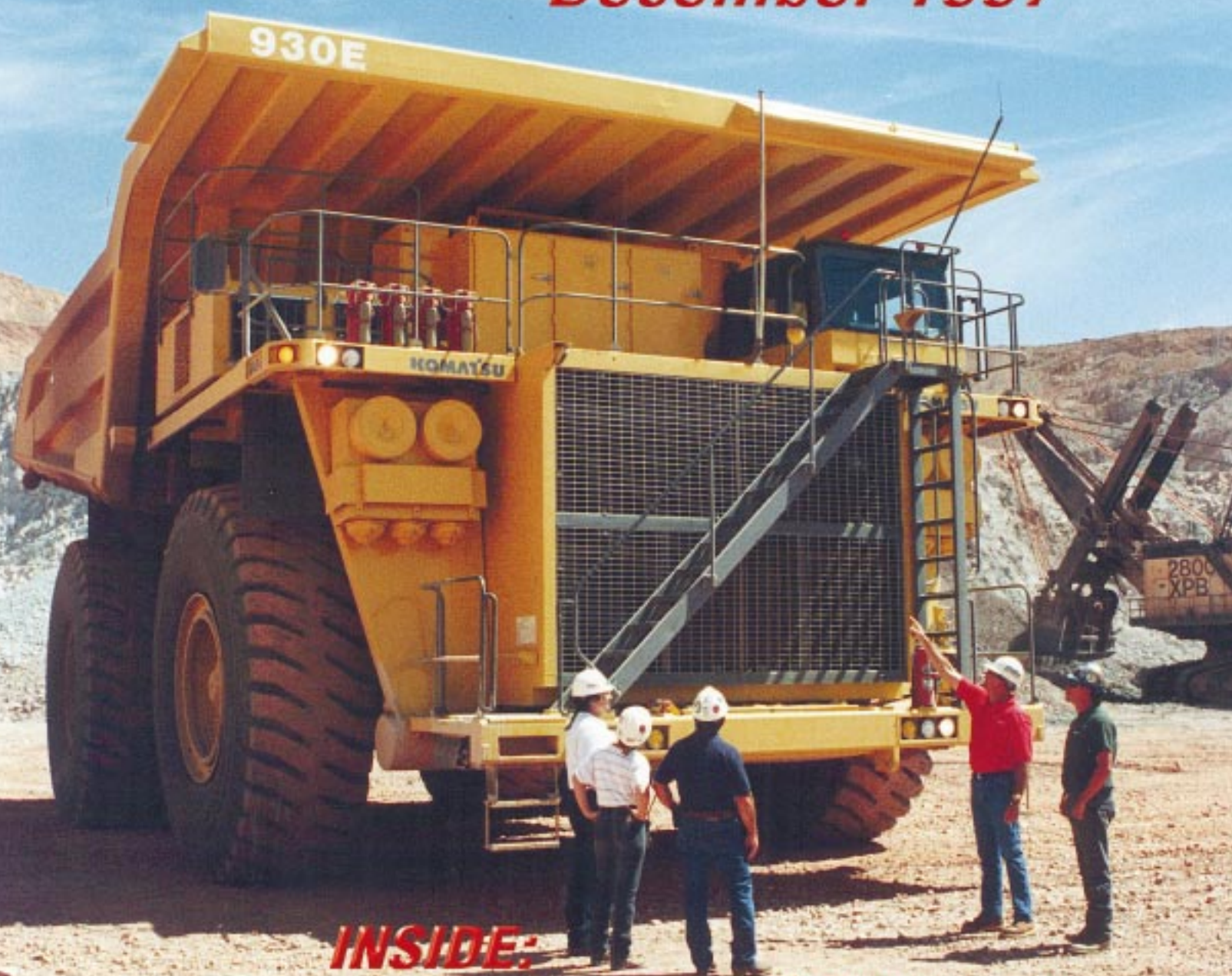


The Holmes Safety Association

BULLETIN

December 1997



INSIDE:

Rising fatalities in Metal/Nonmetal

Safety in the age of teams

Sitting up to sleep



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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 by the Mine Safety and Health Administration.

COVER: Thanks to H.L. Boling of Phelps Dodge for this month's cover photo.
[If you have a potential cover photo, please send an 8" x 10" print to the editor, Fred Bigio, MSHA, 4015 Wilson Blvd., Arlington, VA 22203-1954]

**KEEP US IN CIRCULATION
PASS US ALONG**

MSHA takes action over rising fatalities in Metal and Nonmetal Mines

The metal and nonmetal mining industry includes all mining operations other than coal mines. Typical operations include gold mines, lead mines, silver mines, crushed stone operations, quarries, sand and gravel pits and mills.

By Thomas MacLeod, MSHA Office of Educational Policy and Development

As of September 15, 50 miners in metal and nonmetal mining operations have been killed on the job as compared to 34 at the same time during 1996. Of these 50 deaths, 35 occurred at mines that are exempt from MSHA enforcement of part 48 training regulations. Not since 1987 has the total number of metal and nonmetal miners killed on the job reached as high as 50 by this date. In an effort to reduce the number of fatalities in the metal and nonmetal industries, MSHA has begun several initiatives. In an unprecedented move, starting September 15, MSHA conducted a safety sweep of our nation's metal and nonmetal mines. The sweep was conducted to bring attention to hazardous conditions that have caused a significant increase in fatalities this year.

The initiative mobilized all available metal and nonmetal inspectors, a portion of the agency's coal mine inspectors and technical and training staff. Their assignment was to speak directly with miners and management about the types of accidents that are occurring and how to prevent them.

Earlier this year, MSHA had expressed concern over the higher number of fatalities and responded to the problem by temporarily re-assigning inspectors to geographical areas of special concern. The agency deployed training personnel to mine sites, conducted pertinent surveys, and performed other accident prevention activities.

The agency also met with and sought the input of industry and labor leaders in an effort to find solutions to the increasing fatalities.

"We have directed a major deployment of agency personnel to address this alarming increase in mining deaths."

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

Topics of discussion included rising production in some industry sectors and the important role of supervisors in preventing fatal accidents. Since that time, fatalities have continued to occur at a pace greater than any time in the past 10 years.

Accidental deaths in the metal and nonmetal mining industry had fallen from more than 200 deaths annually earlier this century. The all-time record-low of 40 fatalities in metal and nonmetal mining was set just 3 years ago, in 1994, beating the previous low of 43 deaths in 1992. Last year, non-coal mining deaths numbered 47, a total already surpassed by the 50 deaths experienced by the middle of September. The primary cause of the accidental deaths was powered haulage—meaning the victim was killed in an accident that involved some type of vehicle at the mine site—which has accounted for 40 percent of the 50 deaths. Machinery and slip-and-fall accidents are the next two leading causes of fatal accidents this year.

Most of the fatal accidents have occurred during routine day-to-day duties typically carried out at mining operations. Some victims were working with equipment that was improperly maintained, while others

were performing certain tasks while not wearing seat or safety belts. As an example, a haulage truck driver lost control of his truck and rode over a berm and down the side of a highwall; the victim was not wearing a seat belt. Other victims were working in unsafe locations. For example, one victim was shoveling material from around a tail pulley when his clothing became entangled because a guard was missing. The man was pulled into the pulley and choked. In another accident, the victim's crew had finished working in one area and had moved to another. Without informing other crew members, the victim returned to the area that had been previously worked

"We need to be vigilant and involve everyone in the industry—from the boardroom to the toolroom—to reverse this dangerous trend. Top management must be committed to worker safety and make it a top priority at each mine. That message has to be communicated to their middle management. Miners have to be committed to protecting themselves as well as their co-workers from potential hazards at their mine site."

J. Davitt McAteer

and proceeded beyond barriers constructed to limit access. He was later found beneath a roof fall.

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MSHA is also looking at such other possible causes such as excessive work hours of employees due to downsizing and/or increasing production at some operations, newly-hired employees who are not properly trained in certain duties, contractor employees who are unfamiliar with the dangers of the mining environment, and a lack of awareness by supervisors of their responsibilities under the Federal Mine Safety and Health Act. According

to MSHA's preliminary investigation, one of the miners recently killed had worked 12-hour shifts for 15 consecutive days before his fatal accident.

During the sweep, MSHA inspectors talked to workers, their supervisors and mine managers. The objective was to discuss making safety a fundamental part of the mining process.

To continue the momentum started with the sweep, MSHA will

focus inspection personnel on specifically identified problem areas. This will include placing more emphasis in the states in which most accidents have occurred; directing additional resources at specific hazardous tasks which appear to be linked to most mining accidents; and tailoring inspections that will direct increased attention to troublesome safety areas or concerns.

The eyes have it

Stone producers who disregard eye safety do so at the peril of their employees' vision and the company's bottom line.

By Patrick Hernan

Eye injuries can be extremely painful and may lead to permanent sight loss. Still, some producers refuse to take the issue seriously.

"The subject often has been overlooked," says Anne Chambers, marketing manager for Uvex, a leading safety-equipment manufacturer based in Providence, R.I. "But the number of cases in litigation coming from employees is forcing employers to be more conscious."

Indeed, more and more companies are adopting and implementing eye-safety programs that give workers a choice of eyewear and provide cleaning stations and maintenance products such as wipes.

Chambers says companies are showing that management is serious about eye safety by holding workers and managers accountable. "Some are even fining and suspending employees for repeat violations."

The goal of any good program is 100 percent compliance with the company's eyewear policy. Be that as it may, workers who are unfamiliar with safety glasses and goggles or never were required to wear them occasionally are slow to get on board.

Education is critical, say the

experts. The best programs promote eye safety at work and home and are not adopted simply because OSHA mandates eye protection.

Applications and danger levels vary, so it is important that employees be made aware of the risks. A hazard assessment of the pit and quarry should be performed to determine where injuries are likely to occur. Areas where stone or sand cause an impact, such as the primary crusher or conveyor transfer points are potential danger spots.

Companies that take a proactive approach post signs that constantly reinforce a "safety first" message. Cases and holders should be provided, and the eyewear should be readily accessible. Lost and damaged eyewear should be replaced immediately.

Employees should be asked for their input in the type of eyewear purchased. Buying decisions, say the experts, should be based on value, style, comfort and price.

Supervisors, meanwhile, should not adopt the attitude that company eyewear rules do not apply to them. Some firms have put in place policies that hold managers accountable for repeat violations by workers. Most

employers make eyewear use a condition of employment.

Safety is paramount

"If there is a chance of particles flying, you have to be wearing eye protection," Chambers says. She notes that it is critical for producers to make sure the eyewear they buy meets ANSI standards and is impact-resistant—a manufacturer's logo imprinted on the eyewear is another good sign that quality standards are being met.

It's also a good idea to take human nature into account. No one wants to wear eyewear that is scarred, scratched, ugly or provided as an afterthought. The safety message must start at the top.

Chambers says she is even aware of cases in which people who work in dangerous applications such as welding were loathe to wear eye protection. Reversing such a dangerous mind set is critical.

Managers that are ambivalent toward safety might also want to consider that eye protection is everybody's business. The alternative can be painful and expensive.

Reprinted from the July 1997 issue of Quarry Safety.

