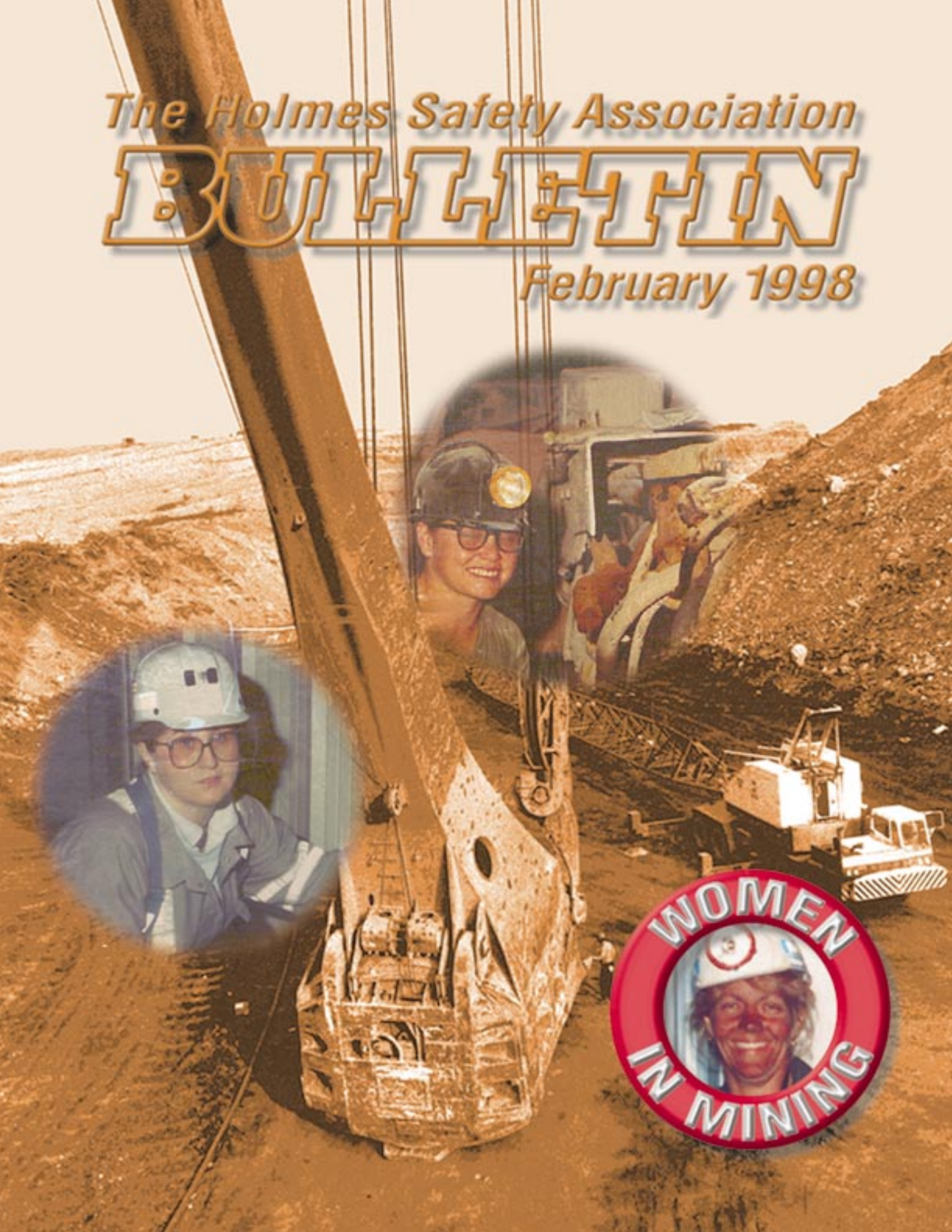


The Holmes Safety Association

BULLETIN

February 1998





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

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

COVER: This month's cover is an electronically enhanced montage of images from the editor's collection. [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**

Despite the stereotypes and the obvious struggles women in the mining industry have faced, those who've made it believe the field is full of opportunities.

Women's work

By Barbara J. Halpern

There's no denying that mining is a male-dominated industry. Yet thanks to technologies developed over the last 20 years, societal changes in sex role stereotyping, individual determination, and the willingness of companies to train women, there are no jobs in mining today where women are not represented.

Women are drillers and electricians as well as drivers of heavy equipment and haulpack trucks. They perform jobs ranging from field exploration and metallurgy to clerical and janitorial and warehousing positions, from prospectors and underground blasters to geologists and land reclamation experts, from communicators to legal experts on mining law and more.

The Women's Mining Coalition, founded in 1994 to shepherd responsible legislative mining reform, estimates that 20 percent of the workers in the mining industry are women. Although women are concentrated in clerical and administrative jobs, at least 10 percent are in non-traditional, hardhat jobs, claims the group. There are women in management, but the numbers in senior management remain small, especially in larger companies.

In particular, single mothers have been drawn to mining, largely because it pays higher wages and gives them access to a better quality of life and more time with their families. With changing attitudes and improvements in safety and technology, the doors are open for women to work alongside men in any kind of mining job, with relatively little prejudice, once they prove themselves and their ability to do good work.

The open-minded West

Female miners are becoming ever more common in the West, and some states have a higher concentration than others. For instance, Montana and Arizona have twice as many women miners as does Nevada, according to the Women's Mining Coalition.

Perhaps it is attitudinal—the rugged individualism of the West—or perhaps it's because the General Mining Law enacted in 1872 made it possible for women to own their own mines and eventually hire workers, but men in the West openly accept women working alongside them in all capacities. In contrast, there are fewer women working in the coal mines in the East. (It is understandable, then, that there are more Women in Mining chapters in the West—California, Colorado and Nevada—than in the East.)

According to Adrienne Ottaviani, executive director of the Maryland Coal Association, there are no women working in the coal mines and only two in management jobs in the entire state. Admittedly, many women (and men) lost their jobs in the rampant downsizing of the 1980s; women miners nearly always lost their jobs first, as union policies dictated workers with less seniority be the first to go. But there also appears to be more traditional thinking in the East, with many old-liners wanting to preserve for men the coveted (and shrinking) jobs traditionally performed by men. Rural East Coast mining towns tend to be more depressed than their West Coast counterparts, with fewer jobs available; so competition for high-paying positions is fierce.

Some women in these areas, however, report that time is changing old-school male perspectives. As their daughters are beginning to enter the labor force and make them aware of travails in the workplace, fathers are becoming more accepting of their female colleagues.

An equal opportunity

Perhaps one of the ironies—and a historical saving grace—is the legacy of the Mining Law of 1872. According to Sarah Mondale, who hails from a fifth generation mining family, this legislation was indeed (and in deed) the first equal opportunity employment act in this country, since it stated categorically that every citizen regardless of gender, age or race had an equal right to stake and work a claim, giving women (and minorities) the right to own property.

Interestingly enough, this same law heralded an unspoken sense of egalitarianism that permeates mining even today. Although details vary by company, mining employers—particularly those in Western states—make it abundantly clear (both implicitly and explicitly) that men and women will be treated equally in performing any job, and that any kind of sexual harassment or gender-based discrimination will be strongly frowned upon. Consequently, most of the women in our story who have come of age in mining during the last 20 years or so report little, if any, gender-based roadblocks in recent years, although the road may have been a little bumpy at first.

Understandably in the early years, women were trailblazers, and they had to prove themselves before they were “tolerated” and later “accepted”

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by men. Most women found that if they worked hard, one-on-one they usually would be treated no differently than their male counterparts. Surely, there were hurdles and individual differences, but the underlying sentiment echoed by many women was: If you did your job and did it well, pulled your weight and worked hard, you were accepted as "one of the boys." Occasionally a woman had to be twice as good as her male counterpart, but once she proved herself, it was relatively smooth sailing.

That does not mean that women have had an easy job of it. For some, like Holly Huyck, a Colorado-based geologist with 20 years' experience, it took the recommendation of her college professor to get mining companies to consider her for jobs, even though she and several of her peers were top academic performers. In the early years, she may have needed support from a male mentor to make her ideas heard. But, once she proved herself, she was accepted enough to hold her own.

According to Maxine Stewart, a geologist and independent consultant

from Colorado, geology was a good point of entry for many women in the early days. Geologists do the initial exploration phase and then leave. In contrast, it was more difficult to get a job lasting for the duration.

Many female geologists report experiences bearing out that theory. They were given interesting field assignments, particularly in the boom years of the 1970s when jobs were plentiful. Women in field exploration appeared to be well accepted, since they were hired on interim project assignments, distinct from the tight-knit, family-oriented, local mining work force. Women in exploration often had to make big adjustments and go where the jobs were, either to remote towns or overseas, where conditions could be even more restrictive for women, due to strict cultural mores.

Other female geologists took a divergent path into environmental permitting for mines or into land reclamation, bolstered by the emerging environmental movement. Many women found they had a knack for these assignments, blending their technical knowledge with writing and

communications functions, areas in which they often surpassed their male counterparts.

"Because the U.S. mining base is shrinking, many women went into the environmental side of mining and cleanup... where there is more work," says Holly Huyck. "Permitting skills require technical prowess and communications acumen, often better suited to women."

Like her peers, Huyck has found that women must network a great deal to get anywhere professionally, especially when looking for the next job or contract.

Ruth Carraher is a Nevada geologist who has worked for zinc and gold operations in Tennessee and Kansas over the last 21 years. She became interested in hardrock mining through her grandfather. She has found older men to be very accepting of her, although there occasionally has been rivalry amongst her peers. In reality, she says, it really depends on the attitude each person takes into the job.

Still other women have become politically active in mining reform and educational efforts, by forming

A group of Women in Mining members tours American Electric Power's Central Ohio Coal operation.



