



BULLETIN

July 1997



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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.

THIS MONTH'S COVER: Thanks once again to Jim Sniegowski for this shot of a Manitowoc crane being used as a dragline with a Sauerman bucket at Powley Sand and Gravel of Spring Bay, Illinois.

**KEEP US IN CIRCULATION
PASS US ALONG**

Underground mine fire preparedness—Part 2

Charles Vaught, Launa G. Mallett, Richard S. Fowkes, Ronald S. Conti, William J. Wiehagen
National Institute for Occupational Safety and Health, Pittsburgh Research Center, Pittsburgh, PA

Part 2 of 4—Preparedness to evacuate and miners' experiences with incipient fires

This is the second in a series of four articles that discuss underground fire fighting preparedness. As with the first article in the May-June issue, it is based on interviews with 214 miners conducted at 7 underground mines ("A" through "G") by researchers of the National Institute for Occupational Safety and Health's (NIOSH) Pittsburgh Research Center [Vaught et al. 1996]. In the first article, the authors presented an overview of the study conducted by NIOSH on mine fire response preparedness and provided a general perspective on underground mine fires. In this article, we will describe miners' preparedness to evacuate a fire and their experience with incipient fires.

Miners' evacuation experiences

Fire affects a significant proportion of miners at some time during their working lives. For instance, 180 of the respondents were asked if they had ever been notified to evacuate a mine because of fire. Almost 40% of these questioned answered in the affirmative:

"That's been—well, a long time ago. They had a cutting machine caught on fire, but it's been several years ago. I don't know how long ago it was. They evacuated us for that."

"Yeah, it happened one time down here and that was just a few months ago. That was probably back in December. We had a hot spot back in our

return. It was producing smoke and they immediately shut the mine down."

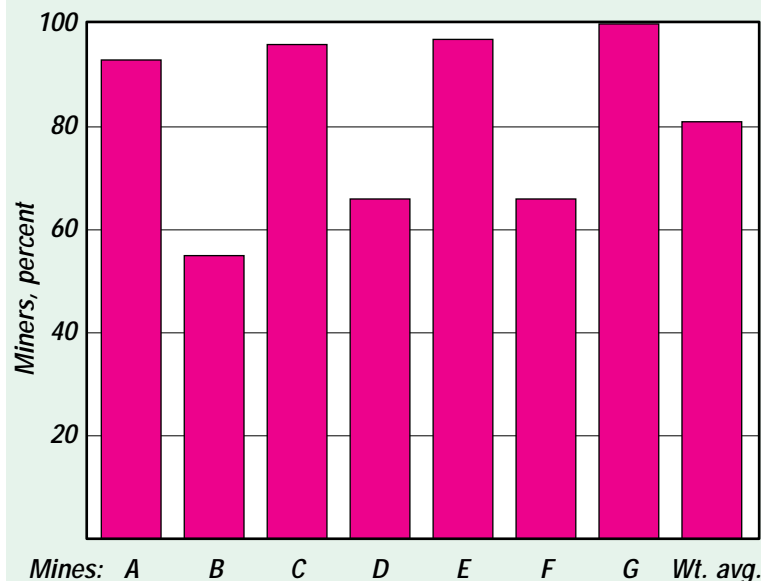
The proportion of respondents who have had to evacuate due to a fire ranged from slightly less than one-fifth at Mine E, which had a younger and less experienced workforce, to about two-thirds for mines F and G.

Considering such a potential for fire underground, it is important that miners know their escape routes and mine evacuation plan. Workers were therefore asked when they had last walked their escapeways. The percentages of miners who reported having walked their escapeway within the past year are depicted in Figure 1. The

remainder reported having either walked their escapeway over a year ago, never walked it, or couldn't remember when they last walked it. Over 90% of the workers at Mines A, C, E, and G reported having walked their escapeways sometime during the previous year. For the remaining three mines (B, D and F) this percentage was less than 70%. Although rotational assignments for walking escapeways are required by regulation, it seems likely that four of the mines had such an actual practice in place while the other three did not.

Mitchell [1990] discussed escape from mine fires. He indicated that 30 CFR 57 and 75 gives the minimum standards for escapeways from U.S.

Figure 1.—Percentage of miners who had walked their escapeways within the past year



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underground mines. The regulations do **not**, however, answer questions such as: Are there immediate positive routes to safety? Are these routes likely to be contaminated by leakages or flow of fire-produced gases and tars while the fire is being fought? A study of fatalities during underground coal mine fires by the former Bureau of Mines (USBM) [Goodwin and Kissell 1990] identified the delay time required to detect the fire and leave the section as a key factor in an escape. Another factor, discussed in the USBM study, was inadequate knowledge of the escape routes. As Mitchell [1990] notes, this lack of knowledge, added to the shock of not being able to see your hand in front of your face, can lead to disorientation and possibly fear. Most miners depend on reflectors hung from roof bolts. However, when smoke rolls in, they might not be able to see these reflectors. They then depend upon such things as frogs and switches to indicate the way out if they are in a track entry, or use other techniques that are unique to their mine (e.g., the location of bottom rollers on a beltline) to help orient themselves. This suggests that threading a lifeline through plastic cones or metal cans with one end open and spaced about every 100 feet might do much to help miners find their way out. An important issue is that, until they are needed, escapeways are often **assumed** to be suitable for the safe evacuation of miners. Clearly, the opportunity to walk (test) escape routes is in the interest of all underground personnel.

Miners' participation in fire drills

Miners were also asked when their crew had last participated in a fire drill. Answers to this question suggest that, in at least some of the operations, fire drills were less than rigorous exercises:

"From time to time some foreman would come in, and after they'd shut the face, they would [announce] 'I've

discovered a fire here.' And we'd walk through a simulated type drill. Just basically, like I said, get to the phone, get to the fire box—nothing to really fine act—not too much realism involved either. I would say most people are pretty reluctant to participate. It's been awhile "

"Oh, just Monday. I don't know what you'd call it... a fire drill or [what]. They got a paper. They read down the steps taken in case of a fire. You know your secondary escapeways, your neutral and your primaries, your in-take. We don't, I mean, we didn't actually go through a drill, 'Hey, there's a fire... Let's do something!'"

Overall, slightly less than 80% of the respondents reported participating in a fire drill at any time during the previous 12 months. Values for the past six months varied from a low of approximately 25% for Mine B to a high of about 85% for Mine G.

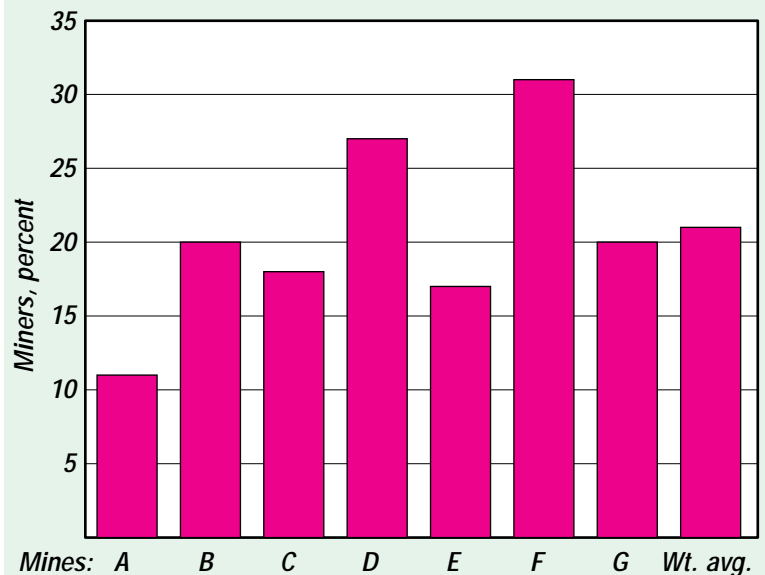
Miners' experiences with incipient fires

An interesting, although imprecise, indicator of encounters with fire is whether or not a miner was ever required to don a filter self-rescuer or a self-contained self-rescuer during a mine emergency. As illustrated in Figure 2, a sizable number of workers interviewed at the 7 operations said that they had done this at some time:

"Smoke came on up in the unit. I think we were about to head on out anyway. Some of us were riding the trip. I went ahead and put [my filter self-rescuer] on and we got out. It was a jeep battery on fire... it had a belt on top of it and it caught this belt on fire."

"The one time—that I put the [self-contained] self-rescuer on was a battery fire. It was on the longwall section in a charging station. The batteries shorted inside. So we went down in there. We put the self-rescuers on, because it was—stunk real bad in the battery fire... There was

Figure 2.—Percentage of miners who have donned a self-contained self-rescuer or filter-self-rescuer in an emergency



smoke.”

The actual percentages having donned apparatus ranged from a low of 11% at Mine A to 31% at Mine F.