In the past 18 months—Metal and Nonmetal fatalities are up

By Thomas MacLeod, MSHA Office of Educational Policy and Development

From April 1996 through the end of October 1997, metal and nonmetal mines have experienced 95 fatalities. Of these fatalities, 35 can be attributed to powered haulage accidents and 13 to drownings. Also, 14 supervisors have died in metal and nonmetal mines in the last 18 months; three were powered haulage accidents. In most instances, the supervisors were not performing supervisory duties, but performing some mine-related task when the accident occurred.

While no one single solution could have prevented these fatalities, a review of some safety fundamentals

while working around water, operating powered haulage equipment, and making sure supervisors are adequately trained while performing mining tasks could help reduce the occurrence of similar accidents in the future.

Drowning fatalities

In the last 18 months MSHA statistics show that 13 miners have drowned while performing work at metal and nonmetal operations. The 13 deaths since April 1996 constitute nearly 60 percent of all drowning fatalities at mine sites over the past seven years (twenty-three mine workers have

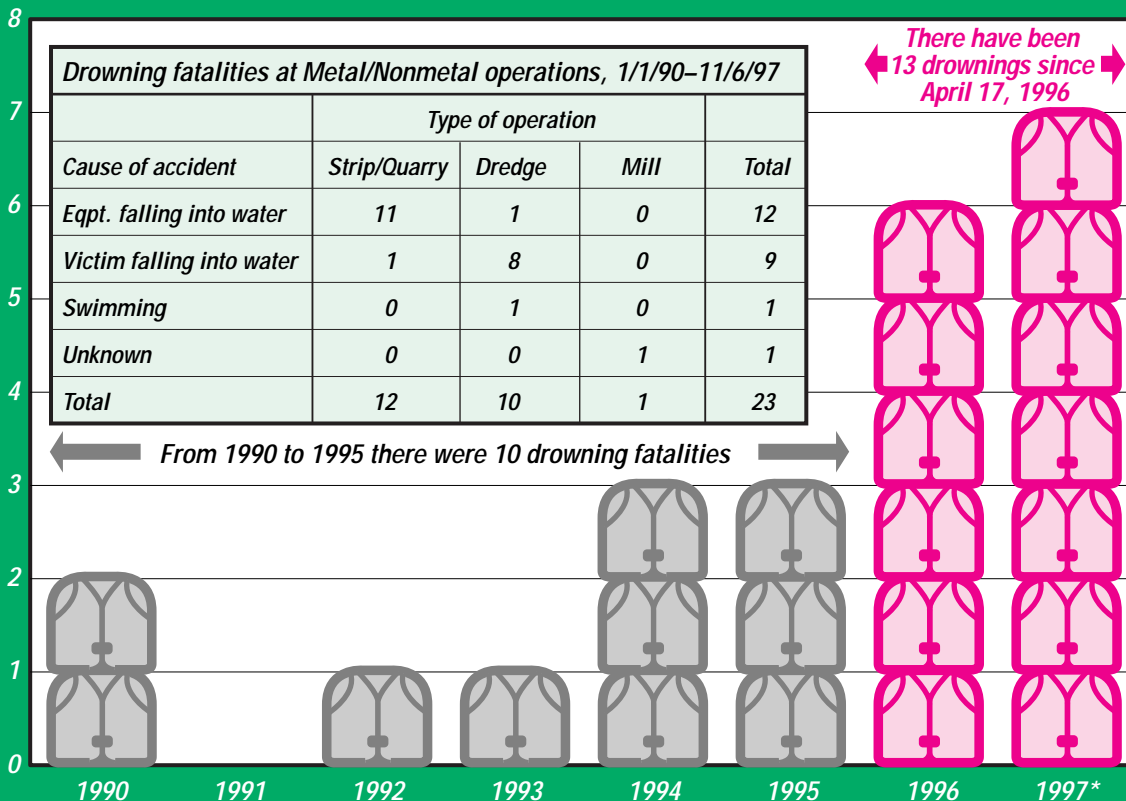
drowned since 1990).

Of the 23 mining deaths due to drowning that occurred since May 1990, 12 of those victims were operating mining equipment that fell into water. Ten other workers slipped and fell into water. One victim drowned while swimming from the shore.

To minimize the risk to workers who work around bodies of water, MSHA advises mine operators to:

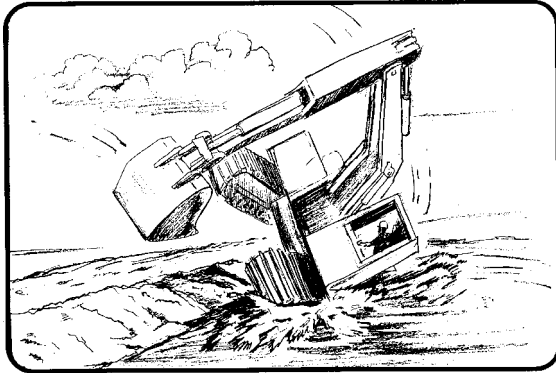
- Ensure that workers on dredges and barges wear life jackets;
- Assign workers who are good swimmers to jobs around water;
- Provide safe access to barges and

Drowning fatalities at Metal/Nonmetal operations, 1990-1997*

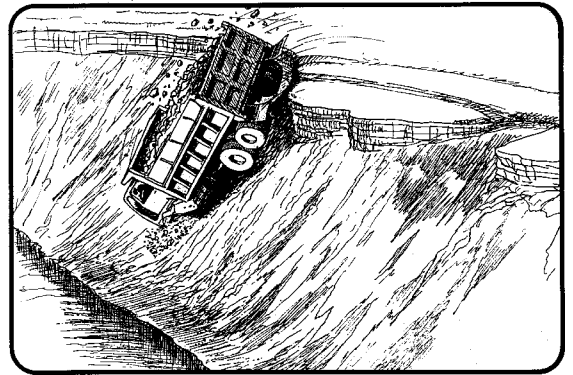


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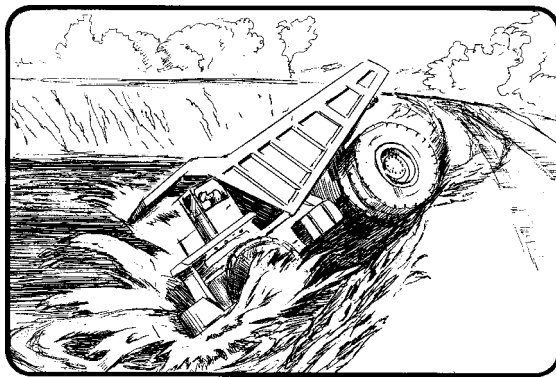
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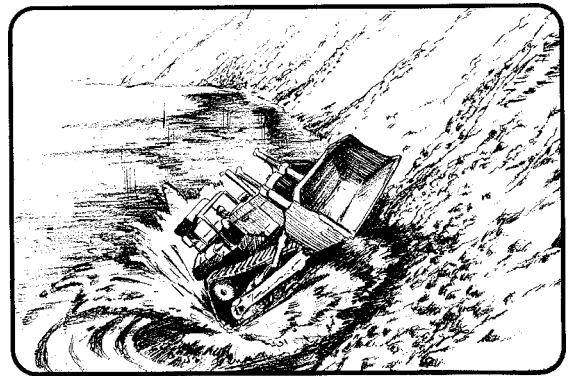
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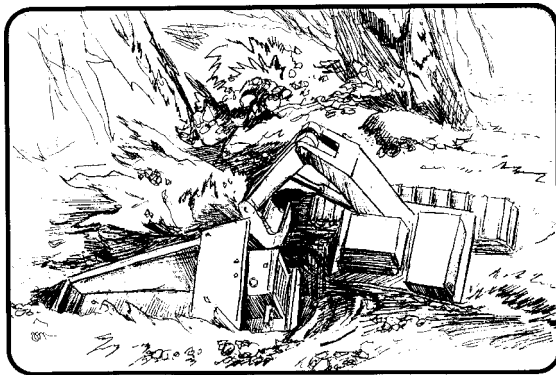
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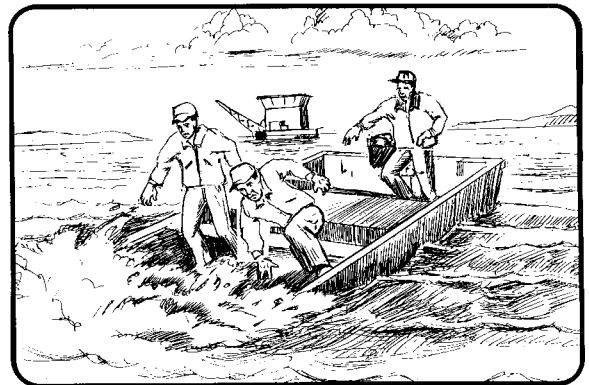
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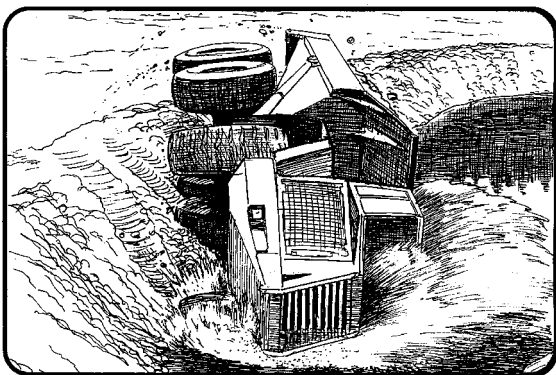
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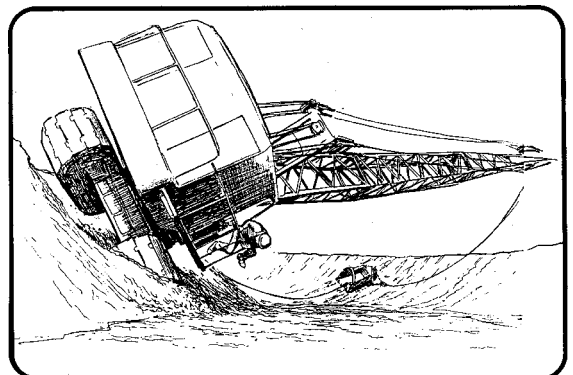
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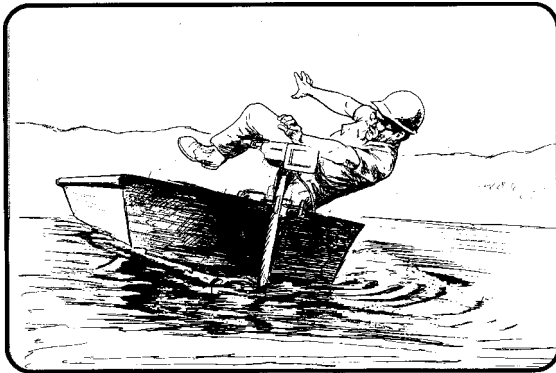
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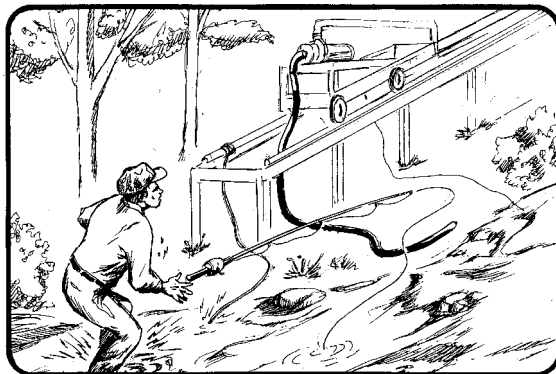
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- dredges;
- Ensure that boats and other equipment are properly maintained and not used beyond design capability;
- Construct beams or barriers along bodies of water;
- Advise workers to avoid working out of sight or hearing distance of co-workers;
- Adopt a water safety/accident prevention program for all employees.