Arloa Woolford (far left) mans the mineral education booth at the National Science Teachers Association's Regional Convention.



the Women's Mining Coalition and Women in Mining (WIM), a national organization focusing primarily on education issues. WIM, which celebrates its 25th anniversary this year, includes both female and male members ranging from engineers, geologists, landmen, secretaries, lobbyists, mine workers, educators and concerned citizens. Its main goal is to educate its members in the technical and other aspects of the business, and to offer educational, scientific, legislative and other programs to help the public understand the link mineral production has with the national economy and the public good. Its success over the years is a testament to the commitment these individuals share in promoting the industry that provides their livelihoods and their children's futures.

To their credit, women participating in advocacy trips to Washington, D.C. convey a fresh, new and articulate voice that commands Congress' attention. They represent real people, families and communities. Best of all, they know about natural resources management because they live it and work it every day.

Congress has stood up and taken

notice of their formidable force, representing the new, diverse mining industry. Although it advocates smart land management, reclamation and environmentally sound operations, the Women's Mining Coalition opposes regulations that would place more financial and paperwork burdens on mining companies, either large or small.

A liberating force

Mining has been a saving grace for many women, particularly single mothers lucky enough to get jobs in mine operations. Most traditional women's jobs—waitress, teacher, store clerk—currently pay minimum wage, or a little better. Especially in small towns, jobs are not plentiful and hourly rates are marginal, so many single mothers are forced to have multiple jobs just to make ends meet. Mining jobs not only pay two to three times average wage, but have eliminated the need for multiple jobs and enabled women to spend more time with their families. In recent years, above average salaries for mine workers—from \$16 to \$20 an hour and up—have enabled mining families to have a comfortable lifestyle, even without college degrees.

Sarah Mondale is a perfect case

in point. Because she held down four jobs concurrently, it was not uncommon for her to work 30 hours straight. Somehow she managed to persist on two to four hours of sleep each night over a four-year period. She was not afraid of hard work or long hours, and she even had jobs that took her out of state. But that was no way to raise a family, particularly one with teenagers.

Mondale has been working in the Barrick Mine in Nevada for some nine years now; she started as a temp, and was eventually trained as a heavy truck driver. Her hourly wage is way more than what she used to make, so there is no need for any extra jobs. This financial solvency has enabled her to buy a house and provide for her children, as well as have more time to spend with them. Not surprisingly, she is a staunch advocate for non-traditional jobs for women.

Mondale reports that at least 10 percent of Barrick's 500 equipment operators working the pit, and overall at least 20 percent of the company's 2,500 workers, are women. Having worked previously in construction, she found that industry to be much more blatantly sexist and discriminatory, without the level of acceptance that mining offered. She was hired in construction as a token to fill a quota, she said, and resented it. She also believes there are women who want special treatment, which spoils it for those who want to be held to the same rules as men.

Mining companies appear to be very open to training women for non-traditional jobs. Many companies report their female employees are stable, reliable and productive workers. Many women equipment operators take such good care of their equipment that repairs and down-time are often lower than the industry average.

How do blue-collar, hardhat workers fare compared to professionals such as geologists? As profiled

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below, it appears that these women sometimes have it best. Laboring alongside men, these women honestly seem to have the most freedom, autonomy and acceptance.

Non-traditional jobs

Tammy Johnson, an electrician at the Golden Sunlight Mine in Montana, has become a grassroots activist with CURE (Citizens United for Realistic Environment). "Whether mining wives or mine workers," she says, "women are supportive of resource producers who have commitment and integrity, and sensitivity toward environment, employees, safety and responsible resource extraction."

Johnson maintains that "while some companies may not actively recruit women, they will generally look favorably on hiring them." In her view, particularly in rural mining communities, women are not seen as threats, and they are involved in every type of job.

Beverly Carpenter is a heavy equipment operator who works for Independence Mining in Nevada. She started as a janitor and an accounting temp 10 years ago. She was offered driver training, and now drives a 150-ton truck. There is always work for her. Operating on the team concept, employees switch roles every six months, she says. She was nominated to be the first woman

foreman in the pit by her peers.

Mining enabled Carpenter, a single mom, to provide improved quality of life for herself and her children. Her new husband, who also works on the same 20-person pit crew (including four women), sees no biases toward women, although he admits it was harder in the early years.

Carpenter reports that her company made it clear from the beginning that it's not appropriate or acceptable to discriminate or harass women on the job. Even the older men accept women workers, she says, and since they work in teams, it is not uncommon for the men to help their female teammates when they need it.

Mary Korpi has worked in mining operations for 21 years and presently serves as Newmont's manager of communications, investor relations and public relations. Her experience has been a little different from that of her peers, she believes. She essentially has worked for the same company through a series of mergers. She earned a supervisory and management role early in her career, and she is a "known" personality through both her work and widespread volunteer activities. By contrast, many of her peers have had to job hop in order to get

ahead.

"At Newmont, there are many women, working in all capacities, and several vice presidents," she claims. "It is less likely to see a woman vice president of operations or women mechanics." Twenty years ago, she adds, it was more likely to see non-working spouses than working women involved with community or charity organizations.

Debbie Schumacher works in a warehouse at the Lynnvill Mine, a high sulfur coal operation in Booneville, Ind. A former waitress, she started in mining 23 years ago as a janitor and worked her way up to warehouse supervisor on third shift. She really enjoys her non-routine job, which involves scheduling manpower and machines, as well as solving problems when they arise.

Her experience has been that women are accepted once they prove they can do a good job, just like the men. She perceives hardrock mining to be more accepting of women, with virtually all jobs open to them. Even without a college education, she says, mining affords her a decent livelihood, with wages at least twice those for typical jobs available in her area.

Schumacher, like many women in the business, has given back to the mining

A gathering of the Women's Mining Coalition Temporary Acting Board includes (seated, (L-R) Mary Korpi, Ruth Carraher, Debbie Aber, Nancy Barto, Kathleen Benedeito and (standing, L-R) Sarah Mondale, Susie Mason, Jamie Fernetie and Ann Carpenter.





Outside Harnischfeger's P&H manufacturing facility are (from left): Ruth Carraher, Nancy Barto, Cindy Emmons, Debbie Siruhsacker, Jana Murphy, Sarah Mondale, Liz Arnold, Diana Baies, Kathleen Benedetto, Nicki Hindal and Debbie Aber.

industry by working to educate her community and those in public office about mining's importance. A longtime, active member of Women in Mining, she currently serves as national treasurer and has been WIM's representative to the National Coal Council for more than a decade.

Similarly, Arloa Woolford, who has worked for a Winnemucca, Nev., gold mine for many years, now spends much of her free time educating teachers locally and nationally about mining as president of the WIM Education Foundation. She is joined by others around the country—such as Jackie Beesley Door, who works for BHP in Denver and is the immediate past president of WIM-National, and Carol Sheppard, its current national president and NMA's director of education and communications—in giving workshops for teachers at the National Science Teacher conventions.

The mining heritage

Leta Collard, whose family has been in mining for three generations, recently reopened her grandfather's claim at Thunder Mountain Gold in Idaho. She recounts that "in the old days, mining was a much more family-oriented life, with the simple pleasure of the family pulling together, often traveling around the country, panning for gold. There was a sense of joy, excitement and contentment associated with life, a rhythm of working and cycling of

jobs and seasons. Things were more casual, but everyone knew what was expected of them, and the routine didn't vary much from day to day."

Collard feels that "it is worth a little inconvenience to earn top dollar." She says, "Every type of job is open to women, except perhaps in remote areas, where the physical demands and logistics of setting up a camp make it too rugged for most women." She perceives that the key to being successful is to be a capable worker as well as a good sport.

Lois Van Hoover's family is the fifth generation to work in mining. Her children, who have college degrees, are all in the industry. She is proud of mining's legacy. "The 1872 Mining Law was the first equal opportunity legislation in this country," she says. "It allowed everyone to own real estate, and all were treated equally. For this reason, women have always been active in mining, and the women's suffrage movement went from the West Coast to the East Coast."

Van Hoover has worked in large mining organizations, as well as in small mines. Modern mining "since the 1970s is like any other business," she says. "Women have always been involved in mining... but in different capacity, and not in the same numbers as they are today... Jobs are really based on temperament, not on gender."

Coming of age

Kathleen Benedetto, a geologist reborn as a grassroots activist, observes that a handful of women were tapped early in their careers for management. Twenty years ago women were an unknown quantity in the industry, and few were senior enough to assume management positions. Only now are these early pioneers really ready for the next step, she believes.

Once she became aware that Congress was penning significant mining legislation without insider expertise in resource management and environmental issues, Benedetto launched the Women's Mining Coalition in 1994 as an ad hoc group. The original goal was to mobilize women to lobby for acceptable mining reform and to position the group as a reliable resource for Congress.

Because "the old boy network" no longer appeared to be enough to communicate the industry's message, the new coalition's focus was simply to send female mining industry representatives to call on the freshmen women legislators—on their turf in D.C.

These knowledgeable and committed women were successful in getting their message heard, and the group quickly established credibility. To their credit, mining companies were supportive of the Women's Mining Coalition, giving monetary support for women from all facets of

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The Women's Mining Coalition held an appreciation picnic in Elko, Nev., for retiring Nevada Representative Barbara Vucanovich (center, in cowboy hat)



mining to attend meetings in Washington.

A number of state mining associations presently have female executive directors, including Laura Skaer (Northwest Mining Association), Denise Jones (California), Dianna Miller (South Dakota) and Jill Andrews (Montana). Each has her own independent, assertive style and fresh approach.

Women in mining are poised to lead the industry to new heights. As Laura Skaer reveals, "The industry has come to realize that diversity is a good thing. Women bring skills and insights to the table that weren't there before. Clearly, women bring new perspective and consensus to the process that allows divergent perspectives to build on each other's strengths."

