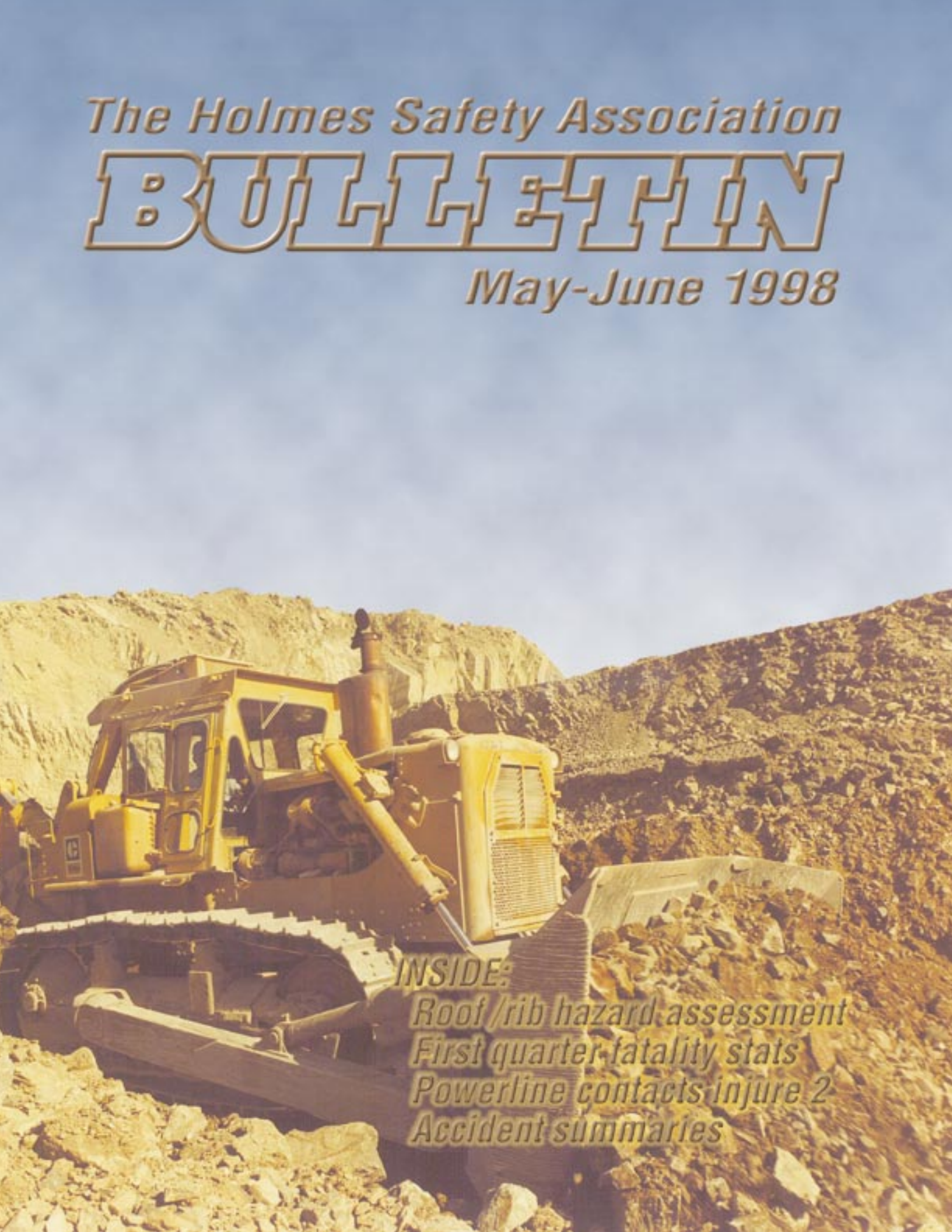


*The Holmes Safety Association*

# **BULLETIN**

*May-June 1998*



**INSIDE:**

*Roof/rib hazard assessment*

*First quarter fatality stats*

*Powerline contacts injure 2*

*Accident summaries*



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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](http://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:** A Cat D-9H bulldozer scrapes limestone rubble from a recent shot at the Devil's Slide Quarry (taken in late 1980) 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 22203-1984]

**KEEP US IN CIRCULATION  
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# Roof and rib hazard assessment for underground stone mines

## Hazard assessment techniques

Of the 33 mines visited, 32 used the room-and-pillar method. This method is most efficient and safest when the mining results in a smooth, competent roof (back) and the ribs (walls) are free of loose rocks. Finding a mining horizon that has both a stable roof beam and a stable roof line and determining an optimal mine layout are critical tasks in developing a safe and productive mine. Room widths, heights and lengths and pillar orientations and shapes should be predetermined to minimize roof and rib hazards. During development of a new mine, detailed consideration should be given to the mine portals and main access drifts, as these openings must remain stable for the life of the underground mine.