Powered haulage fatalities

From April 1996 through October 1997, 35 of the 95 fatalities experienced in the metal and nonmetal mining industry were attributed to powered haulage. Just making sure that miners who operate powered haulage equipment are adequately trained, and that pre- & post-operational inspections are performed, could significantly contribute to reducing the number of powered haulage accidents.

An operator's knowledge of the machine and how it works is directly proportional to his/her ability to safely operate and control the machine in an emergency. Training should always be completed before the driver starts production work at a mine. MSHA training regulations, part 48, states that this training shall be required for miners who have not been trained and demonstrated safe operating procedures or who have not performed and demonstrated safe operating procedures within the 12 months preceding assignment.

This training includes instruction in the health and safety aspects and safe operating procedures related to the assigned tasks and shall be given in an on-the-job environment; supervised practice during nonproduction, or supervised operation during production is also required. The training shall include operation of the machine or equipment and the performance of work duties while under direct and immediate supervision and while production is in progress. If possible, new drivers should be tested on their knowledge after the initial hands-on training, then rechecked periodically. At intervals, drivers should be observed to ensure that they have not developed any bad habits and to reinforce the training.

Miners who operate haulage machines should develop a "Zero Compromise" safety attitude. Simply put, this means that equipment will not be operated which is not properly maintained. The following list can be utilized as a guideline for conducting an inspection:

- Check the machine for major damage to its structure or other components.
- Inspect the ROPS (rollover protective system) and FOPS (falling object protective system). Has it been drilled into, welded on, or damaged? Can you find the certification tag?
- Check safety appliances such as fire extinguishers, fire suppression systems, seat belts, lighting, glass, and

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wipers.

- Examine tires, wheels, and rims for obvious damage.
- Look for fuel, coolant, and lubrication leaks.
- Warn people around the machine before you start it.
- While the machine is running, listen for pneumatic leaks, and check gauges for proper pressure ranges.
- Ensure that the electrical system is operating within appropriate amp, volt, and current draw requirements.
- Ensure that all pressure, temperature, and position-type gauges in the operator's compartment are within limits.
- Warn people around the machine that you are going to move it.
- Perform (if applicable) an operational check of the secondary (emergency) braking system and/or the steering system before entering a production area.

Supervisory fatalities

In the past eighteen months supervisors have experienced 14 fatalities in metal and nonmetal mines. While no single specific cause can be identified to point to a single reason for these accidents, it is clear that most of the fatalities occurred while the supervisors were performing some mining-related task. Whether these supervi-

sors were adequately trained to perform the task they were doing at the time of the accident is unclear. However, past analysis suggests that two factors play a large role in a number of fatalities involving supervisors. The first is a disruption of normal operations before the accident occurs. The second is the performance of nonsupervisory work by the supervisor or foreman.

The disruptive problems that preceded fatal accidents included equipment breakdowns and personnel shortages. It is common for a

"These accidents are preventable and many of these victims may have been saved by something as simple as wearing a life jacket."

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

supervisor to step-in and do a task that is nonroutine and possibly more dangerous. Most often, the direct causes of supervisors' fatal accidents, as stated in MSHA investigation reports, were unsafe acts—often on the part of the victims. Violations of mandatory safety standards were cited in numerous accidents in which supervisors were killed.

MSHA encourages all supervisors to receive adequate training prior to

conducting any mining related task. Part 48 requires that all personnel including supervisors be trained in any task they have not performed safely within the previous year. Supervisors not only have the responsibility to ensure that their employees are adequately trained and have a safe environment to work in, but to follow the same safety rules and regulations that the miners they are responsible for are required to follow.

Focusing on the fundamentals

Focusing on the basic safety fundamentals for miners working with powered haulage equipment, miners working around water, and supervisors performing mining tasks can go a long way to reducing the increasing number of fatalities being experienced in metal and nonmetal mines. A basic review of safe work practices and an emphasis on the areas discussed in this article in annual refresher training classes will help solve this troubling problem.

For information on the availability of health and safety training materials, visit the MSHA home page at www.msha.gov or contact the National Mine Health and Safety Academy directly at (304) 256-3257.

Roof bolter seriously injured in fall

A 47-year-old roof bolter with 26 years' mining experience was seriously injured in a roof fall accident on Oct. 22, in Basin, W.Va.

The victim was attempting to install the first resin-grouted bolt in the face area. He had set the ATRS firmly against the mine roof, but did not use the ATRS's extra extensions for additional support. He was located about 5 feet from the rib

without any roof support when a roof fall occurred. The fall measured 8 feet long, 5-feet wide and nearly a foot thick. The fall struck the victim's lower extremities and crushed his pelvic area.

After the section foreman provided first aid, the victim was transported by mantrip to the surface to a waiting ambulance. He was transported by helicopter from

Columbia Raleigh General Hospital in Beckley, W.Va. to Roanoke General Hospital in Roanoke, Va., where he was listed in critical condition in the intensive care unit.

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Safety in the age of teams: Keep your eyes on the prize

Throughout the world, restructuring and downsizing have forced drastic changes in virtually everything organizations do, and the safety function is no exception. Because of smaller safety department staffs, many responsibilities (e.g., safety meetings, workplace inspections, job safety analyses, accident investigations) have been shifted to production supervisors and their teams. While performing safety-related duties has not been a welcome change for some hard-nosed bosses, most people are getting the message that the “bull of the woods” days are over. Supervisors accustomed to giving orders as the front-line officers of traditional hierarchies have either had their jobs eliminated, or have found it necessary to quickly learn radically different skills.

But old habits die hard. A military-style hierarchy has defined roles and responsibilities, and a well-understood chain of command. From officers to privates, people in a hierarchy know where they stand, and what is expected of them. Especially in the chaotic transition phase, employees finding themselves “empowered” are often willing to trade their new-found freedom for the stability and security of following orders. To make a successful transition, people throughout the organization must come to share the belief that where they are going is better than where they have been. Providing and communicating a vision of where the organization is going is the most important function of leadership.

One of the best examples of a leader communicating a new vision is that of George Washington at the end of the Revolutionary War. His troops were getting restless: they were owed considerable back pay, and a lot of

them hoped Washington would lead a march on Congress to set things right. If the general decided to seize power, it would be all right with them, and many of their countrymen felt the same way. But Washington had not fought for independence from one King George only to have himself installed as another. Instead of leading a coup, he bade his soldiers an emotional farewell, and returned to Mt. Vernon. Throughout the period of the Articles of Confederation and the drafting of the Constitution, Washington participated in the nation’s struggle to invent itself, but he never attempted to impose his will on others. When the people elected him president, they did so because they trusted him to look out for the interests of the entire nation, not just his own. When he voluntarily left office at the end of his second term, he had fixed in the American mind the image of what a president should be: a public servant of unquestioned integrity, willing to wield power for the people, and just as willing to walk away from power and pass it on to a newly elected successor, establishing the principle that the presidency is more important than the president.

Leaders of team-based industrial organizations are following Washington’s example more than 200 years later. They are testing the idea that if democracy works for America, it can also work for them. But this idea does not come any more naturally to them than it did to most 18th century generals. Decision-making through consultation and consensus does not provide the same kind of rush as command and control, and depending on teams in other locations to make the right decisions requires a lot of trust. Americans trusted George Washington

because they shared his vision of freedom, and they knew he would not betray that trust. For today’s leaders to succeed, they, too, must communicate an inspiring vision, and demonstrate their commitment to that vision.

Even military leaders, who will never lose the prerogative to give orders, find that orders are more readily obeyed when their troops believe in what they are doing. On the eve of D-Day in 1944, General Eisenhower, who always referred to the war in Europe as a great crusade to eliminate tyranny, made a point to visit paratroopers who were certain to suffer terrible losses. He honored those men because he knew victory was impossible without them, and thousands of others like them. Soldiers know they are risking their lives when they go into battle, and their willingness to take that risk will be diminished if they believe their cause is pointless. Stories have been told about officers who were attacked by their own men for being too eager to engage the enemy in Vietnam. The sons of World War II era troops were no less brave than their fathers, but their fellow citizens were bitterly divided about U.S. involvement in Vietnam, and these divisions inevitably affected in-country morale.

Workers in the United States are (usually!) not expected to risk their lives to earn a paycheck, but most employers would prefer a level of commitment that more closely resembles the D-Day paratroopers than the Vietnam era grunts. Actually, the time has come to change analogies. Since the Cold War is fast receding from memory and we have entered the age of teams, obtaining commitment to a common cause might be easier using models from the world of sports than from the military.

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Successful coaches invariably are skilled teachers and motivators. Aided by each player's natural desire to perform well, and by the fact that keeping score is an essential part of every game, the Lombardis' and Lasordas' of this world are masters at getting people to work together to achieve a shared vision: victory. The great coaches convince players to believe in themselves, and magic happens: Bart Starr's fourth-down quarterback sneak in the closing seconds of the "Ice Bowl" at Lambeau Field. Gimpy Kirk Gibson's game winning home run in his only at bat, pinch-hitting with two outs in the ninth inning of the first game of the 1988 World Series, lighting the spark that led to the Dodgers' winning the series against the more talented Oakland Athletics in five games. The most memorable sports moments are often those that involve team synergy so strong that players perform over their heads, beating odds, confounding experts, and making legends.

While Tommy Lasorda's teaching and motivational skills were keys to the success of the Dodgers, he could not have enjoyed that success without the consistent support of the team's owners. The O'Malley family believed in hiring a good manager, providing him with talented ballplayers, then leaving him alone to do his job. This approach did not supply them with pennants every year, but it kept their teams in the hunt often enough to reward their patience, eventually producing magical times like the 1988 season. The

entire Dodgers organization shared a vision of continuous team success, and everyone was



committed to contributing his best effort to achieving it.

An organization wishing to emulate the Dodgers' success needs leaders with the vision of the O'Malleys and the managerial skills of Lasorda. In fact, Lasorda was so valuable because he could both communicate the vision (remember, he "bled Dodger blue") and manage the training, strategizing, cajoling, and constant pressures that go with the longest season in major league sports, all to make the vision a reality. Here is a diagram that illustrates the different functions of leadership and management:

LEADERSHIP	MANAGEMENT
Vision	Mission
Compass	Map
"Do right things"	"Do things right"
Effective	Efficient
Improved job	Achievement of
performance	objectives

Returning to the baseball metaphor, a natural hitter could have an unconventional batting stance. A batting coach could work with him until he looks better in the batting box, but if his batting average drops 30 points, what has been accomplished? Lasorda would tell the coach to leave the kid alone. Team-based organizations seek to keep everyone pointed in the right direction, provided with the knowledge to be effective as well as efficient. In this environment, a supervisor, like Lasorda, must keep the team focused on long-term goals while maintaining every-day performance at a high level.

Of course, a major league baseball team is not quite the same as the production crew at a gravel pit. What vision can inspire the crew to work as hard to achieve it as did the 1988 Dodgers in winning their World Series rings? One thing that Lasorda could depend on was that the players wanted the championship as much as he did, but a supervisor seeking

to motivate safe production cannot point toward any rewards as glamorous. Furthermore, because much of American culture celebrates risk-taking more than safe work, many workers are likely to believe that safety rules are made to be broken. To make safety their highest priority, workers must be convinced that management really believes that no job is so important that it cannot be performed safely.