If there are occasions when workers must don their breathing apparatus, there are many more in which that potential exists. Table 1 summarizes for each mine the frequency with which miners reported seeing or smelling smoke underground **for any reason**. These frequencies varied widely from mine to mine. For example, over 50% of the workers at mines D, E and F reported seeing or smelling smoke at least once a week, only about 30% of those at mines C and G reported smoke this often. The two remaining operations (A and B) fell somewhere in between. It appears from examining the data in Table 1, that smoke is a fact of life at most of the mines. In many instances, however, miners may well be aware of where the smoke is coming from and what is causing it.

Workers were thus asked when they were last *caught off guard* by the sight or smell of smoke underground. Their responses are presented in Figure 3. The cumulative frequencies indicate that, while less than 25% of the miners at mines A and D reported being caught off guard in the past 6 months, over 50% of the workers at mines C and F reported being caught off guard during the same period. As a follow up to this question, miners were then asked what the source of smoke was determined to be:

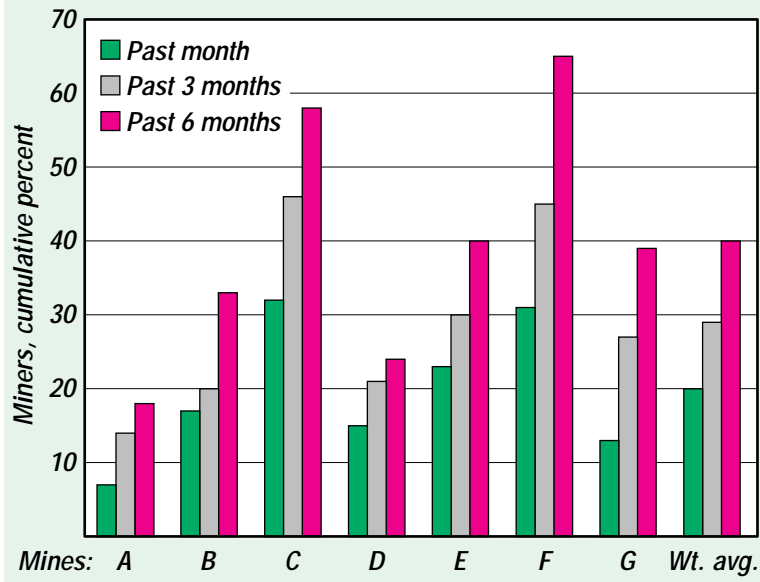
“A couple of weeks ago... I smelled something that we didn't normally smell, and we got to looking for it, to try to find out what it was, from the smell... and then, a few minutes later, we noticed the smoke. [A plug back of a sub had overheated.] I knocked the power the sub, and let the foreman know about it.”

Cumulative frequencies (in percent) with which miners reported either seeing or smelling smoke underground for any reason

Frequency	Mine							Wgtd. avg.
	A	B	C	D	E	F	G	all mines
At least once per shift	4	7	4	18	16	20	7	11
At least once per week	37	37	32	55	55	71	27	46
At least once per month	63	70	46	67	84	95	67	71
At least once per year	78	80	89	79	100	97	90	88
Less than once per year	96	100	96	100	—	100	97	99
No response	100	—	100	—	—	—	100	100

¹Median frequency for the mine

Figure 3.—Percentage of miners caught off guard by the sight or smell of smoke



These known origins are listed in Figure 4 along with the number of miners reporting each one. The most commonly cited sources were belt rubbing and hot metal.

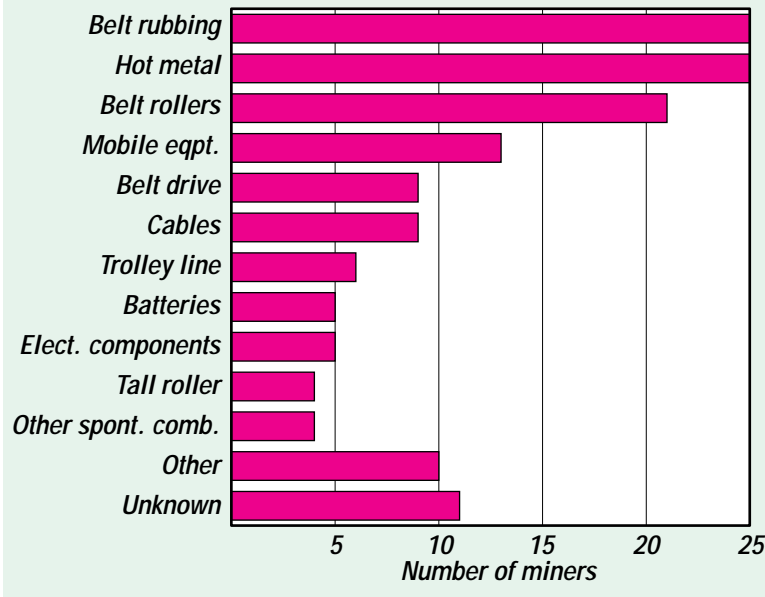
Of additional interest to investigators was how often miners were caught off guard by smoke whose source was not on their section, but rather had rolled in from some other location. Workers were thus asked

when was the last time they were caught off guard by smoke that had its source at another location in their mine:

“Yeah, about five years ago there was a roller on the belt—a big main roller. The belt had gotten jammed, and it was slipping inside the belt. Created a lot of smoke and we was notified that there was a

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Figure 4.—Source of fire for miners caught off guard by smoke



fire outby and we were to proceed to the evacuation area at once. The proper measures were taken at the time. Everybody was okay. We used our self-contained rescuers at the time (I recall putting them on) until we got into the clear.”

About one-third recounted that, sometime in the past, they had been caught off guard by smoke coming from somewhere off their section. In sum, although smoke may be a fact of life at most of the mines in this study, its presence often comes as a surprise to workers. If underground workers consider the presence of

smoke to be commonplace at some mines, this could easily lead to complacency and delayed reactions because miners might consider it, perhaps at the wrong times, as an event that someone else is investigating. To reinforce this point, the reader is advised to review the reportable fire data summarized by Pomroy and Carigiet [1995] in the first article of this series. These data suggest that, at times, miners may be required to take action. Miners taking action to mitigate the effect of a small mine fire is the subject of the next article of this four-part series.

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Diesel emission control

Through contract work, we are developing and evaluating diesel exhaust control techniques that lower specific pollutants without creating unsafe conditions. Exhaust catalysts are a means to reduce diesel particulate matter, and catalyst manufacturers are continually refining their products for better performance. One extensive diesel oxidation catalyst (DOC) evaluation is planned consisting of several repetitions of steady-state, ramp, and transient assessments. One or two shorter laboratory evaluations of DOC's may also take place. Technical support of

MSHA in-mine evaluations of DOC technology will be provided.

A new generation regenerable fiber coil diesel particulate filter system will be mounted on a Getman utility vehicle for evaluation. This filter system is made from high temperature ceramic fibers wound around a perforated metal support tube. It has superior mechanical and thermal durability when compared to ceramic filters. Each cartridge contains its own electric heating element. The unit is regenerated after each operating shift by plugging into an off-board power source. This

allows the system to be used on vehicles which do not operate with hot enough exhaust temperatures to self-regenerate. The vehicle and filter system will be taken to the Kerr-McGee Galatia coal mine for durability tests and to ascertain miner acceptance. This work will be performed in conjunction with the U.S. Department of Energy, MSHA, the 3M Co., and Engelhard Corp.

URL:<http://www.usbm.gov/DOE/decontrol.html> [Accessed 18 April 1997]

Have a safe and healthy July 4th!

Safety reminder Five steps to a safer workplace

There's a system the mining industry has been using for more than 50 years to help prevent accidents and injuries in the workplace. Called the "5-Point Safety System," it offers workers and supervisors a step-by-step approach to safety. It's an approach that could help every industry.

The 5-Point Safety System was crafted by Neil George, General Safety Engineer at Inco in Sudbury, (Ontario) and later Director of Safety with the Western Quebec Mines Accident Prevention Association. Since he introduced his system in 1942, it has been adopted in mines across Canada and around the world. These are the steps in the system:

1. Check entrance and travelway to workplace.

Enroute to their workplace, workers inspect the entrance and travelway for unsafe conditions. Any problems are either corrected immediately or reported. When the supervisor arrives

he or she checks the entrance and travelway again.

2. Are workplace and equipment in good working order?

Before starting to work, workers [should] check their workplace for unsafe conditions, and their equipment to ensure it's in good working order. Substandard conditions are corrected immediately. The supervisor checks again to confirm that workers have corrected any problems.

3. Are employees working properly?

Workers determine whether they are using the proper job procedures or practices, and the proper tools and equipment. They ask themselves whether they are putting themselves or their co-workers needlessly at risk. The supervisor is responsible for checking the work methods, procedures and equipment.