### Finding a stable roof beam

Perhaps the first critical roof-safety consideration is to find a stable roof beam. The ideal roof beam is massive, strong, persistent and weather resistant. Local stratigraphy (the layers of stratified rock) dramatically affect ground stability, especially when certain lithologic thickness, bedding lamination and cross-bedding features are present. In general, a thick competent bed of rock (preferably limestone) within the immediate roof horizon results in a stable roof beam. This is because limestone is generally stronger and more massive than shale or siltstone (which is soft and bedded). Stiffer rocks sag (deflect) less than softer rocks, and thicker roof beams sag less than thinner beams. Therefore, the immediate roof should consist of a limestone beam of sufficient strength and character so as to minimize roof sag.

In general, the less a roof beam sags, the less chance for beam failure. A meter (3 ft.) or more of competent (having few joints) limestone was observed to form a stable beam in 10-m (35-ft.) wide rooms in many underground mines. As more joints intercept the roof beam or the associated room is widened, the chance for instabilities increase. Therefore, changes in roof beam characteristics should always be considered as new faces are advanced.

Massive limestone is very strong, often having compressive strengths of 207 MPa (30,000 psi) and tensile strengths of 14 MPa (2,000 psi). Unfortunately, like any other rock, limestone contains discontinuities (vertical joints or fractures and horizontal bedding planes) that can affect roofbeam strength. These discontinuities (breaks) in the rock control the strength of the rock mass. Therefore, hazard assessment is based mainly on recognizing the characteristics and structure of the local roof geology.

Rock characteristics that should be measured or observed are: the orientation, the dip and scale (spacing) of the horizontal bedding planes (smooth surfaces), and the high-angle vertical joints (breaks). When drilling exploration holes, a geologist should be employed to log and examine the core from the mining horizon, identifying the character of both the intact rock and the observed fractures or breaks. When a highwall exposure of the mining horizon is present, measurement and observation should be made of the bedding and joint characteristics within the highwall. If the face is weathered, a new "clean"

exposure should be developed if possible. Presplitting a small cut of highwall can minimize blast damage and maximize the percentage of observable "in-place" breaks. It is also important to examine the rock debris left on benches after blasting. Often, competent horizons will produce large boulders. Note the location and character of rock fragments from different strata. Most surface quarries have boulders placed along road sides to act as beams or barriers. Find out where these boulders came from.

As a mine develops away from the highwall or outcrop, underground exposures must be analyzed to determine stable beam characteristics. These exposures are found in existing roof falls, shafts or declines (ramps). In addition, observation holes should be drilled into the roof at regular intervals. A great deal of information can be gained from these observation holes. Drill-hole penetration rates and drill cuttings can often be used to identify the roofbeam rock type and thickness. Any breaks or separations and relative indications of material hardness should be noted and recorded for future comparisons as development proceeds.

Weather, humidity, temperature and groundwater can all have a detrimental effect on the strength of roof and rib rocks. In general, rocks that are resistant to these forces are highly desirable. Shales and clays are generally very susceptible to weather influences, especially if they possess swelling characteristics. Limestones and sandstone generally weather slowly. However, the occurrence of certain minerals, bands of shale or clay, internal structures, etc., can provide gaps or openings by which

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Figure 1.—Locations of Underground stone mines evaluated in this study.

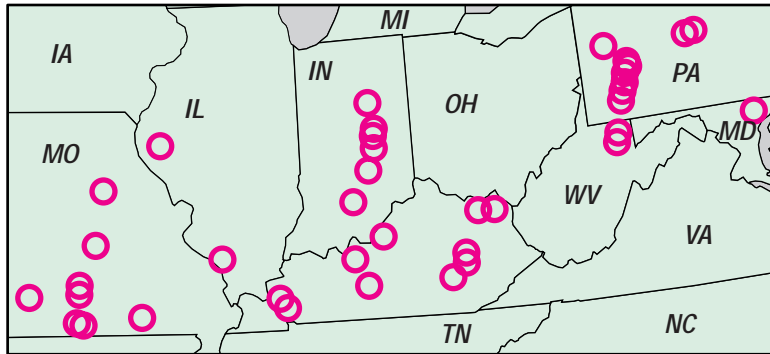


Figure 2.—A smooth roof line produced by a persistent bedding-plane lamination within the limestone roof beam.

weathering forces attack and eventually weaken even limestone.