Debra Struhsacker's father had supplied drilling equipment to mining, so she grew up in the mining

industry. A geologist, she began in exploration but later became interested in environmental and land regulatory affairs. She now enjoys combining the technical and political skills necessary to permit a mine, responding to public concerns about environmental issues.

She perceives jobs and leadership, although still evolving, to be influenced not so much by gender, but rather by age and experience. Now that women have experience and respect, the next decade will be "telling."

Jamie Femette, land manager and geologist, got her start working in nuclear power plants and on the Alaska pipeline, an experience she considers unmatched. She believes women are well suited for mining. "Women offer good thinking and know-how to handle themselves well in hostile and dangerous situations," she says.

Fernette believes the inclusion of women has benefited the mining industry. "Women bring a generational perspective, having come of age in the industry. It has been a natural evolution to authority and responsibility," she says. "Although there are few women in high visibility positions, women have now acquired the experience, performance and leadership to pass the baton."

Or, better yet, to share it.

Reprinted from the July/August 1997 issue of MiningVoice.

Six named to Mining Hall of Fame

Six honorees will be inducted into the National Mining Hall of Fame on September 6. The ceremonies, marking the Hall of Fame and Museum's 10th anniversary, will be held in Leadville, Colo., where the museum is located.

Two of the honorees are living: Paul Wheeler Allen, who guided Cyprus Mines Corp. through a highly

successful program of mine acquisition and development in 1955, and Joseph Rosenblatt, who pioneered the manufacture of mechanized loading in hardrock underground mines.

The other four inductees are the following Arthur Fay Taggart, who wrote the *Handbook of Ore Dressing* and *Handbook of Mineral Dressing*; Joseph Toy, who developed an

improved safety fuse for blasting; Joseph Wharton, who established the U.S. zinc and nickel metal industries; and John Benjamin Zadra, who developed carbon adsorption/desorption technology to extract gold from pregnant cyanide solution.

Reprinted from the August 1997 issue of Coal Age magazine

Fatality summary Jan-Dec 1997

This article updates the status of fatalities occurring in both coal and metal/nonmetal mines from January through December of 1997. Based on preliminary accident reports, as of December 31, 1997, ninety-one (91) fatalities occurred at coal and metal/nonmetal mining operations. During this period, thirty fatalities occurred at coal operations and sixty-one fatalities occurred at metal/nonmetal operations. Powered haulage fatalities, in both coal and metal/nonmetal were the most frequent accident classification, causing thirty-eight percent of the fatal injuries; machinery fatalities accounted for fifteen percent of the fatalities and fall of roof, rib or back caused twelve percent of the fatalities.

Below is a summary of coal and metal/nonmetal statistics:

Coal mining

Twelve of the fatalities were classified as powered haulage, nine were classified as fall of roof/rib/back and three were classified as machinery. Of the thirty fatalities, seven occurred in West Virginia, five each occurred in Kentucky, Pennsylvania and Virginia. Twenty-two fatalities occurred underground and eight occurred on the surface.

Metal/Nonmetal mining

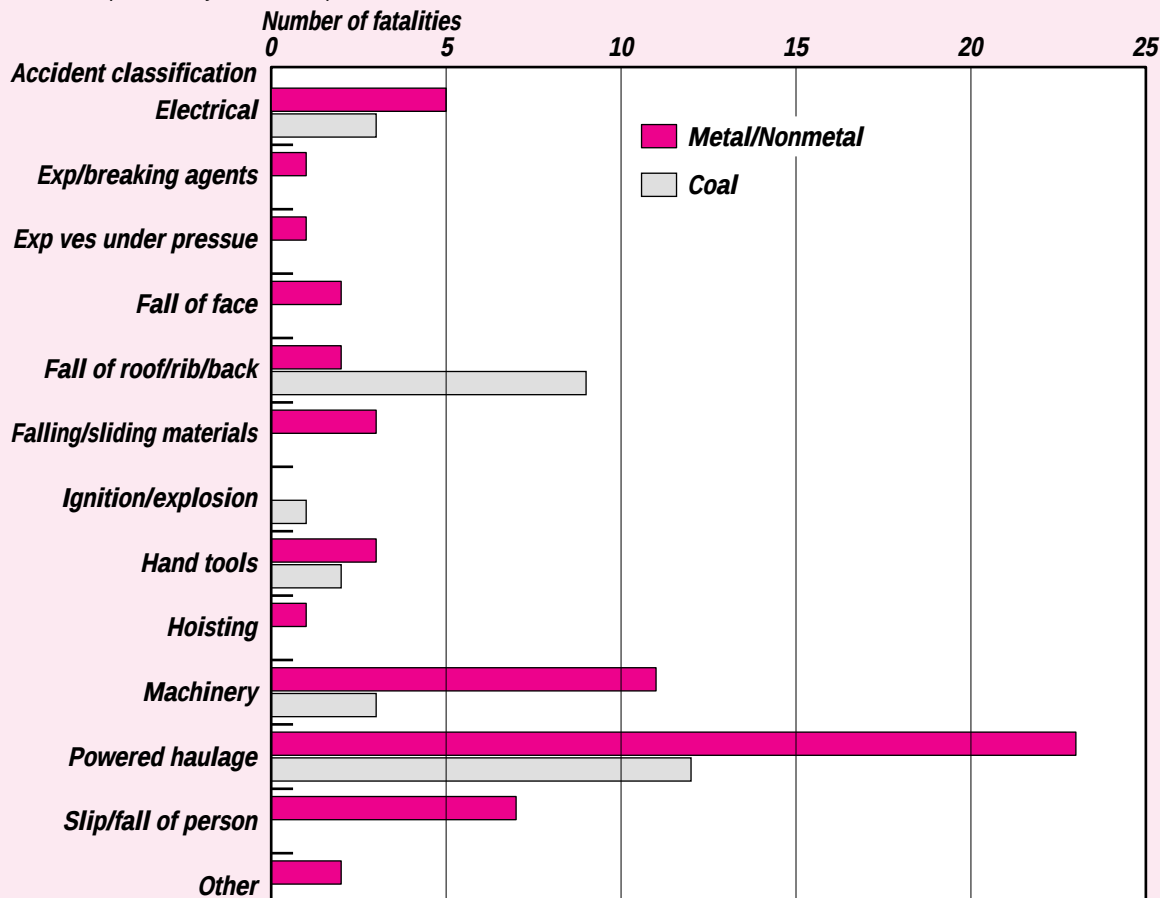
Twenty-three of the fatalities were classified as powered haulage, eleven were classified as machinery, six

were classified as slip/fall of person and five were classified as electrical. Sixteen fatalities each occurred at limestone and sand and gravel operations and eight occurred at gold operations. Six fatalities each occurred in California and Texas and five fatalities each occurred in Florida and Nevada. Fifty-one of the fatalities occurred at surface operations, the remaining ten fatalities occurred at underground facilities.

Submitted by: John V. Forte, National Mine Health and Safety Academy, Beckley, WV

Fatality summary, January–December 1997

Based on preliminary accident reports as of 12/31/97



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Once more we are talking seatbelts!

Seatbelts are one item of safety equipment, that you never want to put to the test. For most people belting up is a reflex action. For those who still haven't adopted this safe practice, it may become the last lesson you never learn.

On mines, ROPS cabs are designed to stop the operator being

crushed in a vehicle when it rolls over. If you aren't wearing the seatbelt, you won't damage the inside of the cab as you are thrown against it—it will damage you.

More importantly the seatbelt may save your life when it stops you from being thrown out of a vehicle during a rollover or collision.

Seat belt maintenance is critical. Belts need to do their job without any risk of failure. They are designed to hold you in a position that minimizes the chances of injury.

BE KIND TO YOURSELF!

Reprinted from the December 1997 issue of Western Australia's Dept. of Minerals and Energy's MINESAFE.



Far right: Long drop with seatbelt—ALIVE!
Near right: Short drop—no seatbelt—FATALITY



New study links coal use to prosperity

The National Coal Council released the findings of a major new study on coal, entitled Vision 2020: The Role of Coal in U.S. Energy Strategy, which examines the long range role of coal in fulfilling a vital portion of the nation's future energy needs.

The report addresses misconceptions about coal and probes the positive contribution coal can make to help the United States meet its future energy, economic, and environmental objectives.

Clifford R. Miercort, chairman of the National Coal Council and president and CEO of the North

American Coal Corp., said the study "compares and contrasts existing coal-use technologies with new technologies that are in various stages of development; and shows that by using the latest technologies, coal can contribute to meeting America's and the world's energy needs in a clean and cost-efficient manner."

The report indicates that the demand for low-cost electricity in the United States is projected to grow by as much as 2% annually. More than 55% of electricity produced by U.S. utilities is generated from coal-fueled power plants, according to the study.

The link between the use of low-cost coal and lower-priced electricity is clearly identified and explained.

The report shows that the modern use of coal is clean and efficient. In large part due to advanced technologies from the Clean Coal Technology Program. The generation of electricity from coal has increased substantially over the years, yet actual emissions of pollutants has decreased significantly, the study said.

Reprinted from the August 1997 issue of Coal Age magazine.

Four Injured in Alabama methane explosion

Adequate rock dust lessened impact

A Dec. 11 methane ignition injured four miners at an underground coal mine near Shelby, Ala.

While none of the miners' injuries were considered to be life-threatening, one was burned on 24% of his body and required skin grafts on his legs, according to MSHA District Manager Mike Lawless.

Lawless said that MSHA is still investigating the ignition, but noted that the company was lax in its ventilation controls and complying with its mining plan.