4. Do an act of safety.

When the supervisor arrives, he or

she and the workers discuss a safety topic, such as a specific hazard, work procedure, or company policy.

5. Can and will employees continue to work properly?

Workers determine whether they have the knowledge, skill, and motivation to continue to work safely. They also determine whether the condition of equipment and materials will allow safe operation throughout the shift. This is confirmed by the supervisor before he or she leaves.

If each step is followed carefully, the 5-Point Safety System can become a habit for both workers and supervisors. It's a simple approach, but it can go a long way toward preventing many needless accidents in all industries.

Reprinted from the March/April 1997 edition of Ontario [Canada's] Health & Safety RESOURCE.

EXIS now available

EXIS (External Information System) is a networked computer system developed by the Washington [state] Department of Minerals and Energy to enable the mining industry to

access on-line, up-to-date information on safety and health in mining. Access requires a PC or server with a modem and Lotus Note (V 4.1 or later). More information is available

on the Department's web site.

Source: Knowledge Adventure, Inc., 1997.

Technology off the job...

Automotive

Will we soon be waxing nostalgic for those cardboard automobile sunscreens? Lear Seating of Southfield, Mich. has developed a retractable sunscreen that is integrated into a

vehicle's 'A' pillars. To operate the device, two nylon shades are simply pulled from the pillars and attached together in the center of the windshield. When not in use, they easily retract into the pillars and are removed from view. An electric model of the sunscreen is also being

developed which would allow the driver to activate it at the push of a button.

Reprinted from the March 13, 1996 issue of Industry.Net Report by Automation News Network.

Leave the use of fireworks to experts



Safety analysis of surface haulage accidents—Part 2 (Part 1 appeared in the May-June Bulletin)

By Robert F. Randolph, Research Psychologist and C.M.K. Boldt, Civil Engineer, NIOSH, Pittsburgh and Spokane Research Centers

Abstract

Research on improving haulage truck safety, started by the U.S. Bureau of Mines, is being continued by its successors. Fatal haulage accidents most often involve loss of control or collisions caused by a variety of factors. Lost-time injuries most often involve sprains or strains to the back or multiple body areas, which can often be attributed to rough roads and the shocks of loading and unloading. Part 2 describes research to reduce these accidents, including improved warning systems, shock isolation for drivers, encouraging seatbelt usage, and general improvements to system and task design.

In 1995, the USBM laid out new initiatives for improving surface haulage safety based on a history of research (May and Aldinger, 1995). Although the USBM was abolished by Congress in 1996, the health and safety research functions in Pittsburgh, Pennsylvania, and Spokane, Washington, were continued. The

surface mining hazard reduction project, formerly conducted out of the USBM's Minneapolis, Minnesota, center, is continuing in Spokane. The project, "Hazard Reduction for Surface Mining", is continuing to build on past accomplishments while refocusing future goals to meet the needs of the newly formed health and safety research centers. The objective for the project is to reduce accidents and injuries associated with coal and metal/nonmetal surface mining. Several strategies are being investigated, including improved operating practices, hazard recognition, and safety and warning devices.

Equipment manufacturers are working to incorporate alarms, improve vision, and improve ergonomics on large equipment. Other approaches involve the development of remote-controlled or autonomous vehicles for specific extremely hazardous or repetitive, simple tasks. Improvements in sensing technology such as GPS, radar, laser, and infrared offer an

opportunity to introduce these technological improvements as an aid to vehicle operation and/or control.

Currently the efforts for the Hazard Reduction for Surface Mining project are aimed at:

- **Safety Analyses.** This will review MSHA accident data to determine root causes of recorded accidents. For example, slips and falls from powered equipment are a major cause of injuries. But in evaluating the accident narratives, nearly half the slips and falls are affiliated with jumping from a vehicle or conveyor. Of those jumping, over half were from vehicles which had lost power or brakes. This analysis will help identify operating practices that should be modified or avoided to improve safety.
- **Early Warning.** Existing and developing sensing technology will be reviewed to determine what systems might be easily incorporated onto existing equipment or into current operations to provide warning to

operators and others in the immediate proximity. Currently, engine performance (rpm, oil pressure) and machine operating conditions (speed, tilt, load) will be reviewed as possible parameters that could be used or recorded to define machine operating safety. In addition, geotechnical sensing devices, laser surveying, slope monitoring, proximity warning and optical sensing devices will be investigated to determine the potential of short- and long-term applications that might be used to improve equipment operating safety.

- **Operator Safety.** Methods to minimize injury to operators during accidents will be investigated. Previous research on vibration testing done by TCRC will be continued to define and isolate elements that could lessen shock loads to the operator. Methods to promote seatbelt use will also be investigated.

Conclusions

There is sufficient evidence from a variety of studies, including the data presented here, to identify several key problem areas in surface haulage truck usage. These include:

- **Driver fatalities involving loss of vehicle control.** These accidents can be addressed through a combination of solutions, including haulage roads with less-steep grades, better signs, and longer sight lines. Also, driver visibility can be improved through mirrors, video cameras, and cab design. Drivers can be educated about keeping their equipment within controllable limits. Finally, seatbelt usage should be promoted for those

times when loss of control cannot be averted.

- **Strains and sprains from rough roads, and the shocks of loading or unloading.** Road maintenance can smooth out washboarding and other types of bumps. Loading and unloading techniques, such as lining the truck bed with small material before loading large boulders, can reduce shocks. Also, suspensions can be used to dampen the transmitted shocks.
- **Strains and sprains resulting from a slip or fall while mounting or dismounting the truck.** Improved railings, nonskid surfaces, and damage-resistant ladders are some of the ways of helping drivers to mount and dismount their vehicles safely.

Despite the range of data presented here, there are still many unanswered questions to pursue:

- How often are seatbelts used, and how can usage be increased? How many truck drivers are in the mining workforce, and how many of them are contractors? Do any of these groups have a disproportionate number of accidents?
- What range of truck sizes are in use. Are some types of accidents more likely for different-sized trucks?
- What haulage safety problems will be solved by automation? What new hazards will be created?
- How can the existing information on improving haulage safety be communicated more effectively?

These issues, and others that will emerge from more detailed analysis planned during the next year, will guide the development of tools and strategies for improving haulage truck safety.

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Pumps respond to mining demands

The first three Godwin Dri-Prime (Model # HL5M) 'high head' centrifugal pumps have been delivered to a major Alberta (Canada) mine to upgrade their dewatering capabilities. Each pump has independent CAT diesel power; will be operating at 1,250 USgpm at 350 feet TDH and can be repositioned on short notice. The decision to purchase was based on the ability of these pumps to automatically prime to 28-foot dry static suction heads and through long horizontal suction hoses; handle solids and run dry continuously and unattended without damage to the unique oil bath lubricated mechanical seal, located away from the harmful affects of the flow.

Four Godwin Dri-Prime (Model # HL10) 'high head' centrifugal pumps powered by CAT 3406B and Cummins NTA855P diesels and with thousands of feet of hose and piping are on rental to a major Quebec metallurgical complex. This temporary pumping system operates 24 hours per day and is designed to provide 12,000 USgpm at 185 feet TDH of plant process and supply water to several operations. Pumping station was damaged and water source level had dropped significantly. RMSEnviro Solv Inc. personnel responded to the emergency, with this system being engineered, installed and operational within a week.

A strip mine lay dormant for eight years waiting for the right combination of technology and equipment to allow it to reopen. Years before, the coal from the center seam had run out leaving a two mile long cut in the earth, the width of a football field.

Then new technology became available allowing the mining company to extract coal from the seams on the sides of the high walls. Only one thing stood in the way - 6

billion gallons of water.

Over the years, inflow and rainwater had built up the level in the strip mine to over 100 feet at the deepest point. The only way the coal in the highwalls could be exposed would be to pump away the accumulated water.

To make the project profitable, the company needed to remove this water within six months. So the call went out for high volume, high head pumping equipment. Godwin Pumps responded.

Calculating the necessary flow requirement, Godwin determined that four Model HL10 pumpsets, each driven by a 500 hp motor and pumping 4,500 gpm would be required to meet the company's deadline. Total flow: 18,000 gpm.

Satellite telephone

To keep in touch across the vast open spaces of Canada, you need a telephone designed to bridge even the greatest distances without wires or constant maintenance, and Westinghouse has it.

The series 1000 Satellite Telephone System can provide customers, through the MSAT Network, with voice, fax and data communications throughout virtually all of Canada, even as far north as Baffin Island. Calls are directed to an orbiting satellite, then routed back to an earth station and on the worldwide telephone system. The result: full telephone service from just about any location in the country.