Several practical and simple techniques exist for determining the weathering characteristics of rocks. If rocks are clays or shales, specimens placed in a glass of water overnight can deteriorate into fine particles, indicating that they react unfavorably to moisture. For limestone, an equally simple technique exists. Rocks from different potential roof beams can be marked, photographed and located outside the underground mine. Routine temperature and moisture fluctuations attack the full-scale specimen, allowing for the direct observation of the weathering characteristics (Winick, 1996).

**Finding a stable roof line**

Another important assessment factor

is to evaluate potential stable roof lines. If several stable roof beams exist, the one that produces a persistent, smooth roof profile most often should be selected. If the stable roof line does not occur then a smooth roof profile should be produced using drilling (altered drilling densities near the roof and rib line) and blasting (pre- and post-splitting) techniques.

A persistent, smooth roof line is generally formed by bedding-plane laminations and rock-layer interfaces (Fig. 2). A technical definition of bedding-plane laminations can be found in Krumbein and Sloss (1963). They refer to a bed (beam) as a rock unit composed of several strata or laminae. The laminations contained within each layer are characterized by their ease of breaking

along bedding planes. Interfaces between beds of different limestone types or even different rock types (shale, clay, etc.) often separate with the same ease of breaking as the bedding planes. Both bedding planes and interfaces can have thin layers of clay which greatly facilitate the separation process.

The advantage of bedding-plane laminations and rock interfaces is that properly drilled blastholes can result in a clean break along such a horizon. However, if too many bedding plane laminations or rock-layer interfaces exist, the roof can separate with time into many thin layers that are inherently unstable.

Blasting also has a tremendous influence on roof and rib stability. Overbreak can damage the roof rock, while bootlegs (poor rock breakage at the end of a blasthole due to inadequate explosive burn) can leave broken rock along rib and face surfaces. If a natural smooth roof plane does not exist, blasting procedures such as presplitting can be used to produce a smooth roof plane. Presplitting requires additional drill holes along the roof and rib line, often drilled at close spacing and charged with special low-strength explosives. As the face is blasted, the perimeter holes are shot prior to the rest of the drill holes to initiate a breakage plane. Postsplitting or trimblasting is another technique used to produce smooth, undamaged rock around the surface of the face. The drill holes around the perimeter of the face are blasted last and are loaded with either a higher or lower strength explosive. These techniques act to evenly break the final rock pulled along a perimeter plane.

**Safe mine layouts**

After determining the optimal mining horizon, safe mine layouts need to be evaluated. Typically, mine layouts are controlled by haulage, ventilation, crushing and storage requirements. Observations indicate that more

consideration should be given to designing the shapes, sizes and orientations of mine structures that minimize stress and geologic related hazards.

Vertical stress. In general, dangerous levels of vertical stress were only observed in very deep, benching or multiple-level mining operations where pillar sizing and pillar positioning produced high stress concentrations. Overburdens ranged from <10 to 360 m (<30 to 1,200 ft.), but most were between 30 and 100 m (100 and 300 ft.). Vertical stress is a function of the overburden. Because most underground stone mines are relatively near to the surface, high vertical-stress conditions are uncommon.

Pillar design is generally perceived as a less critical design issue in underground stone mines, because of the low vertical-stress conditions and the inherent high strength of limestone. Therefore, the pillar width-to-height ratio for development rooms are relatively low, averaging 1.72 with a standard deviation of 0.66 from a sample of 33 mines (Fig. 3). Pillar design becomes a much more significant issue when second mining or benching is practiced. Twenty of the 33 mines extracted benches ranging from 3 to 24 m (10 to 80 ft.) and averaging 8.6 m (28 ft.) in one to as many as three lifts. The width-to-height ratios of pillars in bench rooms were significantly lower, averaging 0.84 with a standard deviation of 0.31 (Fig. 3). These pillars are slender and are more susceptible to buckling failure or to failure along large geologic structures such as faults or slips angled through the entire pillar.