Six citations have been issued to the company for contributing

violations. Lawless said that the dust scrubber was not working and the water pressure was low on the continuous miner. Dust and ventilation examinations were not made at the beginning of the shift and the face ventilation was insufficient to carry away and dilute the methane; the company was mining deep cuts and cutting out of sequence; and, the line curtain was back further than it should have been. He also said that there were roof control violations.

It was noted in a special winter alert put out by MSHA that the explosion was not as severe as it



could have been because the accident area was wet and sufficiently rock-dusted.

Reprinted from the January 9, 1998 edition of Legal Publication Services' Mine Safety and Health News.

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MSHA adds new provisions for miners in proposed rule covering noise exposure

MSHA is adding a new provision to its proposed rule for noise exposure addressing the right of miners and miners' representatives to observe required operator monitoring.

The agency also said there will be a public hearing on the newly proposed provisions on March 10 at the Labor Dept. in Washington, D.C.

Comments on the latest proposal were due Feb. 17th. Comments on the information collection requirements must be received by March 2. Those wishing to make an oral presentation on the supplemental rule at the hearing on March 10 must submit their request to MSHA by

March 5. Post hearing comments are due April 9, which is the official close of the record.

MSHA issued a proposed rule on noise exposure on Dec. 17. The proposal affects every segment of the mining industry and calls for engineering and administrative controls as the first line of defense for hearing conservation.

The supplemental proposed rule would require mine operators to provide affected miners and miners' representatives with an opportunity to observe operator monitoring required under §62.120(f) of MSHA's proposed rule. It also would require

mine operators to inform miners and miners' representatives of the dates and times of planned operator noise monitoring so that miners and miners' representatives would have an opportunity to exercise the right to observe monitoring.

This collection of information is subject to review by OMB under the Paperwork Reduction Act of 1995 (PRA 95), and so MSHA also needs comments on the information collection requirements.

Reprinted from the January 9, 1998 edition of Legal Publication Services' Mine Safety and Health News.

Remember: Winter Alert still in effect

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How much bigger can they get? ***Operators, trainers evaluate new 320-ton Komatsu truck***

By Greg Grimm

Anyone who has worked around the mining industry for any length of time will recognize the name "Haulpak." Haulpak has been building off-highway trucks for over 40 years.

Several different names have been on their trucks, including LeTourneau, Wabco, Dresser, and now Komatsu. We began using haul trucks in the Metcalf Mine in 1969.

Starting with the 85-ton-payload Lectrahaul we grew into the 100-ton version of the same truck. Shortly after that we started using some 65-ton Haulpaks in the Lonestar area of the Morenci Mine, and in 1983 we purchased the first Haulpak for the Metcalf Mine. It was manufactured under the name Wabco and was rated at 170 tons.

We continued to purchase the Wabco units until 1988 and finally retired the last Wabco haulage unit in March of 1996.

During those years the Haulpaks were the main work-horses in the Metcalf Mine and eventually moved into the Morenci Mine replacing the rail haulage. Many millions of tons were hauled and dumped by these

trucks during their lifetime. As our mine developed, larger equipment was brought in to replace the Haulpak.

Bigger, faster haulage equipment is necessary to keep ahead of the game in today's competitive market place. It is that principle that now brings the Haulpak back into the Morenci Mine.

In July 1997, the first of 15 new 320-ton Komatsu/Haulpak trucks was delivered for assembly. The trucks cost more than \$2,000,000 each.

Higher load capacity and speed should save almost \$0.03 per ton.

When asked what he thought about the new trucks, Clayton Babers, AA Truck Driver, said "I think the truck will work out good for the company if we can get it on a designated run where we can take advantage of its capabilities."

Comes in seven loads

The truck arrives in partially assembled modules. Seven semi-truck loads are required to deliver all of the necessary parts to completely assemble one truck. The machine is

manufactured and shipped from three major locations in the U.S.

The frame and cab structure are made in Peoria, IL. The dump body is fabricated in San Antonio, Texas. And the wheel motors are put together in Erie, PA.

The crew from Road Machinery requires 14 days to complete the assembly and present the truck to our Heavy Duty Truck Shop for inspection and approval.

In order to achieve the higher payloads and operating speeds, the Haulpak uses a 16-cylinder MTU engine which develops 2,682 brake hp. The engine drives a General Electric alternator.

Unlike the older versions of Haulpak trucks, the new trucks have AC induction traction motors and circuitry. The operator will find the trucks more "user friendly" in comparison to the old Wabco model. "I like the ride," says driver J. Chavez. "You don't have the constant shifting, and I definitely like the size of the cab."

Along with higher payloads and speeds, improved safety is also a primary concern at Phelps Dodge. The loaded truck can weigh 1,059,000 lbs. and reach speeds of 40 mph. These two factors create a lot of momentum.

Improved braking system

The new Haulpak has a greatly improved braking system. It still uses the Dynamic Retarder that can generate a maximum braking effort of 5400 hp. But it also incorporates an oil cooled, multiple disc service brake.

Unlike the old electric trucks, this service brake is capable of stopping a loaded truck on a ramp time after time without fear of running away. Larry Smith, a newly qualified



operator of the Haulpak says, "I like the way they operate; the dial-in dynamic works better than the automatic retard on the other trucks."

Operator acceptance is growing as more and more people are being trained on the new trucks. At first, many of the more experienced operators were very apprehensive about the new trucks.

As they learn more about the trucks and experience the way they handle, most are changing their minds and accepting them as a replacement for their smaller mechanical-drive truck.

No problems in training

Training on the trucks has proceeded without any problems. Initially the Truck Shift Trainers went with the Instructor from Komatsu Haulpak to learn about the trucks. They reviewed all of the information and decided to train the senior people who had prior experience on electric-drive trucks first.

The trainers explained the differences and additional features that affect the operation of the truck and instructed them on the walk-around procedures. The drivers quickly picked up the operation of the truck and began showing others what they had learned.

We have trained a total of 154 drivers on the operation and care of the Komatsu/Haulpak so far.

Our operators have also had quite a bit of input into the final product we are getting. A team of operators and trainers suggested several changes to improve workability and safety on the new trucks.

Road Machinery and the Heavy Duty Truck Shop have been very helpful in implementing these changes.

Our drivers picked the location for the computer in the cab. Instead of mounting the computer on the ceiling we requested that it be mounted on a pedestal to the right of

the operator. In this location it can be seen better and reduce the amount of time the driver would have to look away from the road.

Our team has also been involved in the development of a new bracket for the mirrors. The original mirrors were designed for the standard dump body that we replaced with a larger-capacity bed. This required a change to the brackets to allow the drivers to see down the side of the bed. The brackets have gone through several changes already and we are still working to achieve a mount that will satisfy the visibility needs and hold up under the vibrations and shocks the mirrors receive.

Making truck even better

The team also suggested some changes to the hand rails and grab irons to facilitate getting on and off the equipment, providing additional protection for the operators on the truck. These changes were implemented without delay and have been carried through to all of the trucks that have been assembled.

We also discovered that the canopy on the new dump beds does not extend far enough forward to keep rocks from falling onto the deck.

Building fence on canopy

The "Boyz in Hoodz" Team from the Boiler Shop and Road Machinery are working together to solve this problem. They will build a 30-inch-high fence to be placed directly behind the marquee of the canopy. This should stop rocks from bouncing off the canopy and down onto the deck.

After successful testing, this change will be completed on all of the new trucks.

Several operators agreed with AA Driver Greg Arbizo when he said, "The whole bed seems really light; the truck won't climb a ramp if it's slick." When asked about this problem, Road Machinery stated that a new version of software would be installed to help correct this problem. This situation will

be monitored and any additional corrective action will be taken if needed.

Creature comforts abound in the new trucks. The cabs are spacious and include all items necessary to make a shift as pleasant as possible.

Standard items include an air ride seat that has its own built-in air compressor. This seat is completely adjustable and can conform to any preference you may have. It will supply comfort and support throughout the shift.

The air conditioning is adequate to keep the cab comfortable in the summer heat. It also does a good job of filtering out dust. The cab is furnished with an AM/FM cassette player to help pass the time during the shift.

All the controls are conveniently located and the instrumentation will provide all the information needed to operate the truck efficiently.

The windows are electrically operated and move up and down with just a touch of a finger. The steering wheel adjusts up and down and will telescope in and out with a twist of a knob.

Since the truck is electrically driven, there is no longer a need to select a gear for different operating conditions. The only selection required is forward or reverse.

Ms. D.J. Pugsley says, "I like the Komatsu; they are more comfortable and a lot easier to drive. I really like it when I get lined up on one. I tell everyone I get to run the Cadillac today."

Komatsu/Haulpak has developed and built a truck that has inherited the strength and stamina from its predecessors and incorporates all the high-tech developments needed to increase safety, production, and operator satisfaction in today's mining industry. This truck will help keep PDMI at the top of the world's leading copper producers.

Reprinted from the November 1997 issue of the MORENCI COPPER Review.

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Ben W. Sheppard receives top awards



Ben W. Sheppard, C.M.S.P., Corporate Director Of Loss Control, for Echo Bay Mining Company, recently received a double honor for his outstanding work in safety and health both nationally and internationally. During the presentation of the awards it was pointed out by the presenter that Ben is one of the best known safety professionals in the world

because of his dedication to mining safety. As most will tell you, his commitment to the safety and health of others goes above and beyond the call of duty. Ben's reputation has been built on integrity, performance, and positive communication. He has proven that one person can make a difference when they sincerely believe in what they are doing and properly apply it.