The Series 1000 comes in a variety of models for installation on land, on sea and in the air. The systems differ according to their antennas. Fixed-site systems and vehicle-mounted mobile systems are designed for land operation. The fixed-site antenna is less than a meter in diameter and can be mounted

almost anywhere. The mobile antennas come in two types, a one-meter tall mast, and a 'bicycle helmet'-sized contoured dome. The marine systems, with their variety of antennas, include the new compact contoured dome model known as Wavetalk(TM) and super high gain stabilized systems available in single or multi-channel. Additionally, the Series 1000 is used in Calquest's aeronautical satellite phone. The Series 1000 is also compatible with existing cellular service in that the handset can be used to make both satellite and cellular calls.

The Series 1000 is digital, thus totally private and virtually impossible to clone. In addition to voice, the unit is capable of transmitting and receiving digital data, including access to on-line services and, with optional equipment, faxes and Global Positioning System (GPS) coordinates. The phone can also emulate radio networks for closed user groups and communicate short messages via packet-switched data. Use GPS to pinpoint your location, or to map your exploration property, and send that information to your head office. Use the voice capability to call your head office to report in, then use the fax capability to receive and send maps.

'Westinghouse is proud to offer the Series 1000 satellite telephone system throughout both Canada and the U.S.,' says Bob Struble, president of Westinghouse's Wireless Solutions Co. 'This system represents a new standard in communicating to and from areas not served by traditional telephone service, offering unique capabilities to the mining industry.'

With the Series 1000, the most remote mining operations can keep in touch with offices in Vancouver, Toronto and other cities throughout Canada. Maps can be faxed back and

forth promptly, updated information can be data-transmitted or faxed via satellite at any time of the day or night, allowing executive and managers to rely on up-to-the-minute information to make sound business decisions.

Dispatchers will also benefit from the telephone's ease of use. Offices in Yellowknife, for example, can easily dispatch vehicles throughout [Canada's Northwest Territories] to transfer people, core samples and supplies. If you need to send food, fuel, equipment, or spare parts, the Series 1000 is an ideal choice for communicating information where you need it, when you need it. GPS technology can track these shipments across the most remote areas.

The Series 1000 provides seamless coverage, which is absolutely vital for safety reasons. In case of accident or other sudden problems, reliable communications are critical around the clock.

And the Series 1000 also offers more personal benefits to those in the mining industry. Workers living on-site for months at a time can contact their families back home more easily than ever. The sound of loved ones can be heard as clearly as if they were in the next room, easing the isolation that can come with seasonal work assignments in the mining industry.

So whether you're sending out a three-person geology crew, dispatching a larger exploration crew, or setting up a full-fledged mining operation, the Series 1000 Satellite Telephone System can be your vital

communications link back home.

Westinghouse Series 1000 satellite telephones operate on TMI communication's MSAT(TM) Mobile Satellite Communication Network. MSAT(TM) service is available across Canada. Regional service providers include Infosat Telecommunications and Northwestel. Service in the U.S. is available through service providers on the AMSC-1 satellite.

Proven technology

In 1992, the first fully-automated Knelson Center-Discharge (CD) Concentrator was commissioned at the Golden Giant mine in northern Ontario. Today, less than five years later, 24 Canadian mines utilize Knelson Concentrators as an integral part of their recovery systems. These include eleven of the country's top fifteen gold producers and by the end of 1997, it is projected that Knelson concentrators will be recovering in excess of 1 million ounces annually; about 20% of Canada's total gold output.

In keeping with their corporate objective of introducing a significant new product every five years, 1997 will mark the unveiling of Knelson's latest breakthrough in centrifugal process technology. The Knelson Variable Discharge Concentrator (KVDC) will be the industry's first truly functional high-capacity continuous discharge concentrator with a patented method of extracting concentrates on a continuous basis.

In 1984, Knelson first began development work on the concept of continuous discharge concentration.

During the ensuing ten years, seven different prototypes were tested with varying degrees of success. It was not until Knelson's R&D team took a 'back to the drawing board' approach and began looking at what critical factors made the existing Knelson Concentrator so effective that the project began to accelerate. In the two years that have followed, the project has been fast-tracked and has evolved from conceptual design, through field testing, through to recently concluded pilot testing.

At this time manufacture of the first production scale unit is nearing completion and will be installed in a flagship operation during the first quarter of 1997.

The immediate target market for this exciting new technology will be the mining and mineral processing industry where Knelson has become established as the leader in centrifugal concentration. This technology will be applied a scavenging device on final tails from gold and base metal flotation operations in addition to numerous industrial mineral applications such as iron ore, tin, tungsten, titanium, chromite and zircon. Potentially the largest application in the minerals industry will be in the de-sulphurization of coal as producers seek innovative solutions to meeting strict new 'clean-air' emissions regulations.

Reprinted from the December 1996 edition of the Canadian Mining Journal, p. 27. Copyright 1996 Information Access Company, a Thomson Corporation Co. Copyright 1996 Southam Business Communications Inc.

Fire safety alert

The Fire and Rescue Service of Washington (FRS) recently investigated the cause and origin of a fire that occurred in a transportable unit located at a remote mine site. The fire originated in the exhaust fan of the 'Donga' unit. The exhaust fan was

severely affected by the dusty environment which caused mechanical failure of the bearings leading to electrical overload and fire. Other fans were inspected and found to be in similar condition. The FRS strongly recommends that all exhaust fans

fitted to these units which are subject to dusty conditions, be inspected and serviced regularly to avoid the potential risk of fire.

Source: Minesafe Vol.7 No.4, December 1996.

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Thermal regulation: The body's delicate balance against the odds

By: Kathryn Maxner

Managing heat stress in the workplace has become a "hot" topic in the 90s.

Out of 6,588 fatal work injuries reported in private industry in 1994, 28 workers—a 4% increase over 1993—died from exposure to "environmental heat." The majority of these deaths were classified under construction, manufacturing and agriculture. Fifty more deaths occurred because of "contact with temperature extremes," with an additional 24 fatalities listed under "other events of exposures," that included the subcategory "bodily reaction and exertion." Additionally, 2,199 people missed from one to five days of work because of the effects of heat and light, heat stroke, heat syncope (fainting) and heat fatigue.

These statistics were compiled from the Census for Occupational Injuries (CFOI), the U.S. Department of Labor's various state and federal sources, death certificates, workers' compensation reports and claims, regulatory agencies, medical examiner reports, police reports and news reports. But the true toll from heat-related causes is undoubtedly higher because the CFOI is not a complete census. Some state laws and regulations prohibit enumerators from contacting the next-of-kin, making it impossible to independently verify work relationships. For instance, 258 fatal injuries were not classified in the 1994 figures and 56 more fatalities were not included because their initiating source documents lacked sufficient information.

State and federal employees and

members of the armed forces are not included in this report, nor are the many small businesses that do not report accidents, injuries or fatalities. Many of these companies employ fewer than 20 employees. So there is virtually no data available to determine a true census of fatalities and work related injuries where the underlying factor preceding the accident or fatality may have been heat stress.

Thermal regulation

Thermal regulation is the process of managing one's "body vitals." That is the delicate balance of maintaining normal body temperature within a very narrow range, compelling the heat produced through normal metabolic activity and the heat lost by way of other bodily mechanisms to be continuously counterbalanced against prevailing environmental conditions.

The variables that define the level of heat stress one faces are personal characteristics such as age, weight, physical fitness, medical condition and acclimatization to the heat or cold. Four environmental factors directly affect our ability to withstand heat stress: temperature, humidity, radiant heat (from the sun or a furnace, for example) and air velocity. At temperatures above 92° F (skin temperature), the body gains heat through convection; that is, outside air molecules carry heat to the skin. When temperatures exceed 92° F, body heat is lost almost solely through evaporation, through insensible perspiration (drying of the skin tissues) and through sweating.

Sweating does not commence until the body triggers a need for cooling. When moderate climates prevail (temperatures less than 90° F), more means are available to dissipate body heat than under hot climatic conditions.

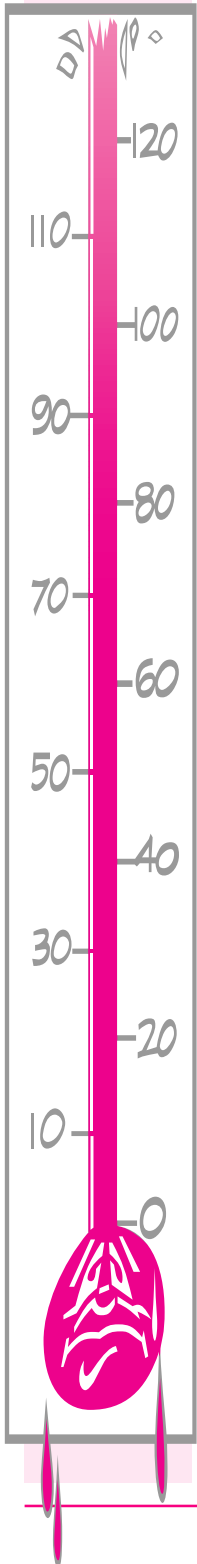
Diagnosis and prevention

The National Safety Council, NIOSH and OSHA and other authorities offer detailed diagnoses of heat stress, heat exhaustion, heat cramps and heat syncope. They advise seeking immediate emergency care for heat stroke victims.