Multiple-level mining was observed at four mines. Three of the mines did not practice superposition of the pillars (i.e., superimposing developing pillars directly over or under existing pillars using similar sizes and shapes). Superpositioning

Figure 3.—Width-to-height ratios of pillars used in development and benching sections.

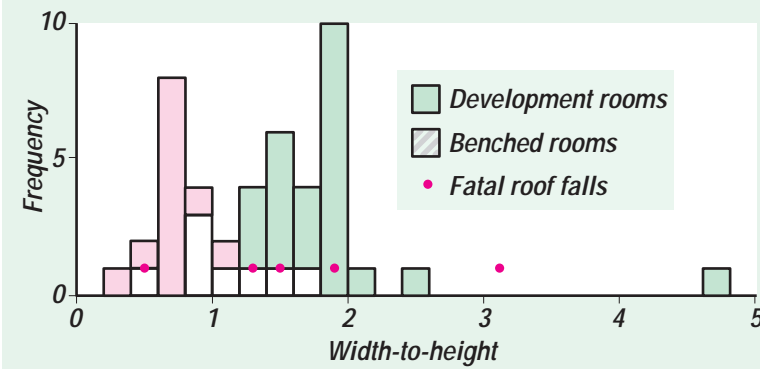
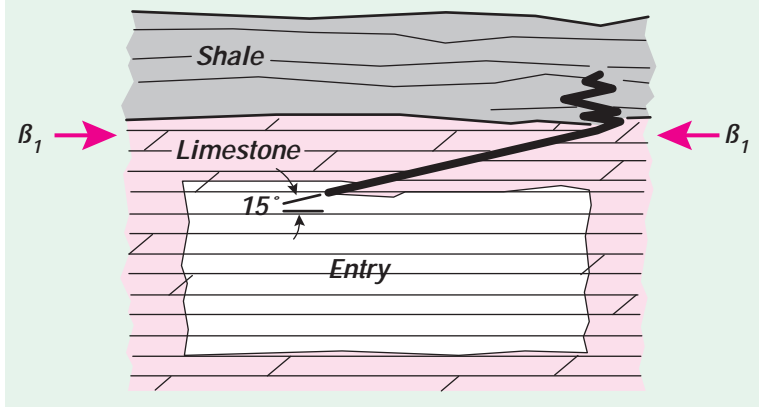


Figure 4.—Buckling failure in a limestone roof beam caused by high horizontal stresses. Note the low-angle shear associated with the failure.



helps to funnel vertical loads through a continuous column of rock and has been highly successful in mitigating stress-related rock failures in other mining situations (metal, nonmetal and coal multilevel mines). It is also beneficial for long-term stability to leave a substantial interburden between mining levels. The median for the four mines was 12 m (40 ft.), which appeared adequate considering the geology and mine layout.

### Horizontal stress

Perhaps one of the most unrecognized factors affecting mine layouts is high horizontal stress. When limestone roof contains extensive horizontal bedding or is laminated in nature, the roof beam can be thought

of as a plate loaded along its slender axis. As in any structure, high axial loads can cause the beam to bend and finally buckle (Fig. 4). The shear planes developed in response to this buckling occur at low angle to the mine roof and are oriented perpendicular to direction of loading.

High levels of horizontal stress, ranging from 14 to 70 MPa (2,000 to 10,000 psi) in the first 5 m (16 ft.) above the mine roof, were measured at stone mines in Pennsylvania (Iannacchione et al., 1996) and in Kentucky (Parker, 1996). The horizontal-stress field is biaxial with one direction usually greater than its orthogonal horizontal-stress component. The greater stress magnitude is called the major principal horizontal

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stress, and the lesser stress magnitude is called the minor principal horizontal stress. The directionality of the horizontal-stress field is considered to be largely the result of tectonic forces due to movements of the earth's plates. Many of the underground stone operations in the United States lie within the large midplate stress province that is compressional in nature and usually exhibits an ENE or EW principal horizontal stress direction.