Hierarchies tend to value production more than people, while teams recognize that production is impossible without the contributions of people. When people are valued, safe production is more likely to become a workplace value. The following quotations reflect changes in expert recommendations for achieving a safe workplace at different stages in management evolution from the 1930s to the 1990s:

There is little need for substantiation of the oft-repeated assertion that the foreman is the "key man" in industry, that he, from an executive point of view, is responsible for accidents, and that he is the man upon whom dependence must be placed for the maintenance of practices and conditions that control quality and volume of work as well as safety.

—H.W. Heinrich, *Industrial Accident Prevention*, 1931.

However, although the supervisor is the key to safety, management has a firm hold on the key chain.





It is only when management takes the key in hand and does something with it that the key becomes useful.

—Dan Petersen, *Safety Management: A Human Approach*, 1975.

What were once known as foremen, quarry managers and superintendents, are now referred to as “leaders.” “Our leadership group has been through training sessions where they have examined their own values and incorporated those with the corporation’s set of values,” Fleming explains.

Leaders at CSR/American Aggregates are taught how to:

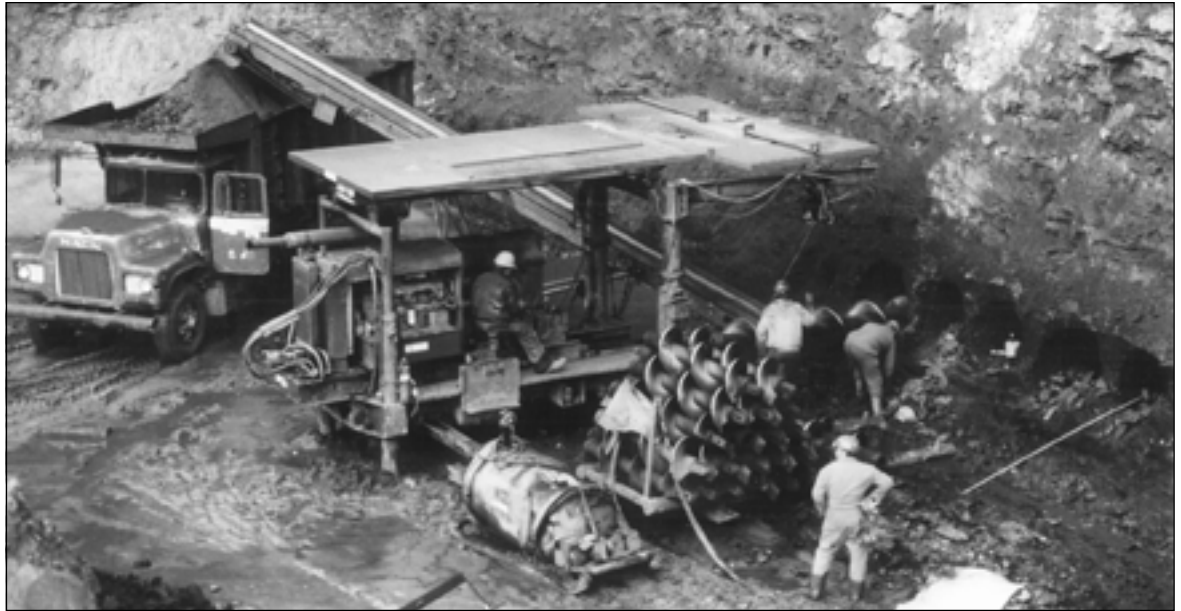
- inspire others through vision
- empower others
- work through teams
- relentlessly pursue innovation and improvement
- clear the way for team success
- manage the business effectively, and
- be personally customer-focused.

—Steve Fleming, *Training and Development Manager, CSR/American Aggregates*, paraphrased and quoted by Kyle W. Nichol in “Quality... Built In,” *Pit and Quarry*, May 1996, pp. 26-28.

While Heinrich’s concept of the supervisor as the key to safety was correct for hierarchies, Petersen defined its fundamental weakness when he pointed out the need for management to turn the key. By the 1970s, many safety programs had evolved into sloganeering, poster-hanging, showy appendages of employee relations departments, and as staff representatives, company safety people had little influence over what workers actually did. Supervisors were motivated more by what their managers rewarded them for than by the exhortations of the safety director. If management stressed safety as a central concern, so did the supervisors; if not, safety was a lip-service game unrelated to the real business of production. When safety was not a primary concern, legal mandates, such as training requirements, were complied with grudgingly, using the fewest resources possible. Required courses were taught at centralized facilities, many times off-site, sometimes by company safety people but often by contract trainers. If transfer of training to realize on-the-job safety benefits ever occurred, few people noticed, because it was seldom measured.

Managers were more likely to look at federally mandated training as a cost to be borne rather than as an investment in employee development.

In the age of teams, safety training is an essential part of efforts to control losses and build in quality, or as a CSR/American Aggregates leader might say, to “manage the business effectively.” Legally mandated training is customized to address legitimate needs, rather than simply to comply with the law. As empowered team members, workers play an active role in designing and often conducting training with active support from their supervisors. Because actual workplace requirements and conditions are addressed in training by people who have a stake in making things better, real improvement starts to happen on the job. Trust grows, morale soars, and the seemingly dull vision of “safe production” becomes a reality. While still the keys to safety, supervisors in team-based organizations act as teachers, coaches, and counselors to “clear the way for team success,” rather than simply give orders to carry out directives from upper management. Indeed, the difference between hierarchical bosses and team



leaders is the difference between Sgt. Rock and Tommy Lasorda. Here is a description of these polar opposite safety management paradigms (most organizations fit somewhere between a total hierarchy and a total team):

SAFETY MANAGEMENT PARADIGM SHIFT

OLD	NEW
Hierarchies	Teams
Top-down	Participatory management
Follow orders	Empowerment, consensus
Go through channels	Quick response
Bureaucratic	Customer driven
Bosses, masters	Facilitators, mentors, coaches
Program	Process
Labor-management safety committees	Loss control teams
Well-defined roles	Problem-solving focus
Adversarial	Collaborative

Reactive	Proactive
Low trust	High trust
Little employee input	Employees help design safety training
Canned training courses	Customized training
Minimal transfer from classroom to job	Supervisors and teams teach, model, enforce safety on-the-job
Low commitment ...	High commitment
Macho culture	Safety culture
"If I followed all the safety rules, I'd never get any work done."	"If it's not safe, don't do it."
Safety first	Safe production
Don't always walk the talk	Always walk the talk
Implies safety and production are separate	Safety and production cannot be separated

The shift from hierarchies to teams is as much about a process as a vision, because the value of the

vision is realized in the process. The people of the United States came to realize who they were and what they were about in the process of declaring their independence and becoming a new nation; team-based organizations will follow the same path. There will be struggles along the way when team members point out areas where reality falls short of the vision, just as America struggled through a civil war and several crusades for equal rights when the national vision of "liberty and justice for all" seemed to some like an empty promise. But just as veterans of the Civil Rights Movement counseled the discouraged to "Keep Your Eyes on the Prize" in the 1960s, so must members of today's teams stay focused on the prize of an accident-free, collaborative, productive workplace. The genius of American democracy has been that the vision of freedom, which after all was first championed by men who owned slaves, has been big enough to survive the struggles and accommodate the needs of an expanding, diverse population. So will it be for safety in the age of teams.

David T. Couillard, Member, HSA National Executive Committee

Different look, new view

Two major thinking tools are now in place for progress in injury prevention.

By Carl Metzgar

The word accident is used so frequently that it is easy to get the idea that we know what it means. The definition is in the ear of the hearer and not in the mouth of the speaker. Accident includes in its definition at one time or another:

1. A harmful encounter with the environment, a danger not averted; as such, an accident is a psychological phenomenon, subject to prediction and control (a process).
2. As an unpredictable event; it is by definition, uncontrollable.
3. As a significant injury or damage (a result).



Artwork by Jack Cottle of the National Mine Academy

The word itself makes clear thinking difficult and acts as a detour to progress in reducing injuries. The complication of multiple definitions of the word makes it difficult for men of good conscience to discuss injury causation and prevention.

Drivers haven't changed, yet the traffic fatality rate has been reduced since the 1960s. How was the progress made? What worked? Where was science plugged in? What has compensated for repeated driver failure? Is there a method that is transferable from auto crash mitigation to mining, milling and manufacturing that will allow for good analysis and countermeasure

development?

Yes, science is applicable and provides a transferable technique. There are two parts in the solution. There are behavioral and environmental features to program for effective loss control. Scott Geller has developed a very powerful "Actively Caring" model to maximize behavioral techniques as injury-prevention tools. His environmental considerations include Engineering Standards and Operating Procedures. Both of these are part of the organizational and operating environment. This article is directed at environmental change.

Energy transfer as a key cause

The first statement of the energy transfer insight came in 1961 when James Gibson said, "Injuries to a living organism can be produced only by some energy interchange."

In 1963 William Haddon published his statement of the energy transfer theory:

"Accidents, at least those of concern to the medical profession, are defined in effect by the unexpected occurrence of injury. The first of these comprises all injuries caused by interference with normal whole body or local energy exchange. At the whole body level, examples of injuries due to such interference with normal energy exchange include the results of suffocation by mechanical or chemical means for example, by drowning, strangulation, carbon monoxide inhalation and cyanide poisoning.

"The second and more important group of injuries compromises all those in which the damage is caused

by the delivery to the body of amounts of energy in excess of corresponding local or whole body injury thresholds. The types of energy, which can be delivered, however, are but few in number, and each produces highly specific lesions.

"Foremost are injuries due to the delivery of mechanical energy. The impacts of moving objects such as bullets, hypodermic needles, knives, and falling objects and those produced when a moving body collides with relatively stationary structures, as in falls, plane crashes, and auto crashes illustrate this group.

"The energy transferred injuriously may also be thermal, as in the case of first, second, and third degree burns; electrical, as in electrocution; or, it may be ionizing radiation.

"Finally, chemical energy may also be transferred in excess of body thresholds, and this group of injuries includes all those due to plant and animal toxins, and to inorganic and organic compounds. Viewed in this light, the fundamental problem in the prevention of injury is the prevention of such abnormal energy exchanges, and research in accident causation and prevention can and must be analyzed in similar terms."

Later in 1968, Haddon published another groundbreaking observation:

"The most common and universal fallacy in the field, whether viewed within a descriptive or etiologic framework, is one which is so ingrained that it is seldom explicitly recognized. It involves the assumption that the priority rank of countermeasures, in terms of their ability to influence the end results of concern, must parallel the ranking, in order of

their relative contributions, of causes influencing those end results. In its most common form, it states that because drivers cause most accidents, programs correspondingly must be concerned with drivers. In the real world, there is no basis for making this assumption.”

The search is not for accidents, since we can't agree what they are. The search is for an energy exchange from some source to a body or structure. The energy transfer has to be large enough to do damage to the human body or physical structure. Energy is an abstract quantity and quality. We don't know what it is but we can recognize its forms. We can measure and observe its effects. We can do something about it.

Two major thinking tools are now in place for progress in injury prevention. First there is the theory that injury results only when there is energy transfer beyond the ability of the body or structure to resist it. The second tool is the statement that to reduce injuries the priority rank of countermeasures does not have to match the relative contributions of causes.