OSHA Fact Sheet 92- 16, "Protecting Workers in Hot Environments," outlines ways to avoid all types of heat stress. The fact sheet lists these basic precautions:

- acclimatization to the heat
- engineering controls
- work practices
- training and education
- providing cooling devices
- appropriate protective clothing
- longer rest periods in cooler areas

While this [article] is addressed to workers in foundries, refineries, paper mills, [surface mines,] construction projects, and other locations where hot conditions can pose special hazards to personal safety and health, managing heat stress in the workplace is very much a concern for employers as well as employees. For employers, heat stress poses the threat of injuries, workers' compensation losses, costly downtime, lost workdays, and poor performance. For the employee, it can be the prelude to accidents,



cardiac stress, even death.

Heat stress can get the best of a healthy, physically fit individual no matter the time of year. It is no longer just a summer problem. Christopher Kearns, senior project officer for the U.S. Army's Dismounted Battlespace Battle Lab at Ft. Benning, GA, said the Army reports more incidents of heat stress during winter-like conditions, a problem attributed to the thermal burden of protective clothing and equipment while marching or exercising.

From January 1, 1994 to December 11, 1995, the U. S. Navy reported no heat stress fatalities. They did, however, report 17 heat stress casualties involving eight lost work days at a cost of \$3,364.

The body's trigger to react to the need for cooling or warming is the temperature of the blood as it reaches the hypothalamus in the brain. Reaction time to obtain thermal equilibrium is extremely quick. A similar process is our sympathetic nervous system's continuous fight with our parasympathetic nervous systems, keeping our pupils evenly dilated.

But, thermal regulation is difficult to achieve and maintain when working in hot conditions, particularly when the person is burdened by wearing protective clothing. The average individual doing light work burns approximately 3,000 calories daily. Sixty-five percent is lost through radiation, convection and conduction of the skin to the atmosphere, while 25% is lost through evaporation of water from the skin and lung surfaces. An individual performing heavy work, however, may burn as much as 425 calories per hour.

Humidity is one of the most important variables in the delicate balance of attaining thermal regulation. If the humidity is not excessive, the air velocity is sufficient to carry adequate amounts of heat away from the body, the body is properly and

continuously hydrated, and the body's organs can efficiently handle the level of metabolic activity and heat dissipation requirements, then thermal equilibrium can be maintained. But, when humidity is excessive, air molecules are unable to absorb additional moisture, making it extremely difficult for the body to dissipate heat.

Exertion in hot sun and high humidity, coupled with the conductive moisture created between your skin and protective clothing, makes it difficult for a workers body to dissipate heat easily by evaporation through the skin. An individual in a situation as this will not attain thermal regulation without some form of relief—cooling, hydrating and rehabilitation. The six-man Palm Bay Police Dive Team, Palm Bay, FL, who worked the ValuJet crash site in the Florida Everglades, wore impermeable containment suits in a heat index environment approaching 111° F while combing the site for evidence. The thermal burden imposed on this team required short work periods, intermittent rehabilitation breaks and continuous, close monitoring by the EMTs until the team received body management cooling shirts donated by Exothermal Technology Corp. Wearing these cooling shirts beneath their specially designed dry dive suits afforded the team the ability to extend their work time and finish their work at the site without any signs of heat stress.

The effects of medication and drugs

The picture becomes more complicated if the employee is using over the counter headache, cold and flu remedies, tranquilizers or pain medication. Antihistamines, decongestants, and remedies containing alcohol act to dry up the mucous membranes and decrease sweat gland secretion, causing further dehydration.

"You're just asking for trouble,"

said Dr. John C. LoZito, a neurologist in Melbourne, FL. "You won't sense the onset of heat stress as quickly. Your senses, your reaction time and your motor skills are affected," according to Dr. LoZito.

Drugs and alcohol make people extremely susceptible to heat stress, while lack of sleep and improper nutrition, coupled with several cups of coffee and maybe a donut are terrific for triggering the quick onset of heat stress. The effects of a sleeping pill can linger for up to 24 hours within a person's system according to Dr. LoZito.

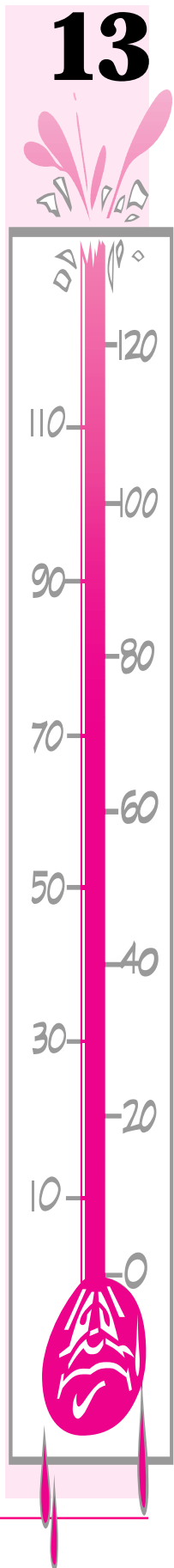
People who are diabetic, hypoglycemic or anemic are considered more susceptible. So are those with circulatory problems, atherosclerosis, previous head injuries or nerve damage, underactive thyroid or hypertension, as are individuals who are dieting, taking diuretics or smoke at least one pack of cigarettes daily.

Sequelae—the name for recurrent complications—is frequent in individuals who recover from a severe heat illness. Such individuals are usually intolerant of heat and become extremely uncomfortable when exposed to heat stress conditions. Subtler physiologic changes may occur, such as emotional instability, clumsy articulation and lowered tolerance to alcohol.

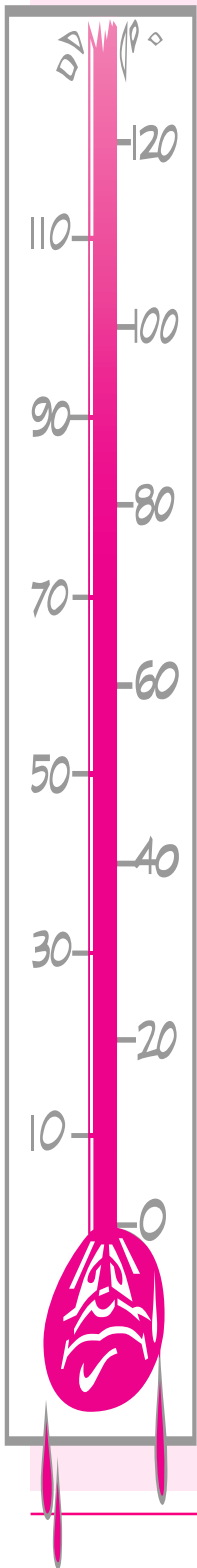
Permanent anhidrosis (cessation of sweating) has been occasionally noted in some individuals who recovered from prolonged exposure to high heat and high humidity. For some individuals, irreparable damage to the body's heat-dissipating bodily mechanisms is noted. Muscle coordination is weak and affected in all quadrants of the body, and equilibrium and hand-eye coordination is off. Also, noted in some cases is the lack of nerve conductivity in the lower limbs.

The morning after

So you thought last night's birthday party was a blast? You took a



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sleeping pill and finally got to sleep at 2:30 a.m.. You drank too much alcohol and now, upon waking, you feel so miserable that it's all you can do to gulp down some coffee and pop a few aspirin tablets before heading off to work. Physiologically, the alcohol already has you extremely dehydrated, your senses are dulled by the headache medication and the carry over effects of your sleeping aid have further dulled your senses. Sitting in the air-conditioned office, your motor skills, muscle coordination and equilibrium are affected, but you're feeling that caffeine boost. At least you didn't have to operate a hazardous piece of machinery in the hot sun or a hot warehouse today. Time performs its healing magic, but it will take several hours for your body to expel the toxins and medication, rehydrate itself and attain some metabolic balance. But what if you must work in a hot room or

wear protective clothing and you haven't had time to eat and properly hydrate with fruit juice or an electrolyte balanced beverage? And, the lunch break is still a few hours away. The scenario means that you are an excellent candidate for experiencing some form of heat stress. In reality, you could be classified as a safety hazard.