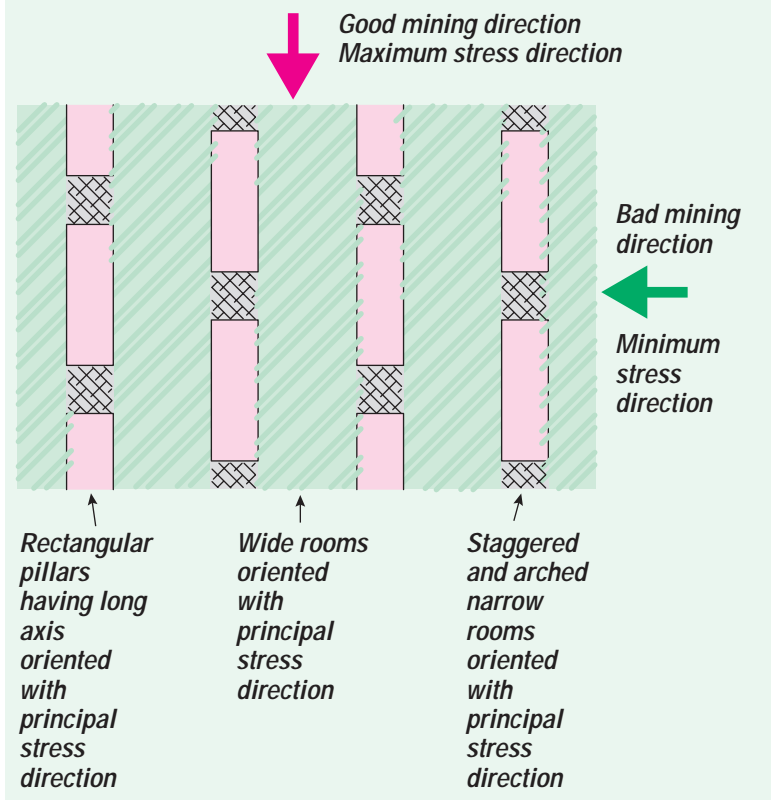
The direction and magnitude of the horizontal-stress field and its application at shallow limestone mining depths (where the vertical stress is generally very small) has resulted in the development of novel control measures. For instance, openings driven parallel, or nearly so, to the major principal-stress direction at affected mines will usually have more stable conditions. Conversely, those driven perpendicular to the major stress direction (in the minor principal stress direction) will have the poorest ground conditions (Fig. 5). Therefore, control techniques such as orienting openings in the favorable direction(s), maximizing mine layout in the good direction, and mining smaller width rooms, possibly with arched openings in the bad direction, are methods that can help control horizontal-stress damage.

### **Geologic discontinuities**

Joints are naturally occurring cracks or fissures present in all rock that are created by geologic processes or in place stress conditions. While it often seems as if there is no consistency associated with joint location, orientation and dip, a closer examination often reveals preferential characteristics. Knowing what these preferential characteristics are allows for planning that can reduce long-term roof and rib instability problems.

There are many techniques available to measure joint orientation,

**Figure 5.—Optimum mine layout for controlling strata in high horizontal-stress conditions.**



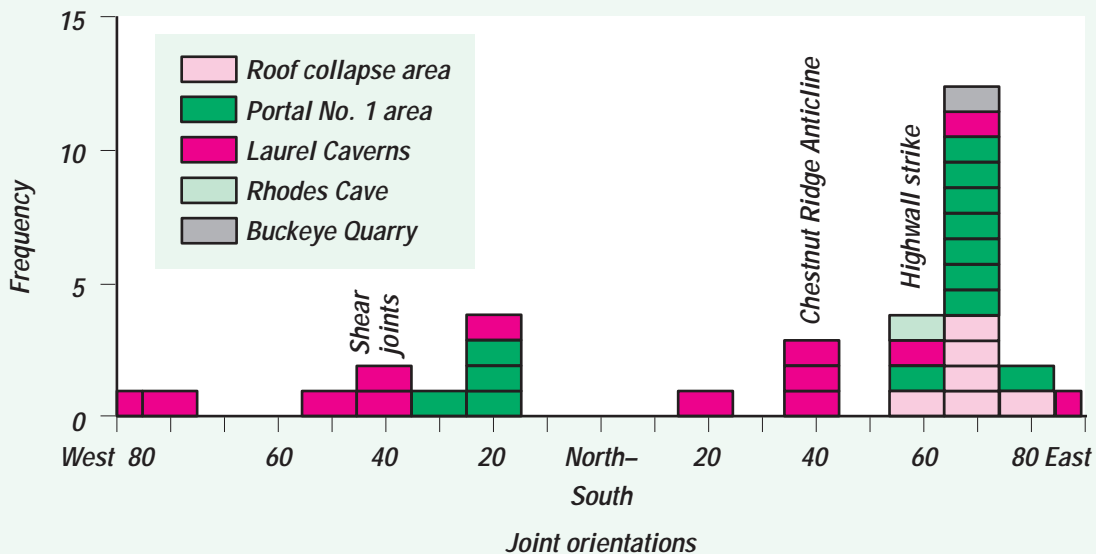
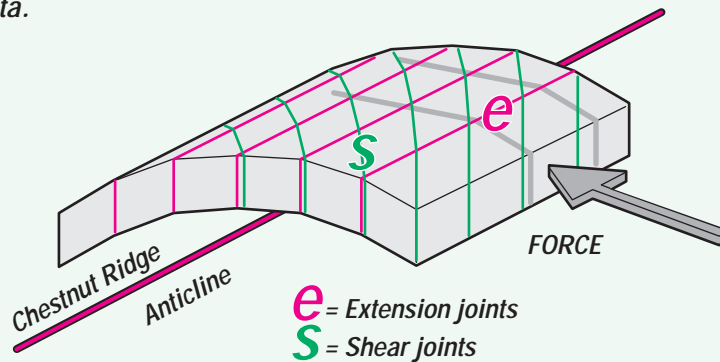
dip and spacing, but, for the miner, one instrument has provided reliable information with minimal cost and implementation. That instrument is the pocket or Brunton compass with the following essential features: a magnetic needle, a graduated surface, a "bull's-eye" level, a level tube and a line-of-sight viewing capability.

