for that ache in your back... your stomach... your chest.

But chronic pain has no apparent function. It's defined as pain that persists beyond the normal length of time needed for recovery from an injury, an operation or a disease. It's pain that goes on longer than six months and doesn't respond to conventional medical treatment.

An estimated 86 million Americans suffer with chronic pain. Pain can be the hallmark of a lifethreatening disease, such as cancer or sickle cell anemia, or it can linger in the aftermath of a less critical condition—shingles is one example.

Arthritis, rheumatism and lower back injuries all cause chronic pain. So do nerve diseases or nerve degeneration. In some cases, the reason for pain is never discovered. Unexplained pain is often worse because of the anxiety it produces.

Although pain and depression are often connected, the link is not as common as one might think. A national study found that while 14.4% of the general population reported chronic muscle or skeletal pain, only 23.6% of these were identified as depressed. Depression varies with age; younger people with chronic pain are more likely to be depressed. They worry about their jobs while older people fear the disability that pain often brings.

What can be done to manage chronic pain? Many physicians are adopting a multi-disciplinary approach to pain and using alternative methods to control and manage it. The goal is to reduce the amount of pain medicine needed and to support a return to a more active and satisfying lifestyle.

Learn a variety of treatment options

Therapies are often most effective when used in conjunction with one another. Among the most frequently prescribed are:

- relaxation therapy and stress management
- biofeedback training and hypnosis
- physical therapy and exercise instruction
- group therapy and family counseling
- educational programs about pain and medications
- TENS units (transcutaneous electrical nerve stimulation), a method of pain relief that applies minute electrical impulses to nerve endings that lie beneath the skin. TENS units seem to work by blocking pain messages to the brain.

Studies show that people who learn several methods of pain control can eventually take care of themselves at home with more mobility, less medication and fewer doctor bills.

Better yet, people who use active coping strategies, such as relaxation and exercise to manage pain, and who have confidence in their ability to control pain, have less of it.

Stop the pain before the pain stops you

True or false? If you're in chronic pain, you should wait until the pain gets really bad before you take your pain medicine.

False. Experts liken that behavior to waiting until your car runs out of fuel and then pushing it to the gas station. Pain medicine takes time to work. If you wait until you're climbing the walls, you'll probably have to take more of the medicine to get relief.

Most pain experts agree that once severe pain takes hold, it is much harder to control. They say that if you have a chronic condition that causes pain day and night around the clock, and your doctor has ordered pain medicine for you, you should take it in the amounts and at the intervals that are prescribed.

Although medication is only one of the treatments you can use in your struggle to control chronic pain, it's an important one. Don't let the pain get ahead of you.

Reprinted from the Fall 1995 issue of Georgetwon University Medical Center's ***Healthy Decisions****.*

THE LAST WORD...

Occasions are rare; and those who know how to seize upon them are rarer. — J. Billings

An optimist is a man who has never had much experience. — Don Marquis

You will never "find" time for anything. If you want time you must make it. — C. Buxton

Plough deep while sluggards sleep. — Benjamin Franklin

To be good is noble, but to teach others how to be good is nobler—and less trouble. — Mark Twain

Wrinkles should merely indicate where smiles have been. — Mark Twain

Do not wait for extraordinary circumstances to do good; try to use ordinary situations. — Jean Paul Richter

If you haven't seen your wife smile at a traffic cop, you haven't seen her smile her prettiest. — Kin Hubbard

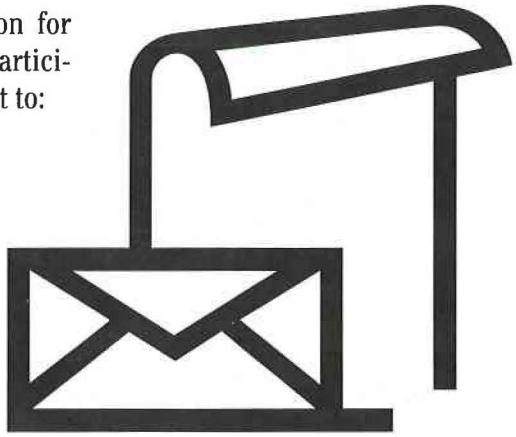
Who dares to teach must never cease to learn. — John Cotton Dana

The optimist proclaims that we live in the best of all possible worlds; and the pessimist fears this is true. — James Branch Cabell

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

DON'T FORGET: If you have not returned the questionnaire at the end of the October issue of the Bulletin, PLEASE do so. We are planning to purge our subscriber list in December!

REMINDER: The District Council Safety Competition for 1995 is underway—please remember that if you are participating this year, you need to mail your quarterly report to:



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

Please address all editorial comments to the editor, Fred Bigio, at the above address. Phone: (703) 235-1400

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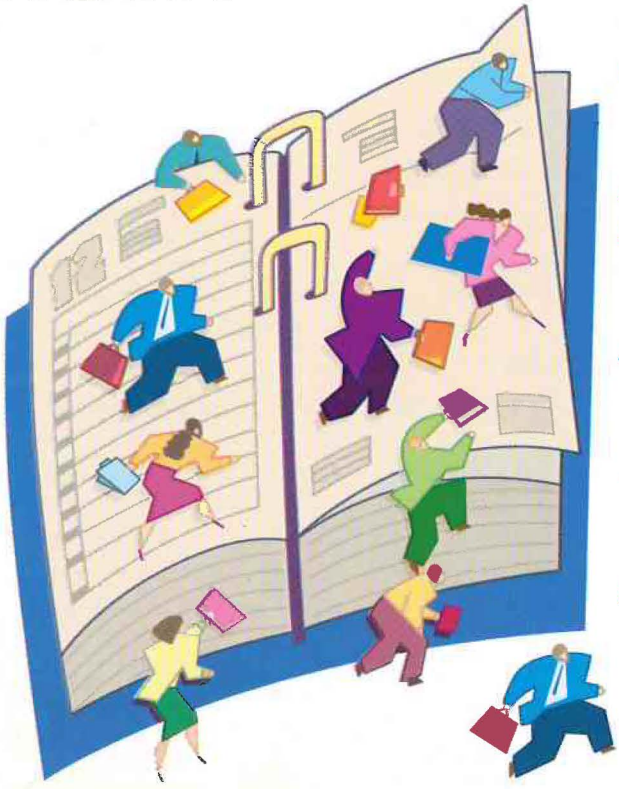

Coming events:

- *Nov. 8-10, NMC's Mining Communications Conference, New Oreleans, LA*
- *Nov. 16-17, Holmes Safety Association, Executive Committee Meeting, at the Hyatt Regency Hotel, Lexington, KY*
- *Dec. 5-7, Power Gen Americas, Anaheim, CA*
- *Dec. 6-8, Northwest Mining Assoc., 101st Annual Conv., Spokane, WA*
- *Jan. 17-19, NMC's Transportation Seminar, Tempe, AZ*