The keys to avoiding heat stress situations are awareness and prevention. People working in hot weather, especially those wearing burdensome protective clothing, should drink before they feel thirsty. If moderate to heavy work is performed, an electrolyte balanced drink is best for keeping the potassium levels up for proper muscle function, but a regular regimen of hydrating at least with water, continuously throughout the work day, assists the body in

continuing its natural process of thermal equilibrium—sweating.

If hydration becomes insufficient, where sweating becomes difficult, you have breached the stasis mechanism that keeps the balance of equilibrium intact. Once that occurs, the body reacts to the onset of a heat stress illness.

Reprinted from the Volume 19, No. 7 edition of the November 1996 issue of Industrial Hygiene News.

About the Author:

Kathryn Maxner is a graduate of the University of Oklahoma and an adjunct faculty member of the Brevard Community College of Melbourne, FL. She provides heat stress seminar instruction for the Central Florida Chapter of the National Safety Council. For additional information on preventive measures against heat stress and improving body performance in today's workplace, contact her at Exothermal Technology Corp., 1720 Main St. NE, Palm Bay, FL 32905, 800/991-5665, FAX: 407/9523964.

Know your sunscreen

It's a case of don't be fooled by expensive imitations. The latest issue of Choice has found that cheaper sunscreens, which claim to be sun protection factor 15+ and broad spectrum, were just as effective as more expensive brands, because the claims were all tested before the products could be sold. The report also warned not to be fooled by sunscreens which boasted about screening out 'infra-red rays' and

'visible light' or were especially suitable for 'sun sensitive skin', because these features already apply to most products.

Source: Home Safety & Security, Summer 1997.

Speaking of skin, a safer sunblock is being formulated using nanoscale titanium powder developed by Nanophase Technologies of Burr Ridge, IL, with funding from National

Institute of Standards and Technology's Advanced Technology Program. The powder particles are smaller than the wavelengths of visible light measuring about 5 nanometers across, or less than a tenth the size of most bacteria. Spread on skin as an additive to cosmetics and sunblocks, they are transparent—leaving no white liquid—but block short ultraviolet rays almost completely.

Reprinted from the September 27, 1995 issue of the INDUSTRY.NET Report.

If you go out in the woods...

Just as every silver lining has its cloud, even the much-awaited coming of spring has drawbacks. Poison ivy, oak and sumac can affect two of every three people with anything from itch and irritation to allergic reactions requiring medical attention.

But a new product might be enough to send even the allergic

back to the woods. The U.S. Food and Drug Administration has approved a nonprescription lotion called IvyBlock to protect skin against the three poison sister plants.

Canadian Market Digest reports the lotion provides a protective layer on the skin that prevents contact with the plants' rash-raising oils. Like a

sunblock, the lotion would have to be applied about 15 minutes before possible contact, and reapplied every four hours.

Reprinted from the March/April 1997 edition of Ontario [Canada's] Health & Safety RESOURCE.

Safe workplaces built on a foundation of literacy

By Susan Haldane, RESOURCE Editor

When Southam News released its study on literacy in 1987, the results caught many Canadians by surprise. The study showed that one out of four of us could not read well enough to carry out daily tasks. In a highly developed nation, with such a superior education system, how could one-quarter of the population be functionally illiterate?

The report sparked a new interest in literacy, launching many programs and initiatives. Yet when Statistics Canada joined in the International Adult Literacy Survey in 1994, it found more than one-third of the workers in Canada possess marginal literacy skills.

The Stats Canada survey looked not just at reading ability ("prose literacy"), but at what it calls "quantitative literacy" and "document literacy" as well. These terms refer to a person's ability to work with numbers and to work with the types of forms, charts, tables and text they might encounter in the workplace.

In each type of literacy, more than one third of Canadian workers rank at Level One or Two. According to definitions in Statistics Canada's publication *Perspectives*, readers at Level One "have serious difficulty dealing with many printed materials and most likely identify themselves as people who have trouble reading. Readers at Level Two have weak test scores but do not generally report having reading problems."

Among workers in agriculture, manufacturing, mining and quarrying the rates are even higher, with 41 to 42 per cent scoring Level One or Two in prose literacy, and as high as 48 per cent in quantitative literacy.

The findings are a wake-up call for business and industry. Among many other concerns, the implica-

tions for health and safety are very serious. Workers at marginal literacy levels may not be able to read and understand safety and health regulations, instructions or warning signs on machinery. They may not be able to put complaints or concerns in writing. What's more, those with some literacy skills may not be aware that they don't grasp the full meaning of what they're reading.

One obvious example of this concern is the WHMIS system. Labels and Material Safety Data Sheets are required on hazardous materials in order to protect the worker, but those with marginal literacy skills will be unable to read the contents of the drum they're handling or the instructions on how to handle it properly.

The 1990 report of the Ontario Literacy and Health Project also quoted the example of a worker who couldn't read. He was hired at a construction site and asked to get his own workboots. The boots he bought looked like those worn by other workers. However, they had no steel plate insert, and later played a part in an injury to the worker's foot.

Safety is one of the incentives that led AbitibiPrice to establish a corporation-wide strategic council on literacy this winter. There had been literacy and skills development programs at the plant level, but this was the first time representatives from both labor and management, from Ontario, Newfoundland and Quebec met to address literacy across the entire enterprise.

Literacy at the root of safety

"We recognize that we face a very demanding time as we move into the next millennium," said Catherine

North, Manager of Training and Development in the company's Toronto head office. "The type of technical information our people are being asked to deal with requires new skills in reading, writing, math and problem solving. We realize that people need to understand the whole of the pulp and paper process, and the root of that understanding is literacy."

Literacy is also at the root of safety, North added. She stressed the importance of "being able to understand and communicate danger." In the future, the strategic council will decide how that concern will translate into programs throughout the corporation.

Workplace literacy programs

There are many programs and strategies available to workplaces interested in boosting workers' literacy skills.

Frontier College, a literacy organization nearly a century old, has a branch devoted to Learning in the Workplace. It offers organizational literacy needs assessments, train-the-trainer courses in The Design and Implementation of Workplace Learning Programs, help in developing learning materials, and courses in writing and designing materials that will be easy to read.

The Ontario Federation of Labor offers the BEST program (Basic Education for Skills Training), designed to be delivered by workers and for workers. Programs can be adapted to meet the needs of each workplace, but they generally include reading, writing, math, communication, English as a Second Language and French as a Second Language.

The Nairn Center Sawmill



operation of E.B. Eddy Forest Products signed on with BEST four years ago. Over that time somewhere between 50 and 65 of the site's 276 bargaining unit members have been involved, said Health and Safety Supervisor Jim Rennie.

Courses are offered in a trailer on-site. Workers take their classes before or after shift, but are paid for their time.

E.B. Eddy's involvement in the program reflects both a commitment to its people, Rennie said, and a "recognition that we are entering into a technological updating phase."

It's nearly impossible to measure results from the program, he said, but he gave the example of one worker who couldn't read three years ago. When he was injured recently, his participation in the BEST program meant he could take a modified job in stores, instead of being off work on compensation.

"Health and safety has always been an underlying core to the program," said Roger Scheel, the mill's BEST coordinator. Being able to read the WHMIS manuals, labels and MSDSs is a priority. In general, though, he sees the workforce modernizing and employees "need to

be able to follow written instructions to keep up."

Courses at E.B. Eddy have been adapted to suit the needs and interests of the average nine to 12 participants enrolled at a time, Scheel said. Most have focused on reading and writing, using relevant materials. "Field and Stream is one of our favorite text books," he said. Participants have also tackled some basic math, setting up RRSPs for themselves.

Helping those who don't ask

The catch is that, in order to take advantage of these types of programs, people need to realize and admit their need for improvement in literacy. As the Statistics Canada survey pointed out, many will not. The real challenge for industry is not so much how to help those looking to improve their literacy skills. It is how to ensure the safety of those who don't realize their skills are marginal, or won't seek help. Some of the newest breed of workplace literacy or basic skills programs are addressing that question.

There are ways to adapt and improve

training and workplace health and safety materials to ensure they will be understandable for everyone, said Mary Ellen Belfiore, a consultant with ABC Canada, a national literacy foundation. ABC helps companies and unions set up skills programs and connect with other organizations to address literacy.

Adapt training for basic learners

To make sure training targets those with lower literacy levels, trainers should tackle smaller chunks of information at a time, encourage lots of discussion, use audio-visual materials rather than written ones, and ensure materials are written in clear, simple language. Trainers can offer help with note-writing or tutorial sessions before or after courses. All materials workers need to read to do their jobs should be reviewed to make sure they're clear in writing and design.

Changes like these don't have to single out those with low literacy levels, Belfiore said. Everyone benefits from easy-to-read manuals and documents, and "everybody can use communication help."