The display of joint orientation and dip data using simplified graphical solutions is the preferred means of evaluating large amounts of measurement data. The stereographic and histogram projection techniques are recommended for graphical display. Because most of the field applications in stone mining involve vertical joints with dips approaching 90°, a simple histogram plot provides an excellent means of evaluating preferential joint trends. A histogram uses rectangular bars to represent frequency, where the width of each

rectangle represents a band of orientations (usually in bands of 5° to 10°), and the height of each rectangular bar represents the frequency of joints within that band (Fig. 6).

Rock joints pose special problems when they are closely spaced, <0.5 m (1.6 ft.), and their orientations match those of the maximum unsupported spans found within mine entries. Joints also play a very important role in initiating rib instability, especially when benching operations lower the width-to-height ratio of supporting pillars. Once the orientation and dip of the joints have been determined, the spacing of the major joint trends should be determined. Spacing is a major concern in determining the size of the mine room along with the determination of roof-bolt patterns and the need for additional support

Figure 6.—A histogram of major joint orientations in the Loyalhana formation near the Lake Lynn Laboratory, showing the relationship between orientation and structural folding of stone bearing strata.



like screening.

Cross-bedding features (low-angle, relatively short natural breaks in the strata) were found to be particularly important in scaling operations and rib control. In general, when cross bedding is present, these strata breaks are from 0.3 to 2 m (1 to 6 ft.) apart and are capable of producing dangerous loose wedges of roof rock (Fig. 7). Scaling procedures must concentrate on removing as many of these wedges as soon as possible.

Solution related failures such as weathered joints and sink holes occasionally occur in limestone mines near the formation outcrop, under <30 m (100 ft.) of overburden

(Iannacchione et al., 1995). Solution failures are caused by water dissolving limestone along joint surfaces that sometimes develop into silt filled cavities or voids (sink holes). In general, vertical weathered joints isolate large unsupported blocks in the roof beam. Optimization of mine layouts can minimize unsupported spans. These optimization techniques consist of altering room widths, staggering crosscuts, and changing entry orientations to minimize the occurrence of unsupported roof beams. In new mine developments, joint patterns and locations should be known and considered so that portals are not later subjected to unstable conditions brought on by weather

changes.

### Conclusions

Roof and rib hazards represent a significant safety concern for underground stone mines. These hazards can be reduced by proper assessment and utilizing techniques that minimize strata instabilities. These assessment techniques consist of finding a stable roof beam, selecting a stable roof line and designing a safe mine layout specific to local stress, geologic and mining conditions. A stable roof beam should be massive, strong, persistent, weather resistant and as thick as required. If several stable roof beams exist, the one that provides a

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persistent, smooth roof profile should be selected. If the stable roof line does not exist, a smooth roof profile should then be developed using drilling and blasting techniques. After determining the optimal mining horizon, safe mine layouts need to be evaluated. The shape, size and orientation of mine structures should be designed to minimize stress and geologic related hazards. These roof and rib hazard assessment techniques can be used to develop stable mine structures and minimize roof, rib and face falls.