Both of Ben's awards were presented by Gerald Scannell, President of the National Safety Council. The first award was The International Society of Mine Safety Professionals award for the United States and its territories. Last year Ben received the society's international award and on his receipt of this year's award became the first person ever to receive both awards. Ben's second award was the National Safety Council's "Distinguished Service Safety Award"—the DSSA. This award is only given to a few people in the

world each year that have done a consistent and exceptional job in safety and health over the years. Ben has been one of those people who has always gone above and beyond in mine rescue, training, writing and directing programs, and communicating. This ethic has consistently returned people safely home to their loved ones after each and every shift. He has truly made a difference in the safety and health of our nation's miners. In addition, it should be noted that Ben is only the second mining person from the west to receive the DSSA in its history.

All of the above indicates Ben's determination to improve safety so we in mining enjoy a healthier and safer work environment. Our sincere appreciation and congratulations to Ben for his dedication to safety.

Submitted by Harold "H.L." Boling, C.M.S.P., Assistant Director of Huam Resources/Safety & Health, Phelps Dodge Arizona Operations.

White (k)night's at Robe

Robe River Iron Associates have put the expertise of their employees to good use during the year, and have come up with some good ideas to improve safety.

One very successful trial was changing the color of the Dresser Truck 26 which now has a white tray—the idea was to make the truck more visible at night. The trial has been so successful that the rest of the fleet will be converted as maintenance schedules permit. Truck 26 has also been fitted with red and

green "navigation" lights which also help the truck to stand out at night.

The perennial problem of light vehicle visibility is also being looked at closely. The lights have to be bright enough to alert other drivers, without affecting night vision. One solution being tested is a two and a half meter long, flexible whip antenna with a small light built into the tip. Different colors are being tested to determine the most visible.

A flag attached to the antenna just

below the light will also help to provide better visibility for light vehicle traffic at all times of the day and night.

For Manager of Mining, Phil Welten, one of the most pleasing aspects of the trials were employee involvement, with suggestions coming from a wide section of Robe's mine employees.

Reprinted from the December 1997 issue of Western Australia's Dept. of Minerals and Energy's MINESAFE.

MSHA strengthens enforcement policy to combat black lung

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The Mine Safety and Health Administration (MSHA) has announced a new enforcement strategy designed to better protect miners from black lung by requiring coal mine operators to take more prompt corrective action once an overexposure has been identified.

Beginning April 2, MSHA will base noncompliance determinations on the results of single full-shift dust samples taken by inspectors and issue a citation when any one full-shift measurement demonstrates that the applicable standard has been exceeded. Adopted as part of a campaign to eliminate black lung from the nation's coal mines, MSHA's new policy will replace the current practice of relying on the average of several inspector samples to determine noncompliance.

"This is another important step to protect the nation's coal miners from black lung," said Davitt McAteer, assistant secretary of labor for mine safety and health. "MSHA will require a mine operator to take corrective action to lower the concentration of respirable dust whenever a full-shift measurement by an MSHA inspector indicates noncompliance. This will minimize the risk to miners of continued exposure to excessive dust levels."

Until now, even when an MSHA inspector found excessive dust levels for some occupations or work locations in a coal mine, corrective action was not required unless and until the average of several measurements exceeded the applicable standard.

MSHA is changing its respirable dust enforcement strategy based in part on the joint finding issued by the agency and the National Institute for

(NIOSH) that a single, full-shift sample will accurately measure the average concentration of respirable dust to which a miner is exposed during the shift on which it was taken.

"Black lung has declined with better dust control in coal mines, but cases still occur," said McAteer. "Effective control of miners' exposure to respirable coal mine dust is critical because prevention is the only defense. The joint finding is based on sound science that has been rigorously scrutinized. Each episode of overexposure contributes to the health hazard of developing black lung disease."

Black lung disease, caused by overexposure to respirable coal mine dust, can impair lung function and even lead to heart failure. Moreover, black lung can progress even after the miner is no longer exposed to coal mine dust.

MSHA's respirable dust standard generally requires that coal miners' exposure to respirable coal mine dust be maintained at or below 2.0 mg per cubic meter, but the standard may be lower in some cases, for example when quartz—a silicosis hazard—is present in the dust.

"A single-shift sampling strategy is the most practical enforcement approach that reasonably assures control of a miner's exposure so that adverse health effects are unlikely to occur," McAteer emphasized.

Federal mine safety and health law explicitly requires that the average dust concentration be continuously maintained at or below the applicable standard during each shift. This is consistent with standard industrial hygiene practice as applied by the Occupational Safety and Health Administration (OSHA) in general

industry, and by MSHA in metal and non-metal mines.

The change in MSHA's inspector dust enforcement policy does not affect samples required to be taken by mine operators as part of the overall strategy to control respirable dust in coal mines.

Under the new enforcement policy, MSHA will continue to take multiple samples for each mechanized mining unit during a sampling shift, but any individual sample indicating overexposure will require corrective action.

The new policy is one of several recent MSHA actions reflecting recommendations by an Advisory Committee on the Elimination of Pneumoconiosis Among Coal Mine Workers. In developing the new joint finding and MSHA policy, MSHA and NIOSH also held several public hearings on the finding and policy in proposal form, and reviewed extensive written comments from the mining community.

The joint finding by MSHA and NIOSH and the new MSHA policy concerning respirable dust sampling appeared in the Federal Register December 31, 1997. The finding and policy also may be found on MSHA's Web Site at www.msha.gov under Statutory and Regulatory Information, Federal Register Documents, Miscellaneous Notices.

Reprinted from the U.S. Department of Labor's Office of Public Affairs (Atlanta, GA) Mine Safety and Health Administration's release no. USDL 98-04 Contact: Katharine Snyder, Phone: (703) 235-1452

Reprinted from the October 17, 1997
edition of **Mine Safety and Health
News.**

Contractors urged toward zero-accident goal

Safety is not just a priority it's a value

By Jodi Black

The second annual Morenci Contractor's Safety and Health Conference was held Sept. 24, 1997. Each year the conference is held to provide technical information to Phelps Dodge contractors and to rejuvenate philosophies on safety.

Innovative and talented speakers were selected to discuss topics which would motivate contractors toward reaching the goal of zero accidents.

In order to achieve zero accidents, contractors must promote safety as part of their value system.

Our belief is that when safety is a value, operations will have as much emphasis on safety as on production and cost saving. An important aspect of any safety program is management commitment. When management shows dedication and commitment, individuals within the company feel free to express their concerns about safety.

This builds trust and encourages employee involvement. Phelps Dodge has truly established a commitment to safety in all aspects of its operations. This is evident in its safety culture.

The Phelps Dodge speakers we selected were chosen to motivate and inspire the contractors to adopt a similar safety culture.

Steve Whisler, Senior Vice President of Phelps Dodge Corp. and President of Phelps Dodge Mining Co., opened the conference with a statement defining his level of commitment.

"I would not have missed this [conference.] Safety is that important to me. Safety is the single most important culture we have."

Whisler continued to explain that safety is as important to contractors as it is to Phelps Dodge. He asked, "Are we willing to accept even one accident?"

Only zero acceptable

He emphatically demonstrated how one accident not only affects the injured person, but also his mother, father, children, friends and coworkers.

"The Phelps Dodge culture," he said, "is one in which only zero is an acceptable amount of accidents."

Whisler stressed the need for contractors working on Phelps Dodge property to share this value and emphasized: "All it takes is a commitment to make it happen."

H.M. (Red) Conger, President of Phelps Dodge Morenci Inc., recently transferred to Morenci from the Phelps Dodge Tyrone Branch in New Mexico.

Red confirmed his dedication to safety as he read the Phelps Dodge OCIP Vision and Mission statement. He recognized the goals set by the OCIP Team as part of the partnership with Phelps Dodge and suggested we work together to reach them.

Those goals include *Zero Accidents, Higher Safety Standards, Drug-free Workplace, Pre-project Planning, and Meeting (or Exceeding) Regulatory Requirements.*

"Safety cannot be merely a priority. We must truly internalize it as a value. Values are simply things that we hold close to us and never compromise."

He asked the audience if it was involved in or committed to safety and used an analogy of eating ham and eggs for breakfast to distinguish the two levels.

When sitting down to breakfast, it is apparent the chicken was involved in the meal. The pig, however, was committed to the meal.

Red's commitment and dedication to the safety of all contractors

working on Phelps Dodge property is welcome at Morenci.

H.L. Boling, Assistant to the Director of Human Resources/ Health and Safety, Arizona Operations, captured the attention of his audience with his understanding of and devotion to safety.

It's managing people

H.L. believes "it is not about managing safety, it's about managing people." He asked the audience, rhetorically, if they could think of one good reason not to practice safe production. As expected, he received no response.

One attendee commented on H.L.'s speech: "He is thorough and easy to understand. It's like attending an excellent, short course in behavioral science—a combination of Dale Carnegie and Norman Vincent Peale. Outstanding, poetic human sensitivity at its best."

There were also technical speakers who shared valuable information.

The success of the conference was due, in part, to the knowledgeable and motivational speakers. "Today," H.L. said, "we have come a long way and that only happens when we are committed."

"We started out managing safety programs, then we went to safety as the process. Today safety is a value. Safety starts at the top and works its way down."

It is management commitment and employee involvement that make a safety program successful.

"A lot of Phelps Dodge's success today," Whisler said, "is due to the excellent work we are receiving from our contractors and I would like to thank you for that."

"We are stepping up our safety programs and we are going to require you to do likewise."

The representatives managing the OCIP, Jodi Black, and Cliff Mull, feel positively about the ability of

contractors to reach the goal of zero accidents.

Phelps Dodge has always been the leader in safe production. The contractors on Morenci property are setting the standard for safe construction.

When put together, the result is the safest mining property operating in the United States today.

*Reprinted from the November 1997 issue of the **MORENCI COPPER Review**.*

CONSOL develops aggregate from coal waste

Scientists in one of the largest private U.S. coal research laboratories are targeting opportunities in the natural aggregates market by developing a synthetic aggregate from a coal-combustion by-product.