The statement of the HaddonGibson energy transfer theory was earthshaking for injury reduction research. The 1968 statement of the need to disconnect the rank order of corrective measures from the order of the contribution by causes is revolutionary. It is also the most difficult, by far, for managers to accept. It is, however, where the opportunity for progress is hiding.

The search for, and isolation of, energy and its transfer is scientific and can proceed a long way before fixing blame. Despite all the sanctimonious sermonizing by government, management and labor at the beginning of every incident investigation that the purpose of the investigation is not to fix blame, in reality it turns out otherwise. Saying a thing does not make it so. If proof (that blame is the object) were required it

is only necessary to review an MSHA fatality report. The inquiry and reporting stops when enough information is gathered to issue citations.

The search for the energy exchange and the separation of rank order of causes and rank order of countermeasures allows for science to do its part and sets the stage for the socio-political opportunities of loss control program development. It is difficult for people to give up their

Pre-Contact (1&2), Contact (3-8), and Post-Contact (9 &10).

The analysis and countermeasure program will have a before, during, and after contact phase. Planning and action using each of the 10 strategies will provide increments of useful activity.

There is no silver bullet in injury prevention and control. Heretical as it sounds, a shotgun approach is appropriate. Parts of all 10 strategies may be required in varying propor-



Artwork by Jack Cottle of the National Mine Academy

hunches and pet prejudices for the limited demonstrable facts revealed by science. However, it is the insights of science, applied through a rational program, that delivers reduced injuries. The abstractions of physics, the insights of psychology when combined with the clear thinking of management can lead to progress.

Ten countermeasure strategies

Haddon proposed 10 countermeasure strategies for reduction of injuries. This list of countermeasures breaks down into three distinct phases. In Haddon's automobile research he called it Pre-Crash, Crash, and Post-Crash. For injury prevention in mining, these translate naturally into

tions with different people and equipment at different places and times in the plant program.

The Haddon countermeasure strategies follow with an exclusive mining example in each case.

1. To prevent the creation of the hazard in the first place. Example: prevent the building of a stockpile beyond the height where it can be a hazard to people and equipment.

2. To reduce the amount of hazard brought into being. Example: Limit the amount of explosives stored in magazines and limit quantities of caps and primers.

3. To prevent the release of the hazard that already exists. Example: Attach safety cables to conveyor belt counter weights so if the belt breaks,

the weight will not fall far enough to do any harm.

4. To modify the rate or spatial distribution of release of the hazard from its source. Example: Controls and stops on the discharge gates of a storage bin.

5. To separate, in time or space, the hazard and that which is to be protected. Example: Repositioning a muffler on a loader so the noise source is removed from the operator's ears.

6. To separate the hazard and that which is to be protected by interposition of a material barrier. Example: Guards on head and tail pulleys. (This has been popular and successful but there are nine others strategies.)

7. To modify relevant basic qualities of the hazard. Example: Different voltages for electrical control and power circuits. Reduce the grades on haul roads.

8. To make what is to be protected more resistant to damage from the hazard. Example: Hard surface welding of loader bucket lips. (Wear and tear are losses.)

9. To begin to counter the damage already done by the environmental hazard. Example: Relocate a road so operations can continue, capitalize on first aid training, put emergency response plan into effect.

10. To stabilize, repair, and rehabilitate the objects of the damage. Example: Retrain a worker in a new job if his injury prevents him from doing his old job.

A further distinction and explanation of countermeasures is included in the two kinds of corrective actions. Haddon in 1980 distinguishes between active and passive countermeasures. It is important to acknowledge a significant difference.

In the auto field, lap and shoulder belts transfer large amounts of energy over large areas of the body (when worn) for successful injury reduction. In the mining environment it is often necessary to



Artwork by Jack Cottle of the National Mine Academy

deal with the problem of large amounts of energy delivered to relatively small areas of the body.

There are challenges in applying the energy transfer theory but the effort will be rewarded with fewer and less serious injuries and property damage. It is important to use the most productive active (the person has to do something) or passive (the environment is modified so the person doesn't have to act) method for effective injury reduction regardless of cause.

A very simple example of the difference between active and passive countermeasures is an old one. As a child, I actually saw part of a house wired with two bare wires run through porcelain insulators. The insulators were run through holes drilled through rafters and studs. The wires were separated by about eight inches of space. The wires were generally out of sight but since I (a child) could see them at some point they were certainly not completely out of harm's way.

If family and friends had spoken to me about not touching the wires the coaching would have been active. The friends and family would have to have taught and followed up to make certain that I didn't approach the wires—an interesting challenge, as

all parents know. The training and follow-up would have been active countermeasures.

Today wires are insulated and a child can poke around a house a good bit and never have the opportunity to touch a wire. Today's parents and children don't have to do a thing to be protected. Domestic wiring is insulated and offers passive protection to the household. The wires in the plant are insulated (passive). The power company delivery lines are bare and have to be avoided (active).

There will be howls of protest. We managers and employers shouldn't have to baby-sit employees! They have a responsibility for their own safety.

Yes and no. What results do you want? If you want fewer and less serious injuries, then do what works. Disconnect the rank order of causes from the rank order of countermeasures. There is a role for active interventions (behavior modification) and for passive interventions (guards on head and tail pulleys).

Creative programming will use the tools of active (behavioral) and passive (environmental) countermeasures blended for the best result. There ain't no silver bullet in injury prevention, so you will have to adjust the choke on the shotgun from shot to shot.

HELPING WORKERS BACK TO WORK

Back injuries continue to be a major source of lost time in all the natural resource industries. Here's how one workplace tackled the problem.



By Judy O'Connell, Reg. N. and E. M. Gardiner MD, Occupational Health Department, Kinross Gold Corp., MacassaMine

Back injury takes its toll in all of the heavy industries. It can be even more pronounced in underground mining, where heavy physical labor in cramped quarters, often associated with poor footing, is the rule rather than the exception. As most studies have found, a review of the injury rates at Macassa Mine revealed the back was the most frequently-injured body part and was the most frequent cause of prolonged lost-time cost under the Workers' Compensation Board. Since 1992 we have been attempting to deal with back injury in a more proactive way through a combination approach using the "medical rehabilitation model" of the Workers' Compensation Board and

our own brand of modified duty.

Macassa Mine has been in production for more than 60 years and only recently has production begun to change to long hole stopes and remote-controlled LHD scoops. Back injury has been a consistent problem for the workforce and for the Occupational Health department. The table below shows the number of first aid, medical aid, and lost-time reports associated with back injury.

Year	First aid	Medical aid	Lost-time	Total
1992	62	21	6	89
1993 (10 mo.) ..	57	7	5	69
1994 (7 mo.)	16	6	1	23
1995	20	6	3	29
1996	12	5	1	18

Our program is based upon a number of elements. All employees with back injuries have access to:

- early assessment for red flags indicating serious injury or disease, and in their absence, a program of back education regarding anatomy and physiology
- pain control via physical measures and stretches;
- use of physical measures to treat back muscle spasm

(chiropractic or physiotherapy);
• use of non-steroidal medication if indicated;

- frequent re-assessment by the company nurse and physician; and
- modification of existing duties or assignment to light duties in another area as appropriate.

In-house back education and safety talks began at Macassa in 1992, followed by a three-day seminar from the Canadian Back Institute in early 1993. This included an education day for local physicians by noted back injury expert Dr. Hamilton Hall, who discussed back injury and the early mobilization concepts he pioneered.

An early-return-to-work program with modification of duties or assignment to a supervised light duty job began in 1993. The goal of this program is for the worker to rapidly progress to increasingly physically challenging jobs and return to their original job. As a rule, modified duty lasts less than eight weeks. Progress is monitored weekly via a brief informal meeting between the occupational health nurse, company physician, and the involved supervisor. Time off for physiotherapy or chiropractic therapy is allowed during modified duty and attempts are made to schedule these towards the end of the day.

We have worked to educate the local medical community to point out what modified duty could mean for their injured patients. Rather than focusing on the diagnosis, an attempt was made to focus on the injured worker's restrictions and limitations and to design modified work around these parameters. Supervisory personnel were educated through a series of talks regarding modified duty and the impact of early return to work on the company's NEER statement.

Since 1996 a company-sponsored and paid-for initiative has been very helpful in dealing with back injury employees at a very early stage. Our usual prompt assessment and early provision of appropriate modified

duty, pain control, and company-paid chiropractic therapy is provided. Daily assessment of the injury and response to modified duty is provided by the occupational health nurse.

As the worker progresses and pain or spasms are lessened, a program of stretching and strengthening is offered via the services of a local personal trainer. The personal trainer is fully qualified and operates under the direction of the company physician to help the worker regain range of motion and muscular strength in the injured area. A series of six to ten sessions is offered. These are fully paid for by the company and done during time on modified duty. Progress is monitored by the occupational health nurse and as soon as they are able, the employees return to their pre-injury jobs.

In 1996, seven injured employees attended stretch and strengthening sessions and ten were treated by local chiropractors.

We feel that this program has definitely helped our first aid and medical aid back injury sufferers to recover more quickly. When used in conjunction with a modified duty program, this offers a viable alternative to being off on lost time for a back injury. Injured employees have been able to work through the pain on jobs that are less demanding while still productive, and to return to their pre-injury job sooner.

By preventing the loss of overall physical conditioning that often accompanies a back injury, and by restrengthening areas that have been weakened by injury, this program will gradually impact upon our incidence of back injury. Our hope is that eventually we won't have a caseload and the program will no longer be needed.

As might be expected, through early intervention our NEER actual costs and our performance index have been favorably affected. The

rationale for the program can be made in a business sense from this perspective alone, but to our mind the decrease in pain and suffering, and the increase in morale more than justify our investment of time and money in this program.

To quote a report to the Ontario Workers' Compensation Board on Management of Soft Tissue Injuries, "The multi-disciplinary approach to rehabilitation can be powerful. function and promote an ongoing Everything the team does to accelerate return to work, maximize healthy work culture sends positive signals to the worker that restore enthusiasm and commitment to mutual goals. Relationships maintained with the worker during the rehabilitation process have the potential to positively influence the achievement of return to work."

This has certainly been our experience at Kinross's Macassa Mine and we are continuing to refine our approach to this ever-present problem.

Further reading:

The program at Kinross Gold's Macassa Mine is based on concepts outlined in two sources:

1. **Critical Path for Management of Spinal Disorders**, prepared by the Quebec Compensation Board taskforce on industrial low back pain and published in *Spine Vol. 12 No. 7 Supplement* September 1987.

2. **Clinical Practice Guidelines for Acute Low Back Problems in Adults**, from the Agency for Health Care Policy and Research of the U.S. Public Health Service.

Both of these sources have recently been reviewed in Management of Soft Tissue Injuries: an Evidence-based Approach to Low Back Injuries, a 1995 submission by an expert panel to the Workers' Compensation Board of Ontario.

Reprinted from the July/August 1997 issue of the Ontario Natural Resources Safety Association's Health & Safety RESOURCE.



Safe use of derricks, cranes raises concerns in bulletin

Mine operators recently raised concerns about potential hazards caused by the improper use and lack of maintenance of certain models of derrick boom trucks and cranes.

Pushed by a recent mining accident involving a 1984 Ford truck with a center-mounted Altec digger derrick, Model D-900B, which resulted in an injury to a worker stationed in the basket attached to the boom, MSHA was prompted to issue a Program Information Bulletin.