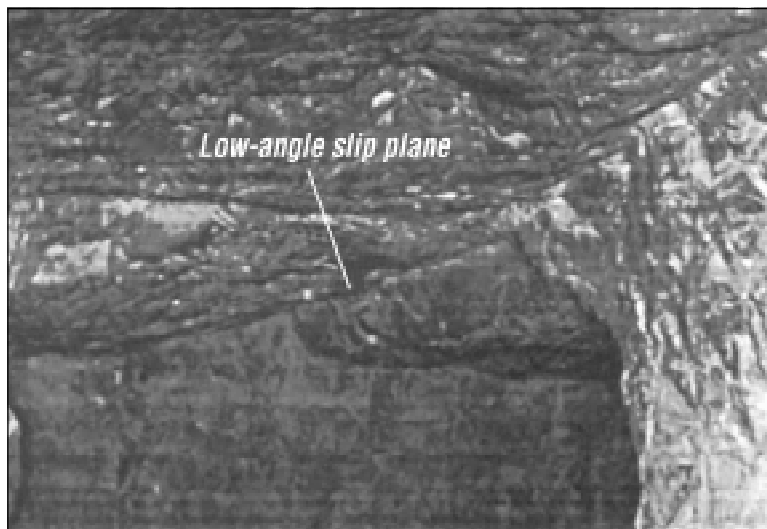


Figure 7.— Photograph of a low-angle slip plane that created an unstable roof wedge.

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*We apologize for the poor quality of the two photos. These were scanned from an existing magazine article and were apparently of low quality initially. —Fred Bigio, Editor*

## Over 350 participants meet in Dallas for Joint Mine Health and Safety Conference

Dallas, Texas was the setting for the 16th Annual Joint Mine Health and Safety Conference. Present were 345 participants who represented 18 states for metal/nonmetal and coal.

The Opening Session was kicked off by MSHA's Doyle Fink. Ed Hugler of MSHA welcomed the group and discussed the latest statistics of accidents and fatalities in the mining community. Suzie Humphreys gave a humorous presentation. A memorial service followed, which honored the 15 people who lost their lives while working for a mining operation.

John Perquin of the United Steelworkers of America spoke about "Labor's Perspective on Health and Safety."

Thursday morning, John Hoffman of International Training Consultants, gave a hands-on demonstration of



powered haulage equipment safety. Discussion groups were also conducted on Thursday meeting.

The Sentinels of Safety Award recognition followed. There were 41

companies represented who received this prestigious award for 1996.

Next year's conference will be held in San Antonio, Texas. For more information, call (800) 687-7345.

Far right: Tom MacLeod of MSHA's Office of Educational Policy and Development addresses the Joint Mine Health and Safety Conference on Part 48 this past Feb. 19.



# First quarter fatality statistics

This article updates the status of fatalities occurring in both coal and metal/nonmetal mines from January through March of 1998. Based on preliminary accident reports, as of March 31, 1998, twenty-two fatalities have occurred at coal and metal/

nonmetal mining operations. During this period, nine fatalities occurred at coal operations and thirteen fatalities occurred at metal/nonmetal operations. Fall of roof fatalities in coal was the most frequent accident

classification, causing 44 percent of the fatal injuries. Powered haulage was the most frequent accident classification in metal/nonmetal, causing 31 percent of the fatal injuries.

## FATALITY SUMMARY, JANUARY-MARCH 1998

Based on preliminary accident reports as of 3/31/98

ACCIDENT CLASSIFICATION	NUMBER OF FATALITIES				
	0	1	2	3	4
Fall of face/rib		Coal			
Fall of materials		Coal			
Fall of person			Metal/Nonmetal		
Fall of roof		Coal	Coal	Coal	Coal
Handling materials					
Hand tools					
Machinery		Coal	Metal/Nonmetal		
Other					
Powered haulage		Coal	Metal/Nonmetal		

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

#### Coal mining

Four of the fatalities were classified as fall of roof. Of the nine fatalities, four occurred in West Virginia, two each in Kentucky and Virginia, and one occurred in Alabama. Eight

fatalities occurred underground and one occurred on the surface.