Under newly issued grants from the states of Ohio and Illinois, the CONSOL Coal Group is attempting to take waste sludge from the flue gas desulfurization (FGD) systems of coal-burning electrical power plants and turn it into a valuable aggregate by-product.

The work is underway at CONSOL's Research and Development facilities in Library, Pa. "The market for aggregates is huge," said Richard A. Winschel, research group leader, exploratory research. "It's well over a billion tons per year nationwide."

Winschel said that good quality road aggregate now costs approximately \$6 to \$10 per ton and the price will only increase as producers consolidate. Disposing of scrubber sludge can cost a power plant as much as \$6 per ton of coal burned, he added. "If we turn this by-product disposal cost into a value-added money-maker," he said, "our efforts will be rewarded."

Under the Ohio Department of Development's Coal Development Office grant awarded last November, CONSOL Coal Group is investigating the conversion of lime-based wet FGD sludge into aggregates.

Sludge being used in the study is being produced by Cinergy's Zimmer

station, located near Cincinnati, and American Electric Power's (AEP) Conesville station, in Coshocton, and the Gavin station, in Gallipolis.

In the second project, CONSOL was awarded a grant from the Illinois Clean Coal Institute to study making aggregates from wet limestone-based FGD facilities at electric power plants. That research and development project has been underway for several months and has similar objectives to the Ohio project, but it is confined to laboratory testing. Sludge samples are being provided by Illinois Basin utilities.

The amount of the FGD material available for making synthetic aggregate is considerable. The sludge is formed when flue gases are sprayed with a slurry made of water and an alkaline reagent, usually lime or limestone. The sulfur dioxide in the flue gas reacts chemically with the reagent to produce calcium sulfite or calcium sulfate in the form of a wet sludge.

As electric utilities scrub more sulfur dioxide out of their stack gases, the amount of FGD waste material continues to grow. According to CONSOL, about 20.3 million tons of dry, unfixed FGD material were produced nationally in 1993. The amount of FGD material produced could increase by an additional 35 million tons per year after implementation in 2000 of Phase 11 of the Clean Air Act, according to Winschel. More than 90% of the FGD material

produced is wet sludge FGD.

"Disposing of this material increases costs for our customers who burn high-sulfur coal," said Frank Burke, CONSOL vice president, research and development.

He said that if it costs a utility as much as \$6 per ton of coal burned to dispose of the waste in a landfill or pond, the economics of scrubbing become less attractive and create more of an incentive for customers to burn lower-sulfur coal or natural gas. "This research," Burke said, "will convert the disposal of a material and its costs into a useful product, save landfill space, and improve the environment."

"If we can identify technology that will lower the overall cost of burning high-sulfur coal," he added "we expand the market for a coal that is abundant and economical to produce."

The aggregates for the study are being produced at CONSOL's R&D facilities under the direction of Milton Wu, principal investigator for the project and senior research chemist.

"Our challenge in the months ahead" Wu said, "will be to achieve a synthetic aggregate with exacting characteristics for density, wear resistance, size, and durability."

Reprinted from the August 1997 issue of Coal Age magazine.

Numerous accidents involving batteries prompts warning, advice

A look into 90 accidents involving battery maintenance showed an alarming number of battery explosions occurring during routine battery maintenance and when jump starting equipment, prompting MSHA to issue a warning about servicing batteries, and instructions on proper battery handling and maintenance.

Numerous accidents resulting from battery explosions have caused injuries to miners, including loss of vision and significant burns.

Many of these accidents occurred while removing or installing the battery. Others occurred while boosting a battery to start a piece of equipment, causing an explosion. Investigations of these accidents disclosed that the most common cause was lack of adequate maintenance procedures and improper connection techniques.

The following are the proper connection and maintenance methods that should be used to avoid similar accidents—personal protective equipment, such as safety glasses and gloves must be used to perform these functions.

Maintenance procedures

Forty-three accidents occurred as a result of not following proper maintenance techniques.

Before performing any maintenance or repair on a battery, ventilate the battery compartment to dissipate any

accumulations of gases. Batteries vent highly explosive gases (hydrogen) that can be easily ignited if proper procedures are not exercised.

When a battery terminal becomes loose and can be twisted, ventilate the battery compartment for a few minutes prior to tightening any of the terminals.

Jump Starting Batteries

Twenty-six accidents were attributed to improper jump starting techniques. The following procedure should be used to jump start equipment with negative-grounded batteries.

- Connect one end of the jumper lead to the positive terminal of the dead battery and connect the other end to the positive terminal of the booster battery.
- Connect one end of the jumper lead to the negative terminal of the booster battery; then connect the other end to the metal frame of the equipment being jump started. Do this at a location away from the battery and its associated fumes.
- Once started, disconnect the jumper leads in the reverse order.
- First disconnect the lead from the metal frame; then disconnect the jumper lead from the negative terminal of the booster battery.
- Second, disconnect the jumper lead from the positive terminal of the booster battery, then disconnect the lead from the positive terminal of the dead battery.

Installing or Removing Batteries

Fourteen accidents occurred while connecting or disconnecting the battery terminal. To avoid this type of accident, use the following sequence when installing or removing negative grounded batteries:

- Shut off all lights and other electrical loads prior to performing battery maintenance.
- Always disconnect the negative terminal connector before connecting or removing the positive terminal connector. If the wrench touches the grounded surface while tightening the positive terminal, no arc will occur. Similarly, when installing the negative terminal connector, no arc will occur since the equipment frame is common with the negative.

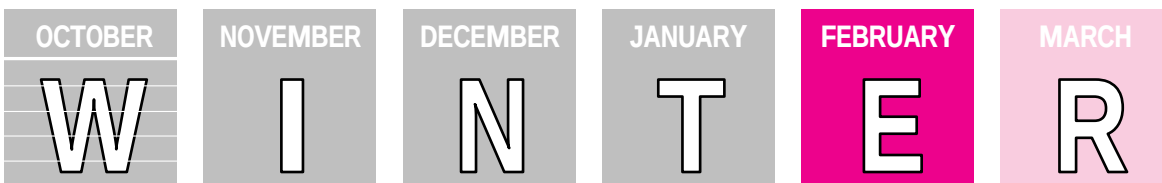
Charging Batteries

Seven accidents were attributed to improper charging techniques.

Exercise care in connecting the battery charger to the battery. Connecting the wrong polarity may cause a short-circuit and result in explosion of the battery.

Ensure that the battery charging circuit is deenergized before making your connections. Once the connections are made, turn the charging circuit on.

Reprinted from the January 9, 1998 edition of Legal Publication Services' Mine Safety and Health News.



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.

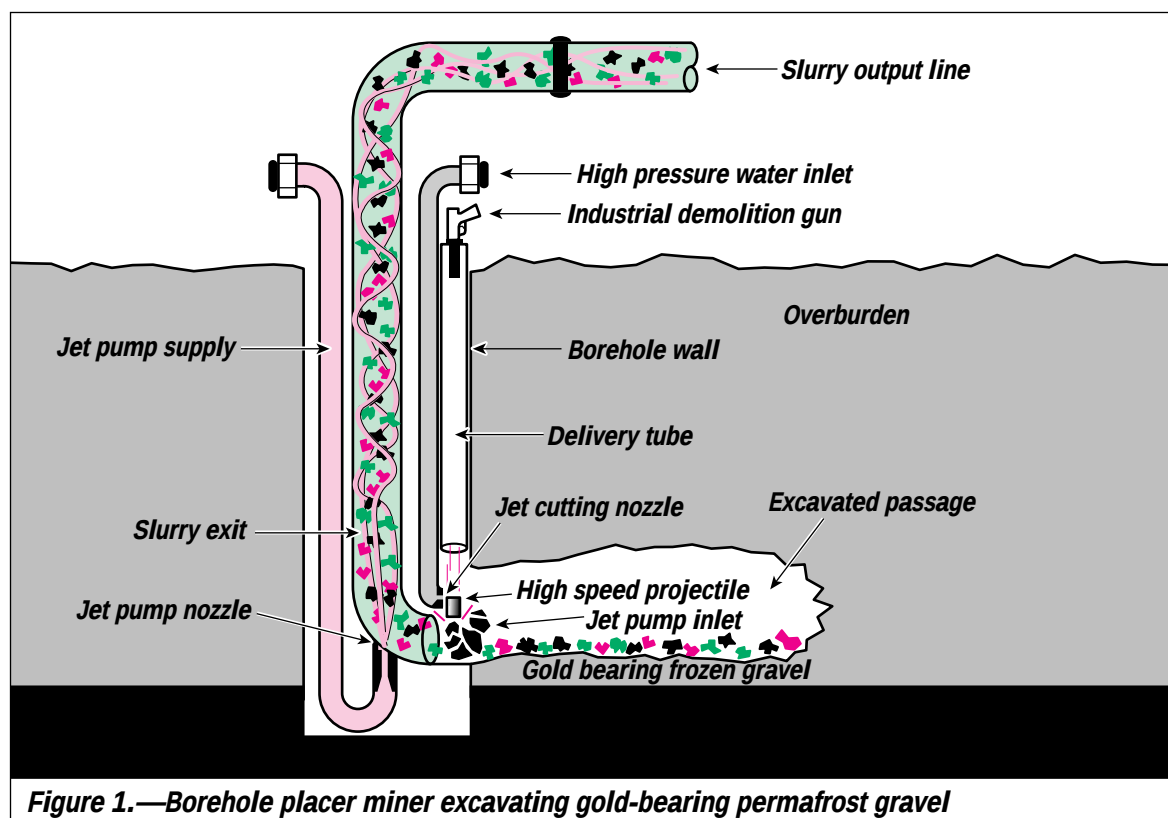


Figure 1.—Borehole placer miner excavating gold-bearing permafrost gravel

Prototype borehole miner selectively extracts gold from permafrost

Objective

Assess the technical feasibility of mining small and/or deeply buried frozen placer deposits from the surface through boreholes.