The boom began to rotate and fell toward the rear of the aerial lift truck, falling about 30 feet to the ground.

The investigation revealed the boom pivot pin shifted out of its right-side support flange and caused the boom to become unstable when inappropriate side loading was applied during winching.

The facts showed that the pivot pin moved to the left, which resulted in the failure of the two retaining bolts. The bolts secure the pivot pin in place.

The investigation also revealed that

the tension placed on the bolts could possibly have been created by repetitive side loading of the equipment.

In the incident, the Ford truck was positioned so that the boom was at a right angle to the direction of the overhead power line being removed.

Research laboratory tests concluded that the tension failure of one of the retaining bolts took a long time to break.

MSHA investigators reported the digger derrick involved in the accident had not been retrofitted in accordance with the manufacturer's recommendations. The manufacturer, Altec Industries, issued Service Bulletin No. SB-D-203 in February 1988 based on reports received from the users regarding the boom hinge pin. The reports stated the pin retainers were not secure. As a result, Altec recommended retrofitting the pin retention system for the affected units.

This indicates that a lack of adequate inspection allowed failed components to go undetected.

If the pivot pin had been inspected in accordance with the service manual during the weeks or months prior to the accident, such failure could have been detected and the accident could have been avoided.

In order to prevent similar accidents, periodic inspections and proper maintenance in accordance with the equipment manufacturers must be followed to ensure safety of personnel operating or working around the equipment.

Potential failure or malfunction of the equipment is normally detected and corrected through required inspection and proper maintenance. Retrofitting will only provide an added measure of protection.

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South Central District Joint Mine Safety and Health Conference

February 18-20, 1998—Dallas Medallion, Dallas, Texas

The South Central District Joint Mine Safety and Health Conference is scheduled for February 18-20, 1998, at the Dallas Medallion, Dallas, Texas. The South Central District includes the states Arkansas, Louisiana, Missouri, New Mexico, Oklahoma, and Texas.

The conference begins Wednesday, February 18 at 1:00 pm. This allows participants the opportunity to travel Wednesday morning to arrive in time for the opening session.

Suzie Humphreys will be the keynote speaker at the opening session. For more than 19 years, Suzie has made radio audiences laugh in Dallas and North Texas where she added her touch of on-the-edge charm and down-to earth savvy to the morning show on KVIL radio, consistently one of the most successful radio programs in the nation.

The conference will be dedicated to Mr. Henry Townsend, a member of the conference planning committee who passed away in 1997, and all the miners who lost their lives in 1997. A powered-haulage equipment safety demonstration will conclude the opening session.

On Thursday morning, mine-specific discussion groups will be held—an opportunity to pose questions to others in industry, plus MSHA officials.

The conference luncheon will

follow the discussion groups and features the Sentinels of Safety Awards. Mr. Tom Faulkner, director of Texas Mining and Reclamation Association has been asked to speak at the luncheon.

Workshops will be offered on Thursday afternoon and Friday morning. Among the topics that will be presented are: accident investigation, accident prevention, behavior-based training, building safety committees, fall protection, how to deal with media after an accident, image of mining with reclamation, noise-induced hearing loss, part 48 forum, silicosis, and world class safety program.

The fee is \$80 for this value-packed safety conference. The goal of the conference is to make our mines a safer and healthier place to work. Please call the Texas Mine Safety and Health Program at (512) 471-4633 or (800) 687-7345 for more information.

What you'll experience Opening session

Suzie Humphreys, "Life Is What Happens to You While You're Making Other Plans"

John Perquin, Assistant Director of Health, Safety and Environment of USWA, "Labor's Perspective on Safety and Health"

Presentations:

Accident Investigation; Accident Prevention; Behavior-based training; Building Safety Committees; Contemporary Legal Issues in Mine Health and Safety Law; Creating a Value-based Safety Culture; Emergency Preparedness; Explosives Security; Fall Protection; How To Deal with Media after an Accident; Image of Mining with Reclamation; Noised-induced Hearing Loss; Part 48 Forum; Silicosis; Why You Need a Drug Awareness Program; World Class Safety Program

Demonstrations:

Electrical Safety Demonstration

(Texas Utilities: Jim Day, Hal Collins, and Donald Brown)

Powered Haulage Equipment Safety

(John Hoffman, International Trairung Consultants)

Hotel information

To receive the special hotel rate of \$84 per night (single or double occupancy) plus tax you must reserve your room by Wednesday, January 28, 1998. Please call (800) 808-1011 and mention "you are attending the Joint Mine Health and Safety Conference." If you would like to extend your stay in Dallas, these special rates are available from February 15 to February 23, 1998.

For more information contact:

Jennifer Atherton at the University of Texas at Austin
(512) 232-2235 or (800) 687-7345

Please register: _____ Organization: _____

Mailing address: _____

City: _____ State: _____ Zip: _____ Telephone number (include area code): _____

Mail to: Joint Mine Health and Safety Conference, The University of Texas at Austin, P.O. Box 7518, Austin, Texas 78713-7518. Call (800) 687-7345 if you have any questions.

"If it's silica, it's not just dust" Sitting up to sleep

The National Campaign to Eliminate Silicosis marks its first anniversary on October 31. "Sitting up to sleep" is the first in a series of articles on silicosis prevention to be featured in the Bulletin.

"How many of you know someone who suffers from silicosis?" Dr. Timothy Weyandt of Penn State University asked a group gathered in the Schuylkill Training and Technical Center cafeteria. In response, 12 members of the audience raised their hands.

"How many of you have lived with someone who suffers from silicosis?" the doctor continued. This time, Dr. Weyandt was among those who raised their hands. "My grandfather died of silicosis," he continued.

"As a youngster, I remember him sitting in the living room in his green upholstered chair. He would sit up in the chair at night to sleep. He would sit in the chair to eat his meals. He had to sit up in order to catch his breath. On a good day," he added reverently, "he could move from his chair to the table, but he would have to stop every few seconds to catch his breath. As he breathed, the air whistled across his lips."

Familiar with this type of story, I nodded.

Invited by District Manager Glenn Tinney to participate in a 3-hour

workshop on silicosis. Dr. Weyandt, along with several other speakers, travelled to MSHA's Wilkes-Barre, Pa. district on a recent summer afternoon. Sitting at a large round table with the anthracite workers and supervisors, I frequently glanced around the large room to watch their reaction to his graphic slides.

First, Dr. Weyandt displayed textbook diagrams of the human respiratory system. He explained how dust containing silica settles in the tiny air passages of the lungs, called alveoli, which look like tiny branches on a tree.

Then, the doctor explained that the lungs react to silica dust as a foreign object and scar tissue forms in the airway passages. Photo after photo showed how crystalline silica dust makes the lungs turn hard. They lose their elasticity. I tried to imagine what it would be like to live with silicosis. How would I catch my breath if my lungs, damaged by silica dust, became inflexible?

Dr. Weyandt also displayed chest x-rays and explained how a specially trained doctor, called a certified NIOSH "b-reader," reviews the radiographs. Some of the x-rays he displayed showed early evidence of silicosis. To my untrained eye, it was difficult to distinguish the healthy lungs from the lungs in an early stage

of silicosis. Some of the other x-rays Dr. Weyandt displayed were very distorted. On these films it was easy to see the damage caused by the dust containing silica.

As the different x-rays flashed across the screen, I wondered how these patients developed the disease. Were they miners who cut or drilled sandstone? Were they workers who did sandblasting or jack hammering? Did they work with molds in a foundry or manufacture glass? Who were these workers? Did they know that dust containing silica was dangerous? Did they know that "if it's silica, it's not just dust?"

Dr. Weyandt explained that there is no treatment for silicosis and the disease is progressive. He emphasized that even after someone is diagnosed with silicosis and leaves their dusty job, the silica dust continues to damage their lungs. As the disease progresses, it becomes more difficult to breath and the patient may need to use a portable oxygen tank. He punctuated this sad scenario by adding, "...and that's just about the time the worker is getting ready to enjoy his retirement."

Finally, he closed his presentation by repeating "there is no cure for silicosis. Prevention is the only answer."

Tips for Miners

Miners concerned about dust containing silica at their workplaces should talk to their employer, employee representative or union. They should also use and maintain engineering controls installed by their employer to reduce silica dust levels, and report to their employer when the controls are not working properly. Miners should also minimize dust by following good

work practices, such as removing dust with a water hose or vacuum with a high-efficiency particulate filter rather than blowing it clean with compressed air. They should participate in air monitoring, medical surveillance and training programs offered by their employer or when required by law.

Employers should commit to preventing silicosis at their worksites and comply with regulations on respirable crystalline silica. They should

perform air monitoring as needed, and when required by law, take corrective action when silica levels are excessive. Employers should also install and maintain engineering controls, establish a written respiratory protection program, and provide medical examinations for employees who may be exposed to dust containing silica.

Avoiding information overload

By John Cheeseman, ONRSA Education Specialist

Organizations continue to rely on training as one of the most popular strategies to improve workplace health and safety. Training is expected to produce, at least indirectly, measurable improvements in safe job performance, reduced accident/incident rates, and safer, more cost-effective workplaces. But a major problem that persists is the inability of employees to remember what they learn. Most experts agree that as much as 80 per cent of newly-learned skills and knowledge are eventually forgotten. What has not been considered seriously enough is how training programs can accommodate the limitations of human memory to encourage more effective learning and long-term retention.

Human memory has popularly been thought of as the storage of information in the brain. Incoming information is registered by the senses and stored temporarily in short-term memory. This information quickly fades and disappears unless we actively think about what it means. Once we recognize or associate this sensory data with previous experiences or knowledge, it begins to enter long-term memory. This is when interpretation and meaningful learning begins to take place. What trainers have to realize is that our short-term memory has a very limited capacity for storage. Overload that capacity and it becomes difficult or impossible for learners to pay attention to what is being presented. The most effective way to overcome this problem is to organize and

present new information in small, bite-sized chunks. In 1956, American researcher George Miller coined the term "chunking" to refer to "small groups of familiar stimuli combined into a single unit." Chunks can be single letters, numbers, a picture, a single word or a word

phrase. Miller concluded that because our attention span is so short, the "magic number seven, plus or minus two" chunks of information is all most people can effectively attend to at one time. Information should then be organized and presented accordingly.