That philosophy is the foundation

Tips for trainers

Ontario Natural Resource 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.



of Ontario's WWEBs program. Short for Workplace-Workforce Employment Basic Skills, the program operates under the provincial Ministry of Education and Training. WWEBs is aimed at private businesses and organizations, explained provincial coordinator Hilke Grunys.

"We're finding there are more people being asked to do different kinds of work," Grunys said. "To be effective, they may be asked to undertake new kinds of training, or read new types of documents."

But the assumption that people need literacy upgrading is "not necessarily correct," she said. Problems may lie in the work processes or in the materials workers are being asked to read and understand.

When a company contacts WWEBs, the first step is to conduct a complete needs assessment, looking at the tasks in the workplace and the essential skills they demand. The WWEBs consultant measures the gap between the skills required and the skills the workers already have. Then WWEBs helps the workplace connect with other organizations in the community to meet those needs, whether they're for new methods of training, better operating instruction manuals, or upgraded math or writing skills.

In fact, Grunys said, WWEBs rarely uses the word "literacy", preferring terms like "essential skills" or "employee development" that imply more than reading or writing.

"There's a stigma attached to the word 'literacy'," she said. "People don't want to come forward."

People with limited essential skills are still good workers, good citizens and good providers, she stressed. It's important to be sensitive to that fact while making sure that all workers have the knowledge and skills they need to perform their jobs safely.

Literacy linked to wellness

But safety is only one side of the issue. Beyond simple accident prevention, there's also the question of "wellness"—the total health and well-being of the individual.

The report of the Literacy and Health Project states that people with limited basic skills "tend to be under a high level of stress and to have limited self-confidence." It demands extra effort to cope in a society that takes the ability to read for granted. "In turn," the report says, "this leads to frustration, anger and even feelings of shame."

Improving literacy can make a worker not just safer, but healthier, happier and more productive.

Before Andre Gelineau got involved in E.B. Eddy's BEST program, he would take materials like WHMIS manuals and paperwork home to have his wife read them and fill them out. Gelineau is perfectly literate in his first language, French, but materials and operations in his workplace are in English. Through BEST, the welder "went right back to the start again" and learned reading and writing in English. Now he is tackling grade nine level courses. His goal is to finish his grade 12 equivalency and take the tests to become a millwright.

"I never had an interest in reading before," Gelineau said. "Now I can pick up a newspaper, I can read my mail from the union, I can bid on jobs that take reading skills. I can read the bulletin board instead of pretending and asking questions later."

Improving literacy has "helped me in every part of my job," he added. "It's given me more confidence in myself. Before, I wouldn't tell anybody that I was illiterate. I would just [fake] my way through. Now I can sit down and have a conversation with people. I can say 'oh yeah, I read that too'."

Reprinted from the Mar/Apr 1997 issue of Ontario (Canada) Natural Resources Safety Association's Health & Safety RESOURCE.

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)



MSHA reemphasizes inspection focus on lung hazards in coal mines

The Mine Safety and Health Administration (MSHA) is strengthening existing enforcement procedures to give coal miners better protection against lung diseases caused by respirable dust, Assistant Secretary of Labor for Mine Safety and Health Davitt McAteer announced. The procedures reflect several recommendations offered last November by the Secretary of Labor's Advisory Committee on the Elimination of Pneumoconiosis Among Coal Mine Workers.

"The advisory committee presented MSHA with more than 100 recommendations to improve the overall program of respirable coal mine dust control," McAteer said. "These enforcement procedures focus on several areas where the committee recommended improvements."

Beginning June 15, MSHA inspectors will follow new instructions during inspections to:

- Provide protection for contractor employees and construction workers at mine sites with regard to dust control plans, training, hazard surveillance and compliance activities;
- Inspect for compliance with ventilation regulations adopted last year that require operators of underground coal mines to perform an on-shift examination of respirable dust controls;
- Place increased emphasis on

examination of dust controls where 100 micrograms or more of quartz (crystalline silica) is present in respirable coal mine dust samples; and

- Place increased inspector emphasis on examining dust controls on roof bolting machines and of machine-mounted dust collectors on continuous mining machines.

The instructions have a delayed effective date (June 15) to allow time to train inspectors and alert the mining community of the enforcement procedures. Other administrative recommendations, as well as recommendations that may require regulatory or legislative changes, are under study. "We'll continue to move forward on the advisory committee's recommendations throughout the year," McAteer said.

The new instructions to MSHA inspectors are set forth in Procedure Instruction Letters I97-V-5 through I97-V-8. To help apprise the mining community of the procedures, copies of the procedure instruction letters are being mailed to all coal mine operators. The procedure instruction letters may also be found on MSHA's Home Page on the World Wide Web at <http://www.msha.gov/>, where they can be accessed via links from Program Information Bulletin P97-9. On MSHA's home page, all recent agency program information bulletins may be found

under "Compliance Assistance Information," which is located under "Statutory and Regulatory Information."

The Secretary of Labor's Advisory Committee on the Elimination of Pneumoconiosis Among Coal Miners was a joint effort on the part of industry, labor, academia and government to address the continued problem of lung disease among the nation's coal miners. While significant progress has been made since coal mine dust controls were first required under the Federal Coal Mine Health and Safety Act of 1969, the advisory committee's recommendations, issued last November, aimed towards further reductions in these diseases.

According to the National Institute for Occupational Safety and Health (NIOSH), in 1990 almost 2,000 miners died with black lung disease. In addition, more than 250 other workers, including miners, die every year with the lung disease silicosis. Overexposure to respirable coal mine dust can lead to black lung, while excessive exposure to dust containing silica (quartz) can cause silicosis.

Monday, May 5, 1997
MSHA News Release No. 97-0505
Mine Safety and Health Administration
Contact: Katharine Snyder
Phone: (703) 235-1452

Home

The Sunshine State is the testing ground for a new computerized photo-voltaic (PV) residential water heater. The Florida Solar Energy Center in Cocoa has begun a one-year trial of the National Institute for Standards and Technology-built device that uses computer technology to

maximize the conversion of sunlight into electricity. A microprocessor reacts to light intensity changes and kicks in the appropriate electrical resistive elements for maximum energy conversion from sunrise to sunset. Unlike previously proposed PV cells for residential homes, it does not require the use of storage

batteries to provide energy and does not need an expensive electronic inverter to convert dc current produced by the PV cells into ac current required for household appliances.

Reprinted from the March 13, 1996 issue of *Industry.Net Report* by Automation News Network.

Mark your calendar NOW! plan to attend...

Second Health and Safety Seminar for Small Mines

The Ramada Inn in Somerset, PA will be the site of the Second Health and Safety Seminar for Small Mines. The seminar, sponsored by The Pennsylvania State University, MSHA, and the Pennsylvania Bureau of Deep Mine Safety will be held on Wednesday, August 13, 1997.

This seminar features timely presentations on a number of small

mine health and safety issues, such as: health effects of dust, silica, noise, chemicals, health standards, engineering and other controls, emergency preparedness, health resources, and the health effects of diesel emissions. This seminar has something for everyone interested in health and safety.

In addition, several exhibitors

from government, and educational institutions will display their health and safety material. The seminar fee of \$25 includes the presentations, refreshment breaks and a buffet lunch. Please call Mary Ann at the Pennsylvania State University for more information. Her telephone number is 814/865-7472; or fax at 814-865-3248.

.....
Registration Form

.....		
_____	_____	_____
<i>Last name</i>	<i>First name</i>	<i>Middle initial</i>

_____	_____	
<i>Social security no.</i>	<i>Title</i>	

<i>Company name</i>		

<i>Business address (number and street or box no.)</i>		

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<i>Business phone + area code</i>	<i>Home phone + area code</i>	<i>Fax + area code</i>

<i>Home address (number and street or box no.)</i>		

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<i>(city)</i>	<i>(state)</i>	<i>(zip code)</i>
.....		

Enclosed is a check for \$ (\$25/person) made payable to **'The Pennsylvania State University'**

Return to:

Mary Ann Sherburne, Staff Assistant, Department of Mineral Engineering, The Pennsylvania State University, 126A Hosler Building, University Park, PA 16802-5000

Home

The Sunshine State is the testing ground for a new computerized photo-voltaic (PV) residential water heater. The Florida Solar Energy Center in Cocoa has begun a one-year trial of the NIST-built device that uses computer technology to maximize the conversion of sunlight

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not need an expensive electronic inverter to convert dc current produced by the PV cells into ac current required for household appliances.

*Reprinted from the March 13, 1996 issue of **Industry.Net Report** by Automation News Network.*



Are you in the dark about driving at night

Has this ever happened to you? Driving down the highway late at night, a quick glance in the side mirror turns into dazzling glare as you catch the high beams from a passing truck—and for the next three seconds you're blind. Or, a pedestrian appears "out of nowhere" on the side of the road, and you barely miss her as you quickly jerk the wheel to the left. Well, you're not alone.