Approach

Placer deposits in permafrost often contain up to 15% cobbles and boulders. Because of erratic loading on the bit caused by elasticity and heterogeneity of the ice-and-gravel matrix, these deposits are extremely difficult to excavate. The approach taken in this research project was to mine only the ore-bearing portion of the deposit using a high-pressure water jet to thaw the gravel and a downhole hydraulic-lift-type pump to bring the ore to the surface as slurry.

Full-scale jetting tests in frozen gravel were completed, and the data were used to design a jet excavator. The excavator will deliver a water flow of 890 liters/min. (235 gal/min.) through a 15.7 mm (0.62-in) dia. nozzle at 6,900 kPa (1,000 psi). It can excavate -4°C (25°F) permafrost at a rate of approximately 9 mt/h (10 st/h) and drive a 0.1-m^2 (1-ft^2) horizontal heading a distance of 4.6 meters (15 ft) in approximately 10 min. The prototype slurry pump was designed to lift minus 15-cm (minus 6-in) gravel to the surface from a depth of 15 meters (50 ft).

How it works

The prototype borehole placer miner is shown schematically in figure 1.

The mining sequence is as follows. Two borehole placer miners are placed in boreholes approximately 7.5 meters (25 ft) apart. Each miner cuts a long, horizontal passage approximately 0.1 m^2 (1-ft^2) in cross section toward the other miner until the two passages meet. The cutting jet of one miner forces slurry toward the inlet of the slurry pump on the second miner at high velocities, which keeps the gold in suspension. The slurry pump then lifts the slurry to the surface. The jetting and pumping sequence alternates between the two boreholes until the ore-bearing horizon is mined out. If a large cobble clogs the inlet, a vacuum sensor alerts the operator, who can fire a projectile to clear the

blockage.

Field test results

Initial field tests of the borehole mining concept were conducted at a mine on Tenderfoot Creek, 43 km (27 miles) northwest of Delta Junction, AK. The gold-bearing gravel at this site is about 0.3 meter (1 ft) thick and lies immediately adjacent to bedrock under approximately 13 meters (43 ft) of overburden.

The first field trial of the borehole placer miner involved three boreholes and took place in two phases. In the first phase, single borehole mining, the only force inducing the gold to flow into the slurry pump was pump suction. In the second phase, one "production" borehole was excavated until a connection was cut in the pay zone that linked the production hole with an auxiliary hole 4 meters (13 ft) away. Then a cutting jet with a 15.7-mm (0.62-in) nozzle was lowered into the auxiliary hole and directed toward the borehole miner

in the production hole. This jet was operated at pressures from 700 to 5,500 kPa (100 to 800 psi) and rotated in the horizontal plane to flush material into the sump of the production hole. The jet pump in the production hole was operated for the duration of the test.

The two-hole arrangement produced three times as much gold as single-borehole mining, although only about 1.5 m³ (2 yd³) of material was excavated from the gold-bearing zone. Thus the total amount of gold produced (7 gm [1/4 oz]) was small.

Clogging of the slurry inlet and presence of large (30- to 35-cm [12- to 18-in.] diam.) boulders were the main problems hindering production during field testing. These problems will have to be overcome before borehole gold mining can become commercially feasible.

Present status

A second field trial was completed and the results published in the

proceedings of the Water Jet Technology Association conference, August 1995. Research was discontinued when the U.S. Bureau of Mines closed in 1996. Final reports and a video summarizing the work are still available from Art Miller and George Savanick at the following addresses.

Dr. George A. Savanick
189 Redwood Drive
Apple Valley, MN
(612) 432-7594

Mr. Arthur L. Miller
E. 315 Montgomery Ave.
Spokane, WA 99207
(509) 354-8028

Reprinted from the July 1997 issue of NIOSH's Technology News—issue no. 460; U.S. Department of Health and Human Services; Public Health Service; Centers for Disease Control and Prevention; National Institute for Occupational Safety and Health

As of October 1996, the safety and health research functions of the former U.S. Bureau of Mines are located in the National Institute for Occupational Safety and Health (NIOSH).

History of metal mining in Maine

Probably the earliest commercial operation in Maine was the mining of bog iron in Newfield, a small scale operation that continued for many years. Other enterprises in the mid-1800s included a lead mine near Lubec and the Katahdin Iron Works north of Brownville Junction. A mining boom swept Maine from 1879 to 1882. In a great flurry of excitement small mines and prospects were opened in many areas, primarily along the coastal volcanic belt from



Blue Hill to Lubec. Iron, silver, copper, lead, and zinc were mined, milled, concentrated, and smelted. A sudden drop in prices in 1883 caused most of the mines to close as fast as they had opened. Sporadic activity continued until 1918 when production of base metals in Maine ceased for almost 50 years.

During World War II, the federal

and Maine governments launched an intensive exploration program for manganese, an element on the War Department's "strategic list," that had been discovered in Aroostook County in the mid-1800s. This effort showed that a large amount of manganese is present, but the ore was never mined because an efficient process for extracting the ore was not available.

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The next round of Maine mineral exploration came in the late 1950's after the discovery of large ore deposits in nearby Bathurst, New Brunswick. While much attention was again focused on Maine's coastal volcanic belt, the inland volcanic belt from northwestern to northern Maine was also examined. From these efforts, part of an ore body estimated at 4.5 million tons was worked near Blue Hill in 1964-65. A significant nickel-copper deposit in Union was discovered and drilled, but not mined. Probably the most famous operation was the open-pit Harborside mine between Brooksville and Cape Rosier that produced 800,000 tons of copper and zinc ore from 1968 to 1972. The largest producer was the Black Hawk mine near Blue Hill, an underground mine that produced an estimated 1,000,000 tons of zinc-copper-lead ore between 1972 and 1977. No metals have been mined in Maine since 1977.

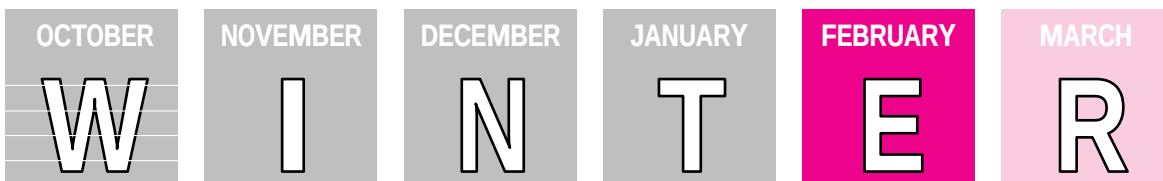
The high level of exploration from the mid-1970s to early 1990s produced several important discoveries. Among these were the Ledge Ridge deposit in Parmachenee (1973), a massive sulfide with several million tons of zinc, lead, copper; the Bald Mountain deposit west of Portage (1977), a large massive copper-zinc sulfide deposit with an estimated 36 million tons of ore; the Mount Chase copper-lead-zinc-silver deposit near Patten (1979), and the Alder Pond deposit (1985), with an estimated 1.5 to 3 million tons of high grade copper-zinc ore underground. While some of these sites may be developed in the future, none



of these deposits have yet been mined.

[Online] URL: <http://www.state.me.us/doc/nrimc/pubedinf/factsht/economic/minehist.htm> [Accessed 21 April 1997]

WINTER ALERT reminder:



Ounce of prevention

Did you know you can use 5 quarters and a ruler as a rough postal scale? Lay a pencil on a flat surface and place a firm 12-inch ruler across the pencil, centering it on the 6-inch mark. Then stack 5 quarters on the 3-inch mark and center the letter on the 9-inch mark. If the letter outweighs the quarters, you'll need to add more postage. (Why: 5 quarters weigh exactly 1 ounce—the same as the maximum weight of a first-class letter mailed with a single 32-cent stamp.)

By D.F. O'Donnell, New Bern, N.C.
Reprinted from the July 1997 issue of *AARP* magazine.



James Petrie, MSHA District Manager Northeast District presenting a safety award to Bob Kunz, of Tilcon-Capaldi at a Holmes Safety Association Meeting in Connecticut.



James Petrie, MSHA District Manager Northeast District presenting a safety award to Tim Williamson, of Tilcon Connecticut at a Holmes Safety Association Meeting in Connecticut.

Tips for trainers

The Ontario [Canada] Natural Resources Safety Association's Field and Technical staff train hundreds of people every year. They often encounter trainees with low literacy skills, or who aren't perfectly comfortable with the language in which the course is being delivered. Here's their advice for ensuring those people get the most out of training without being singled out or embarrassed:

- Be sensitive. Any group of people may include some with low literacy skills. One trainer starts every course by emphasizing that anyone who has difficulty reading or understanding the course materials can ask questions at any time or come to him privately for help.
- Watch for signs that participants aren't comfortable reading or writing the materials. Resistance to reading aloud or to writing tests, for example, could be an indication that some participants have low literacy levels.
- Whether or not you sense a problem, use lots of pictures, videos,

and hands-on exercises during training. Use stories and analogies to help clarify the information in the program.

- If reading aloud is part of the course outline, ask for volunteers or tell participants to indicate if they'd prefer not to read aloud. Phrased properly, this doesn't have to be a reflection on their reading ability.
- If a written test is included, but is not a prerequisite for passing the course, offer to conduct the test as a group exercise. One person in the group can be delegated to write, but others can still contribute.
- If a test is a requirement for passing the course, offer to go through the test with individual participants. Read them the questions or use other means to make sure they've learned the subject matter.

Is there a literacy problem in your workplace?

Here are some questions you can ask yourself about your organization.