Guidelines for chunking

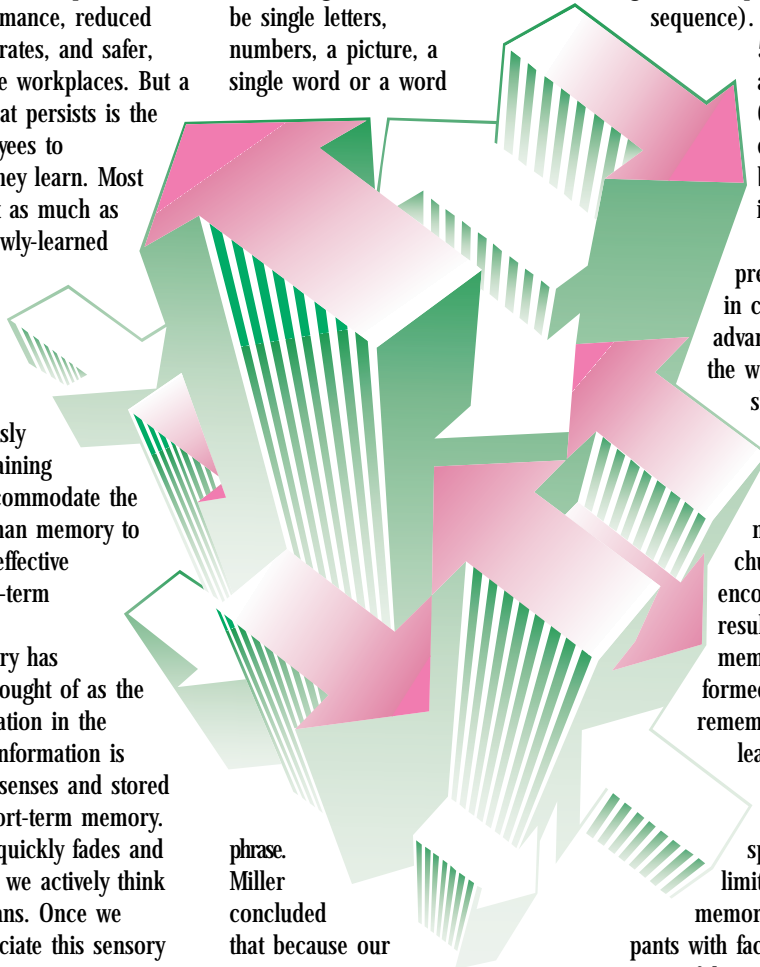
1. Select and organize "need to know" information.
2. Separate it into small bite-sized units.

3. Make each chunk or series of chunks meaningful and personally relevant to the learner.
4. Arrange it in logical order (e.g., moving from simple to complex, general to specific, or matching job sequence).

5. Present it in manageable amounts.
6. Allow learners time to digest and think about it before introducing new information.

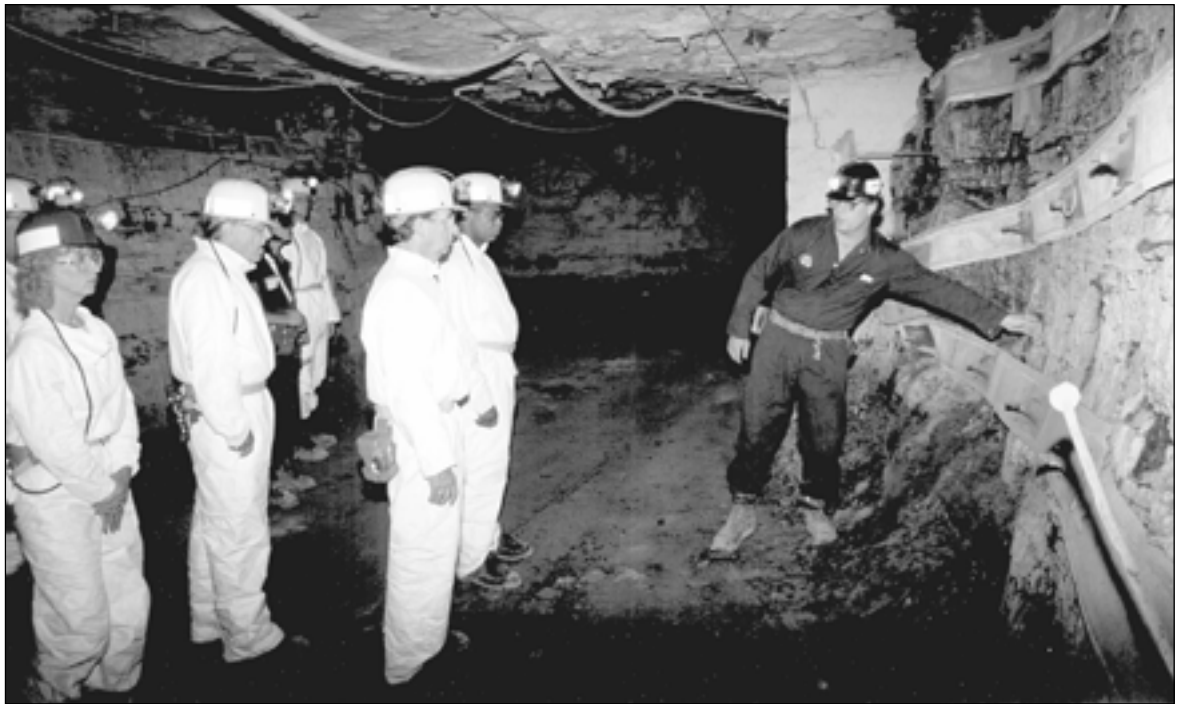
Organizing and presenting new information in chunks has two related advantages. First, it reduces the workload on our short-term memory. This makes it easier to pay attention and process new information in meaningful ways. Second, chunking enables deeper encoding to take place. This results in more durable memory codes being formed, making it easier to remember what has been learned. Trainers can increase their effectiveness by paying special attention to the limitations of human memory. Bombarding participants with factual information serves no useful purpose. If the objective is to cover all the material within a given time frame, chances are there is little time for meaningful learning to take place. This is one of the reasons why training often fails to translate into better job performance.

Reprinted from the May-June 1997 issue of the Ontario Natural Resources Safety Association's *Health & Safety RESOURCE*.



A group of officials from the Illinois Department of Natural Resources and the Department of Corrections toured the Freeman United's Crown III Mine at Farmersville, IL on Aug. 26. Dave Webb, Project Manager, explains how bolts are used to maintain rib stability.

Photo courtesy of the Illinois Dept. of Corrections



Guardians of safety

A perspective from someone outside the mining community

Did you ever have the urge to visit an active coal mine? Odie Washington did, always wanting to see first-hand what it is like several hundred feet beneath the earth's surface. This past August 26, he found out.

Washington, the Director of the Department of Corrections (DOC), and DOC staff members Donnie Snyder, Karl Becker, Nanci Butler Bounds and Rich Doering, were invited to join John Comerio, Deputy Director of the Department of Natural Resources (DNR), and DNR staff members Don Vonnahme, Sam Vancil and Tom Patterson on a mine tour at Freeman United's Crown III Mine (C3), Farmersville, Ill.

John Comerio expressed appreciation to Freeman United for hosting the tour. He said administrative personnel at DNR are eager to become more familiar with all aspects of the coal mining industry in light of the merger of state agencies that placed the Office of Mines and Minerals and the Abandoned Mined

Lands Reclamation Council within the DNR.

As with Washington, it was the first trip below for Snyder, DOC's Deputy Director of Administrative Services; Becker, DOC's Deputy Director of Finance; Doering, DOC's photographer; and Vonnahme, the Director of DNR's Office of Water Resources. For Bounds, DOC's Personnel Manager, it was trip number two.

Comerio said he had been underground five or six times in conjunction with work at the State Geological Survey, while a student at the University of Illinois. "It was during those years that I developed an increased sensitivity to mining," he said. "But that was more than 30 years ago, and I'll admit I was surprised by today's advanced technology and the increased focus on safety."

Comerio, whose own grandfather was a coal miner at Zeigler #2 in the late 1930s, said the tour provided

insight into mining that is impossible to obtain from any other source. "It certainly made me realize why mine safety is the top priority of our Office of Mines and Minerals," he said.

Vancil, the Deputy Director of the Office of Mines and Minerals, State Mine Inspector-at-Large Patterson, and C3's Mine Superintendent Phil Ott, Project Manager Dave Webb and Safety Manager Bill Jankowski explained the functions of the various pieces of equipment and facts about the mining operation as the tour progressed. It was a rare chance for the group of government officials to experience what it is like to work in a world far removed from the State Capitol.

For starters, they found out that it isn't that simple to "go below." Safety regulations are rigidly enforced; and before individuals can take part in an underground mine tour, they must be properly outfitted in steel-toed boots, coveralls and a special miner's belt, and equipped with standard safety

equipment, including hard hats, safety glasses and an emergency breathing apparatus known as a self-rescuer.

Following a mine orientation presentation by Freeman's Vice President of Operations Neal Maryfield, the group was given "hazard training" by Jankowski. Once convinced that everyone in the group understood how to use the self-rescuer and procedures for responding to an emergency, Jankowski issued a hazard training completion form to each visitor.

"We had some in-depth safety discussions during that session," Comerio said. "As we made our way through the mine, I couldn't help but notice the attention each miner paid to his own safety and the safety of others. There was a feeling of security as if the miners were guardians of our presence underground."

"Comerio commended Illinois' coal companies, the miners and DNR's team of state mine inspectors for the fine job they do on a daily basis. "Illinois' safety record speaks for itself as one of the best in the nation," he said.

Comerio stressed his deep respect for coal miners and their profession. He said the Department is very interested in the mining industry and wants to "share its concerns and maintain good lines of communication."

Nanci Butler Bounds, who made her first trip underground nearly eight years ago, said she was glad to have the opportunity for the refresher course. She joked that she enjoyed

witnessing Director Washington's reactions as he dropped beneath the earth's surface and traveled through the mine tunnels. Bounds also pointed out that Washington came away from the tour with a copy of the mine's motto that he thinks should be adopted by the Department of Corrections. *"Be flexible. Embrace change, learn to love chaos, and be ready to 'hit the road, at any time.'"*

"There was a feeling of security as if the miners were guardians of our presence underground."

—John Comerio, DNR Deputy Director

Of his first trip underground, Washington said, "Since I really didn't know what to expect, I can truthfully say I was pleasantly surprised. Safety is stressed so much that by the time we boarded the elevator, I felt safe and comfortable. I was extremely impressed with the camaraderie among the staff and way they interacted with each other and watched out for us."

Sam Vancil, who spent 37 years in the surface mining industry before joining state government, says the C3 mine is an excellent example of the room and pillar method of mining, where specified blocks of coal are removed and adjacent blocks are left for roof support.

Vancil said he appreciated C3's hospitality and the fact that Director

Washington and his staff were invited to join the tour.

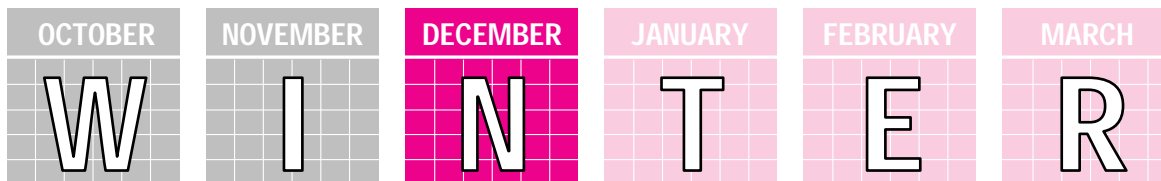
"This indicates a willingness on the part of the DNR to promote and better understand the mining industry," Vancil said. "I am glad to see such an avid interest in mining from people like John Comerio, who has spent his state government career at the former Department of Conservation, and Don Vonnahme, a veteran with the Office of Water Resources. It tells me they are genuinely interested in knowing more about one of our state's most important resources."

Vancil said the merger could easily have placed members of the DNR in opposite corners of the ring, considering their diverse and potentially conflicting areas of concern.