On the edge of night

Our eyes gather about 85% of the information we need to make driving decisions, but what we can see is drastically reduced after dark. Contrast sensitivity (the ability to pick out objects from the background) and peripheral vision (the ability to detect objects at the edges of one's field of vision)—both of which are essential for making rapid, effective nighttime driving—diminish as daylight fades.

Since we are creatures of the day, we see better with illumination. However, headlights illuminate only 250 to 350 feet of the road ahead, and side vision is sharply curtailed (and practically non-existent on unlit roads).

Since the ability to see contrast depends on light, it becomes difficult to distinguish objects from the surrounding darkness at night. As a result, it takes longer to see a hazard so there's less time to respond in a crisis. For this reason, pedestrians should wear light colored clothes or add reflective tape to their garments so they contrast

with the darkness of the evening. For their part, drivers should not wear tinted glasses at night.

Turning your head to the side, rather than just a quick glance as you drive, helps compensate for the side vision loss that occurs at night. If you wear glasses to drive, it's a good idea to choose frames with thin side pieces—large or wide side-pieces will interfere with the side vision.

The eye of the beholder

Nighttime driving puts unusual demands on the eye to adapt to both light and dark. When it's dark, the eye adapts by enlarging the pupil and increasing the sensitivity of the retina to light; the glare of a passing headlight makes the pupils shrink. With age the retina takes longer to make the adjustment from dark to light and back again. In fact, AAA Foundation for Traffic Safety research demonstrates that a 55-year old takes eight times as long to recover from glare as a 16-year old.

You can't make your eyes any younger or the night any less dark, but you can lower the risk of a nighttime accident by minding these AAA Foundation for Traffic Safety Do's and Don'ts.

DO

Drive within the range of your headlights. You need at least 4 seconds to see and react to a hazard. Adjust the rearview mirror to the

"night" setting to avoid headlight glare. Focus eyes toward the side of the road to avoid being blinded by oncoming headlights.

Wipe off your headlights and keep your windshield clean (inside and out). Keep your eyes moving between the road and the rear- and side-view mirrors.

Use high beams when you can. Take sunglasses off at dusk.

Turn your head from side to side to increase peripheral views.

Drive on interstate highways rather than country roads, if you have the choice (they're better lit).

DON'T

- Exceed the speed limit, especially on unlit or winding roads and when using low beams.
- Use tinted glass or tinted strips on windows or windshields.
- Rely only on fog or parking lights when driving at dusk and dawn.
- Keep high beams on when another car approaches.
- Drink, even a little (alcohol hampers your ability to focus on moving objects).
- Keep interior lights on inside the car.
- Wear sunglasses at night.
- Stare into side-view mirrors as cars pass.
- Use any medication that alters night vision or contributes to drowsiness before driving.

Clockwise from near right: the mode of travel to reach the summit of the Chilkoot Pass—imagine walking inline, carrying an 80-lb. pack, at the pace of the slowest man in unspeakable cold—where a strong back and strong bladder were equally important; members of the Soapy Smith Gang of Skagway—a notorious group of claim jumpers and cut-throats—whose efforts were finally thwarted by a small group of vigilantes who shot some of the gang and drove the rest out of town; summit of the Chilkoot Pass; mode of travel on the Chilkoot; Klondike nuggets; Alaska's largest nugget (182 oz.), Pioneer Mining Co.; one of the Canadian Mounties whose importance to the safety of the miners was invaluable.



The great stampede

At the end of a century whose last years were peppered with northern gold strikes, the most spectacular came in the form of the Great Klondike Stampede. In August of 1896, George Washington Carmack and his two Native friends, Skookum Jim and Tagish Charlie, found gold in their pans in quantities never before seen in the Yukon, and the rush was



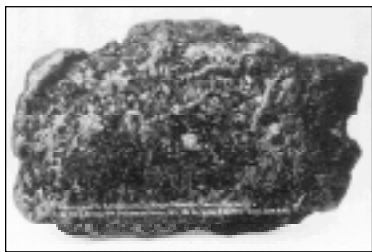
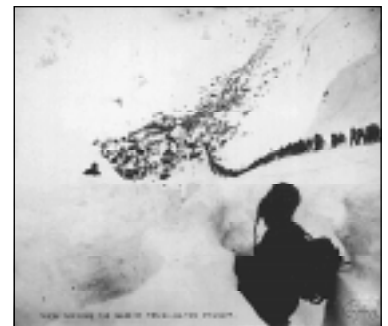
no other time or place in recorded history did so many people subject themselves to [so] much agony, misery, death, and glory than in 1897-98, when countless thousands of [‘would be’ miners took] the Chilkoot Trail has been called [the] “meanest 32 miles in the world.”

There were two routes over the snow-covered mountains to the Canadian border. The route out of Skagway—over the White Pass seemed easier but was plagued by armed bandits such as the Soapy Smith Gang. The route out of Dyea was shorter but led over the frozen Chilkoot Pass.

The vivid image of endless lines of prospectors struggling up the Chilkoot Pass says it all. The two-foot wide trail rose to a vertical height of 1,000 feet, on either side was loose snow, and if a man slipped off the trail, he disappeared never to be seen again.

Because many of the early gold-seekers died from starvation, Canada required miners to bring a year’s worth of food (about 1,000 lbs.) in addition to everything else they needed—pushing their total load to nearly a ton.

These adventurers came to Alaska on crowded ships, made their way



on. In just one year, 1897-1898, over 60,000 adventurers made their way to the rich gold fields of the Klondike. At

through turbulent crowds on the docks at Skagway or Dyea and had to sort out fact from fiction as they received advice from con men, sensible old timers, and well meaning fools. Then they had to find a way of transporting a ton or more pounds of supplies over either the Chilkoot or White Passes. This often



meant carrying the loads on their backs, paying the customs duty into Canada and, upon arriving at Lake Lindemann, building some sort of boat to transport them down the Yukon

River. Unexpected perils included avalanches, drownings, typhoid, scurvy and spinal meningitis. On the American side of the border, there was little law enforcement. Skagway and Dyea were overrun with thieves and con men. Along the trails the stampedeers punished lawbreakers in their own way. Across the divide, the Canadian Mounties kept order and maintained a sense of security among the confused masses. The Mounties required the stampedeers to bring enough provisions, curtailed travel on the rapids, tended to the sick and injured, restricted the use of firearms and meted out justice. That the vast majority of men, women, and

children reached the Yukon safely is not just a tribute to their endurance and resourcefulness; much of the credit goes to the Mounties, whose efforts diverted countless disasters.

URL: <http://www.gold-rush.org/alaska/photo/photo13.html> [Accessed 24 April 1997]

From lower left: S.A. Crawford on the summit of White Pass, September 3, 1898—and yes, even pack animals, like this mountain goat, had to be carried on occasion; Yukoners in the Dyea Canyon, 1897; Campsite, ca. 1900; Freighting in Lake Bennett country with mountain goats—possibly carried there by the same method used by S.A. Crawford (far left photo); near Rocky Point, September 18, 1898.

One of few surviving photos of China Joe.

“China Joe” and other foreign miners

Word of the northern riches spread all over the world. Adventurers came not only from the United States and Canada, but from every country where a newspaper could be read. The “Three Lucky Swedes,” relying more on guile than luck, made their mark in the Nome mining district. Felix Pedro, an Italian, discovered gold in the Fairbanks area and word of



his strike was brought to Dawson by Jujira Wada, a Japanese. Perhaps the best loved immigrant of the Gold Rush era was Lee Hing, better known as “China Joe,” whose unparalleled reputation as a humanitarian stretched from Fort Wrangell to the Yukon River. This humble baker and storekeeper saved multitudes of miners from despair and starvation, asking nothing in return.

On several occasions his benefactors stood ready to protect him with their lives, as they did in 1886 in Juneau, when armed vigilantes tried to seize China Joe and send him out of town with the low paid Chinese laborers they had herded out of the Treadwell mine. China Joe remained to become one of Juneau’s leading citizens. He was said to be the only man in Alaska without an enemy.

URL: <http://www.gold-rush.org/alaska/photo/photo 13.html> [Accessed 24 April 1997]

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*We 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) in this space and adjacent to the photo within the magazine. All submissions will be returned unless indicated.*

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- **Jul. 8-10, JSA/JAH National Council Meeting, Tropicana Hotel, Las Vegas, NV**
- **Aug 5-7, 16th International Conference on Ground Control in Mining, Lakeview Resort, Morgantown, WV**
- **Aug 7-11, WVMRA Annual Meeting, Greenbriar Hotel, White Sulphur Springs, WV**
- **Sep. 10-12, Bluefield Coal Show, Bluefield, WV**