Your responses may not necessarily reveal a serious literacy problem. They may, however indicate areas where literacy may be an issue.

- Are you doing any training? Do employees understand and implement what they are learning?
- Do employees communicate with each other and with their superiors or subordinates effectively? Verbally and in writing?
- Are you implementing new technology? Are employees comfortable with it? Is it taking too long to implement?
- Are you able to promote from within your organization or do you often need to go outside?
- Is there excessive waste of material or time that is affecting productivity?
- Do you have high turnover in entry level positions?
- Do you have high accident rates?

(Source: Frontier College, 1995)



Tis the season—still—for that germ double whammy: the common cold and the more exotic influenza. A cold attacks the airways bringing a stuffed-up, runny nose, hacking cough and scratchy throat. The flu mugs the whole body with fever, chills, fatigue, aches and an overall crummy feeling.

Ubiquitous, contagious and incurable, the two have much in common. Both usually last a week or more. They thrive in winter. Both are caused by viruses, a word whose Latin root means “slimy poison.”

While some of their symptoms overlap and their names are invoked by some victims almost interchangeably, the common cold and flu, are distinct illnesses caused by separate viral “bugs.” More than 200 viruses, can cause a cold. An array of shifting viral strains—classified as A, B or C types are names for the city where they were first identified—is responsible for the flu epidemics that annually sweep the globe.

Each year, they make millions of people miserable. Perhaps because

they are so widespread and incurable, flu and colds have also given rise to a rich if sometimes misleading mythology, including:

Colds and flu are mere nuisances of winter

Wrong. The flu can be fatal. It kills 20,000 Americans a year, on average, and sends 200,000 to the hospital. The flu combined with pneumonia is the sixth leading cause of death for Americans, according to the Center for Disease Control and Prevention.

Colds are rarely life threatening, but their collective toll in misery and absenteeism is nothing to sneeze at. Americans come down with about 1 billion colds a year.

Wear a coat, or you'll catch cold

Wrong again. Harsh weather alone will not cause flu or the common cold. For either illness to strike, it takes a germ, a virus. It has nothing

to do with being outside in cold weather.

A cold takes hold when the virus reaches the lining of nasal passages, via the eyes, nose or mouth. Colds are spread mainly by touch, kissing or other direct contact—as when someone with a cold coughs or sneezes in your face. *People are more contagious during the first 3 days of a cold.*

The flu virus is spread mainly by microscopic droplets released into the air by sneezing, coughing, speaking or breathing. When the droplets are inhaled by another person, the virus can invade the nose, throat or airways in its new host.

Colds and flu flourish more in winter because people spend more time cooped up inside—increasing the chances of person-to-person spread—and because the most common viruses survive better in low humidity.

Exposure to extreme cold *can* increase susceptibility to pneumonia—inflammation of the lungs. And recent studies have concluded that chronic, long-lasting emotional stress can make people more vulnerable to colds.

Can I get the flu from a flu shot?

In a word: NO. The viruses that are used to make the flu vaccine are grown in chicken eggs and then killed by a chemical so that they are no longer infectious.

For the common cold, medical science has little to offer in the way of protection. There is no vaccine against cold viruses. The best way to prevent colds is to wash your hands a lot and not get sneezed on.

Starve a cold, feed a fever

No one knows where that saying came from, or why it caught on. But it is misleading.

There is no reason not to eat when you have a cold, and there is no reason to force yourself to eat when you're woozy from a flu-caused fever. And if you've heard it as "Feed a cold, starve a fever," it doesn't make any sense that way, either.

The point is: Drink plenty of nonalcoholic fluids, whether you have a cold or a fever. And eat when you feel like it.

Treat a cold and it lasts a week: ignore it and it lasts 7 days.

That old adage remains largely true.

Nevertheless, medications can lessen discomfort and help get cold sufferers through the night or day. Nonprescription cold remedies, including decongestants, cough suppressants and antihistamines, may relieve symptoms but cannot cure, prevent or shorten a cold. Acetaminophen (Tylenol) is the recommended treatment for headache and general discomfort, because it is less likely than aspirin or other nonsteroidal anti-inflammatory drugs to upset the stomach.

Who needs cold medicine when there's vitamin C, echinacea, and zinc?

Given that colds are perhaps humankind's most common illness, it is no surprise that a slew of alternative treatments are touted against them. Among the more popular are extra vitamin C, zinc lozenges, and the herbal extract echinacea.

The good news: They probably won't hurt. Taking zinc lozenges can shorten recovery time by 40%.

The bad news: There's no conclusive scientific evidence that any so-called alternative treatment prevents or cures the common cold. Timely hand washing will help more than all of them combined to limit the viral spread.

Chicken soup's the way to go.

Grandma was at least partly right.

Chicken soup has no special curative effect on colds or flu; but it's time-honored role as a home remedy for misery has won over the doctors on at least two counts:

First, soup is a good source of liquids. Second, anything that tastes good and makes you feel better when you're sick deserves a place in the medical armamentarium.

Reprinted from the Washington Post, Health Section—1/6/98 and the U.S. Department of Labor's Safety and Health Center, OASAM 219-6687, No. 98-01, January 1998.

New techniques make heart surgery less traumatic for patients

Nobody wants to have heart surgery, but 1.5 million Americans will need it this year. Open heart surgery, sometimes called bypass surgery, is the most common major operation in the U.S.

Exciting advances in heart surgery at Georgetown University Medical Center are allowing patients to recover within days. "We can help patients heal faster, better, safer, and less expensively," says James Cox, MD, surgical director of the Georgetown Cardiovascular Institute.

Usually surgeons get to the heart by making a foot-long incision in the chest, sawing the breastbone in half, and prying open the rib cage. Also, for many patients, a vein is taken from the

leg just before surgery to use as the "bypass." After surgery, patients go through 8 to 10 weeks of painful and often complicated recovery from the surgery primarily because of the opening of the chest and leg. New procedures at Georgetown are changing the way heart surgery is performed.

• **Closed Chest Bypass.** Using a device called a Heartport, Cox is performing heart surgery without opening the chest. "I hope to substantially change the trauma associated with heart surgery," says Cox. Using the Heartport allows Cox and his team to improve the precision, safety, and effectiveness of heart surgery, without cracking the chest.

• **The Maze Procedure.** The "maze" procedure is a unique surgical solution for people with a rapid, uneven heart beat, called atrial fibrillation. It is one of the most common heart conditions and can lead to heart attack or stroke.

• **Easier Vein Removal.** Through the use of an endoscope (a long surgical tube with a camera at the tip), surgeons at Georgetown make only three tiny incisions in the leg to get the vein for use during heart bypass surgery. This speeds up recovery time and lowers the cost for patients.

Reprinted from the Fall 1997 issue of Georgetown University Medical Center's Healthy Decisions.

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THE LAST WORD...

Some men are like pyramids, which are very broad where they touch the ground, but grow narrow as they reach the sky.—Henry Ward Beecher

Commonplace minds usually condemn what is beyond the reach of their understanding.—François de La Rochefoucauld

Temperate temperance is best; intemperate temperance injures the cause of temperance.—Mark Twain

Moderation is the inseparable companion of wisdom, but with it genius has not even a nodding acquaintance.—Charles Caleb Colton

The pursuit, even of the best things, ought to be calm and tranquil.—Cicero

Nature makes merit, and fortune puts it to work.—François de La Rochefoucauld

To go beyond the bounds of moderation is to outrage humanity.—Blaise Pascal

It is surprising what a man can do when he has to, and how little most men will do when they don't have to.—Walter Linn

Knowledge is power if you know about the right person.—Ethel Watts Mumford

Among mortals second thoughts are wisest.— Euripides

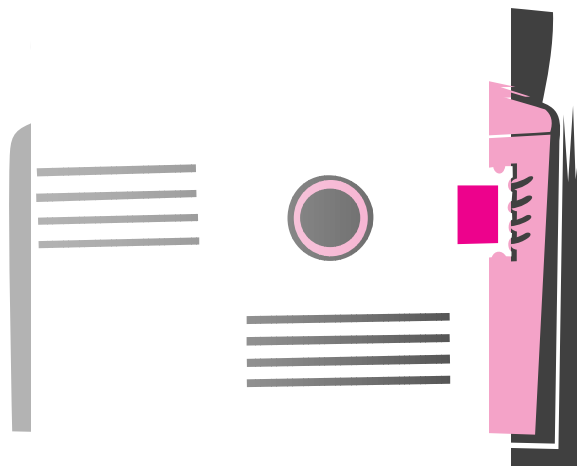
NOTICE: We welcome any materials that you submit to the Holmes Safety Association Bulletin. For more information visit the MSHA Home Page at www.msha.gov. We **DESPERATELY** need color photographs suitable for use on the front cover of the **Bulletin**. We cannot guarantee that they will be published,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

REMINDER: The District Council Safety Competition for 1998 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 any comments to the editor, Fred Bigio, at the above address or at: MSHA—US DOL, 5th floor—EPD #535A, 4015 Wilson Blvd., Arlington, VA 22203-1984.

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



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

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Upcoming events:

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The Inn at Reading, Wyomissing, PA***
- ***Mar. 1-4, Mine Safety Critical Issue Conf./
Expo sponsored by the NSC and Int. Soc. of
Mine Safety Professionals, Riviera Hotel, Las
Vegas, NV***
- ***Mar. 10-13, Annual Mine Regulatory
Conference sponsored by Mine Regulation
Reporter, Crystal City Marriott, Arlington, VA***
- ***Jun. 9-11, Longwall USA '98, Lawrence
Convention Center, Pittsburgh, PA***
- ***Jun. 21-24, 1998 Natl. Jt. Meeting—HSA/
NASMIA/MIIA, Tampa Hyatt, Tampa, FL***