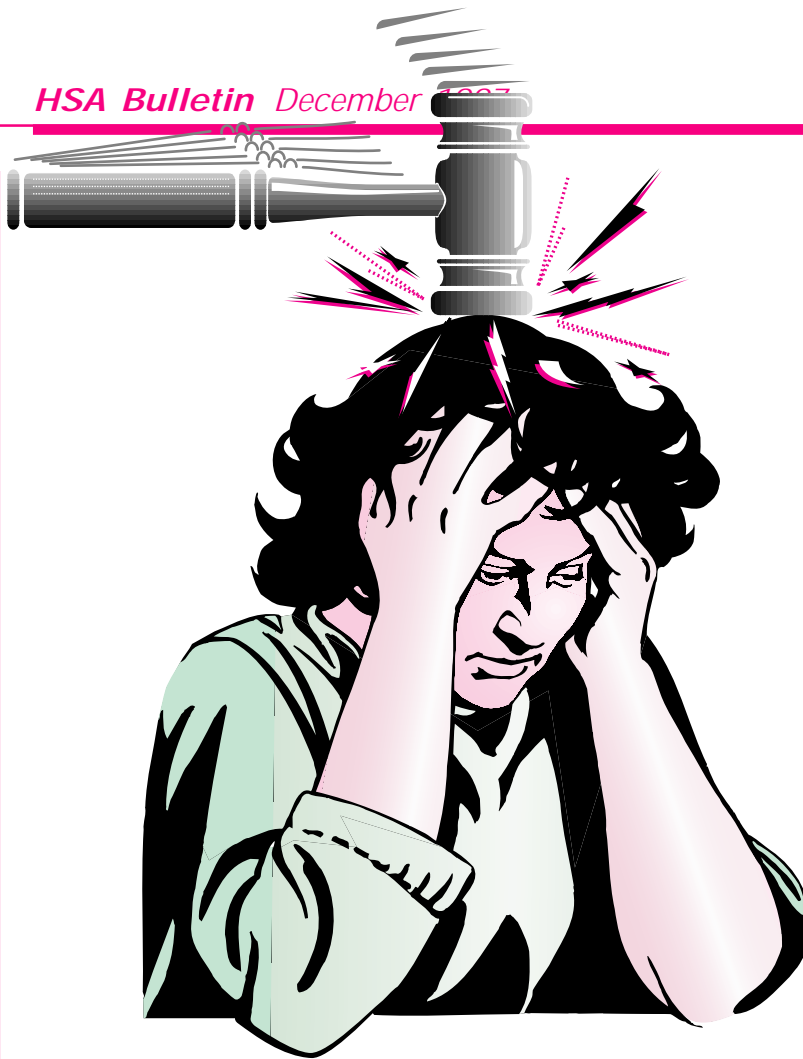
"Instead, we are seeing a cross-over effect with people who joined the DNR from a variety of agencies becoming involved in programs that cover all of the state's natural resources. Among other things, they're learning about mines and minerals, and we're learning about Illinois' native plants, animals and natural areas," he said.

"The more knowledge we each acquire about the others' program areas and the more we interact, the more we have to gain as an agency," concluded Vancil.

Article written and provided by Elizabeth Pensoneau, Public Information Officer for the Illinois Department of Natural Resources, 524 S. Second St., Springfield, IL 62701-1787 Telephone: (217) 785-0970



ALERT reminder: ● Always maintain adequate mine ventilation and make frequent checks for methane and proper airflow. ● Know your mine's ventilation plan and escapeways. Properly maintain methane detection devices. Communicate changing mine conditions to one another during each shift and to the oncoming shift. ● Control coal dust with frequent applications of rock dust. ● Make frequent visual and sound checks of mine roof during each shift. **NEVER** travel under unsupported roof.



Sinus headache pain?

Tips on how to unstuff your head and keep nasal passages open

By Paula Dranov

Many mornings I wake up with a stuffy nose, feeling as if some little guy in my head is trying to push one of my eyes out of its socket. If I'm lucky, I begin to feel better when I get out of bed and gravity prompts my sinuses to drain.

But my problem is nothing compared with what others among you suffer. Sometimes the headaches are so bad your whole face hurts; even your teeth ache. Your nose won't stop running, and you may have a low-grade fever. Or you can't lie down in bed without erupting into a coughing fit.

An estimated 35 million of us share some semblance of this misery. And all because something is infecting or inflaming our sinuses. We spend \$1.5 billion a year in pursuit of something—*anything*—that will take away the

headache, enable us to breathe and end the torment (see "About That Headache").

The source of all this suffering is a collection of cavities surrounding the nose and lodged in the forehead. Lined with the same kind of membranes found in the nose, the sinuses drain into the nose through passages no wider than the lead in a pencil. When air and mucus get trapped inside the sinuses, pressure and pain result. This can happen whenever nasal membranes swell and block the tiny passages to the sinuses.

Symptoms point to specific offending sinuses. Pain above and around the eyes usually indicates that those sinuses above your eyes are the problem. If your teeth and jaw ache

and your cheeks are tender to the touch, the sinuses on either side of the nose are to blame. Blockage of those sinuses near the tear ducts causes eyelid swelling and pain between the eyes. When the sinuses behind the bridge of the nose are obstructed, the result can be earache, neck pain and a deep aching at the top of the head. No one knows exactly what sinuses do, says internist and allergist Donald Pulver of the University of Rochester (NY). "They may be shock absorbers or have something to do with resonating the voice."

Typically, a sinus infection or inflammation (sinusitis) begins with a cold or the flu. Mucus trapped in blocked sinuses becomes a fertile breeding ground for bacteria. "Any sinus blocked long enough will eventually get infected," says Dr. Gailen Marshall, director of allergy and clinical immunology at the University of Texas Medical School in Houston. The symptoms are unmistakable: mucus, pressure and pain in the cheeks and forehead and, often, a low-grade fever.

If you have these symptoms, see a doctor, who typically will prescribe an antibiotic. Home remedies alone usually won't help. In fact, over-the-counter (OTC) antihistamines may make matters worse, because they thicken mucus. Most infections clear up with antibiotics. But if you don't feel better in three to four days, the bacteria probably are resistant to your antibiotic, and you may need a different one.

Chronic sinusitis is harder to diagnose. It may be caused by an allergy, by vasomotor rhinitis (engorgement of the nasal blood vessels and membrane congestion triggered by, say, pollution, smoke or changes in the weather), or, less often, by an anatomical obstruction, such as a deviated septum (a malformation of the structure that divides the nasal passages). As with a cold or the flu, an infection may develop if the passages to the sinuses are blocked.

Whatever the cause, obstructed sinuses will give you nothing but grief

until your nose opens up and you can breathe freely. OTC nasal decongestant sprays and drops, such as Afrin, Dristan or NeoSynephrine, usually bring quick relief. If used for more than four or five days in a row, however, the drugs may cause a rebound effect in which congestion gets even worse. You may then require a prescription nasal spray containing a steroid to calm inflamed nasal passages and reduce swelling.

If you're plagued by chronic sinusitis, it's essential to keep your nose open. Do-it-yourself measures can help, but you "probably need medical treatment to get at the underlying cause. It's best to see an allergist or an ear, nose and throat specialist," says Dr. Michael Kaliner, medical director of the Institute for Asthma and Allergy at the Washington (DC) Hospital Center. Using a thin scope fitted with a light, the doctor can quickly determine the cause of the blockage.

If an allergy is the problem, skin tests will show whether you're reacting to dust, mold, or other common allergens.

About that headache

If you suffer from frequent headaches, don't be too quick to blame your sinuses. Recurrent headaches may be migraines or a side effect of sinus or pain medication.

A real sinus headache consists of severe pain in the sinus areas and is usually accompanied by a stuffy nose, fever and, sometimes, post-nasal drip and a cough. Migraines cause moderate to severe throbbing pain on one side of the head, in the eye, behind the eye or in the temple. They are usually associated with some nausea and can be disabling. But migraines are easily confused with sinus headaches, because both can cause pain in the sinus areas, a stuffy nose and, sometimes, a postnasal drip. Your sinus head-

Heading off trouble

Here's how to keep your nose open and your sinuses clear:

- Use oral decongestants such as Sudafed or Afrin as soon as you feel yourself getting stuffed up. But don't use nasal spray decongestants for more than five days.
- Drink lots of water, to thin mucus so it can drain more easily.
- Avoid alcohol which causes congestion and can dehydrate the body, making mucus thicker.
- Use saline nasal sprays to soothe and moisten nasal tissues.
- Bathe nasal passages and flush mucus out of the nose with a mixture of a quarter-teaspoon of baking soda, a quarter-teaspoon of salt and eight ounces of warm water. Pour some of the mixture

into your palm and inhale gently. Then blow your nose.

- Use a nasal decongestant before airplane flights to avoid sinus blockages caused by air pressure changes.
- Exercise regularly. Physical activity generates adrenaline, which constricts swollen blood vessels and relieves nasal stuffiness.
- Avoid pools if chlorine irritates your nose and sinuses.



When it's impossible to simply avoid the allergen, allergy shots can help. If allergy tests are negative, vasomotor rhinitis is a possibility. With

both allergies and vasomotor rhinitis, treatment usually includes steroid nasal sprays to reduce inflammation and swelling and clear the sinuses.

Available by prescription only, these sprays include Vancenase, Beconase, Nasacort, Flonase, Rhinocort, and Dexacort. Unlike OTC decongestants, prescription anti-inflammatory drugs can be safely used indefinitely. The most common side effects are nasal irritation, nosebleeds and a sore throat.

Most sinus problems can be successfully controlled with steroid sprays, nasal washing and/or allergy treatment. In one survey of 200 sinus patients, only 14 required surgery.

Today surgery to remove obstructions is an outpatient procedure, done through an endoscope under local anesthesia.

My own sinus trouble comes from a little allergy and a lot of vasomotor rhinitis. But it's been much better since I learned the secret of sinus control: Keep your nasal passages open any way you can.

Reprinted from the January/February 1996 issue of American Health.



THE LAST WORD...

If you really want to do something, you'll find a way; if you don't, you'll find an excuse.

The trouble with life is, you're halfway through it before you realize it's a do-it-yourself thing.

The two hardest things to handle in life are failure and success.

If at first you DO succeed, try not to look astonished!

THE FOUR-TO-ONE RULE: For every criticism you make of someone's job performance, make sure you give the person four compliments.

I'm only attending school until it becomes available on CD-ROM.—Anonymous sixth grader

I not only use all the brains I have, but all that I can borrow.—Woodrow Wilson

When a true genius appears in this world you may know him by the sign that the dunces are all in confederacy against him.—Jonathan Swift

I love to think of nature as an unlimited broadcasting station, through which God speaks to us every hour, if we only will tune in.—George Washington Carver

The mind is like the stomach. It is not how much you put into it that counts, but how much it digests.—Albert Jay Nock

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.

REMINDER: The District Council Safety Competition for 1997 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 or at: MSHA—US DOL, 5th floor—EPD #535A, 4015 Wilson Blvd., Arlington, VA 22203-1984. Phone us at (we love to hear from you): (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:

- ***Dec. 14-16, Louisville Construction/Mining Expo, Kentucky Fair/Expo Ctr., Louisville, KY***
- ***Feb. 18-20, '98, S. Cent. Dist. M. Mine Safety/Health Conf., Dallas Medallion, Dallas, TX***
- ***Feb. 26, '98, Joint Health and Safety Conference, the Inn at Reading Wyomising PA***
- ***Feb. 26, '98, Minnesota Mine Safety Assoc. Conference, St. Paul, MN***
- ***Jun. 9-11, '98, Longwall USA '98, Lawrence Convention Center, Pittsburgh, PA***