#### Metal/Nonmetal mining

Four of the fatalities were classified as powered haulage and two each were fall of roof, fall of person and machinery. Four fatalities occurred at sand and gravel operations, three occurred at limestone operations and

two each occurred at copper operations. Two fatalities each occurred in Idaho, Michigan and Texas. Nine of the fatalities occurred at surface operations, three fatalities occurred at underground facilities and one fatality occurred at a surface of an underground operation.

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## Plain language about shiftwork

*This is the first of two parts examining shiftwork hazard and remedies.*

### 1. BACKGROUND INFORMATION

#### Defining shiftwork

There are many work schedules that are called shiftwork. Shiftwork involves working outside the normal daylight hours. That is, outside the hours of around 7 am to 6 pm, the time period in which many people in our society work a 7- to 8-hour shift. Shiftworkers might work in the evening, in the middle of the night, overtime, or extra long workdays. They also might work regular days at one time or another. Many shiftworkers “rotate” around the clock, which involves changing work

times from day to evening, or day to night. This might happen at different times of the week or at different times of the month. Police officers and firefighters, for example, often work rotating shifts.

Other workers might have a “permanent” shift and only work at night or in the evenings. Waiters and waitresses, for example, might work only the evening shift. Night watchmen, on the other hand, might work only the overnight or “graveyard” shift.

#### Society and employer reasons for shiftwork

There are several reasons for shiftwork. A major reason is that modern technology has made it possible to do many activities at any time of the day or night. This “24-hour society” of ours requires that important services be provided at all times. Critical services include public safety, such as police and fire

protection; military defense; health care; transportation; and public utilities, such as electrical power, water, and telephone. Other industries must operate 24 hours per day because the production process is much longer than 8 hours and must be performed continuously. Many chemical products require such a process. Also, manufacturing industries often have expensive machinery that needs to be operated continuously in order to be profitable.

Because several occupations and industries operate around the clock, other services have expanded their hours to accommodate evening and nighttime workers. (They also have expanded access for all the rest of us who simply enjoy the convenience.) Some obvious examples are grocery stores, gas stations, and restaurants that are open 24 hours per day, seven days per week. The increase in these expanded-time services in the past decade or two has opened up the job market for new shiftworkers. This is ironic. Because there are so many shiftworkers, society now needs more shiftworkers.

#### Numbers of shiftworkers

Estimates of the number of shiftworkers varies with the definition of shiftwork. The Bureau of Labor Statistics reports that about 5% of American adults work in the evening. Permanent night workers and workers with irregular schedules make up another 4%. Still another 4% are rotating shiftworkers. All together, this amounts to about 15.5 million people.

Almost any occupation or industry has some people doing shiftwork. A quick check of lists provided by the Bureau of Labor Statistics shows about 2 to 10% of almost any occupation working evening, night, or rotating shifts. These kinds of schedules happen

quite often among police officers and firefighters. More than half of them work evenings and nights, and about a quarter of them rotate shifts. Many transportation and public utility workers—about one-fifth of them—also work shifts. Long-haul truckers often make their best time in the evening or at night.

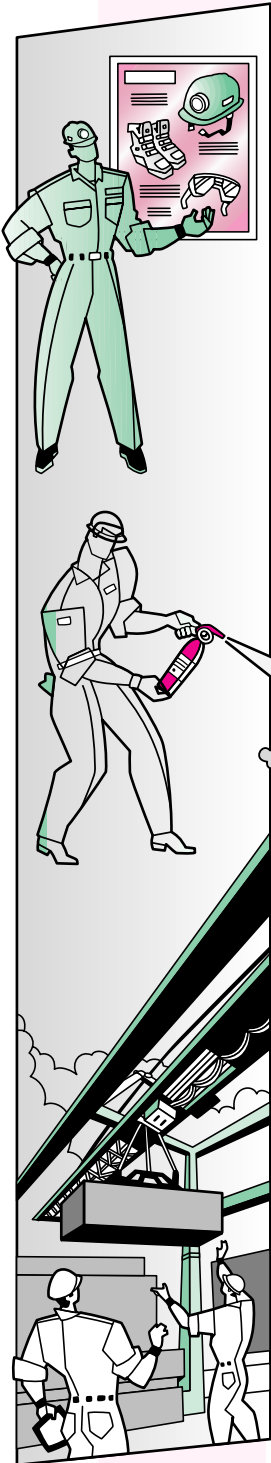
Lately, many materials must be delivered “just in time,” or just before they are used in manufacturing. For example, parts for making automobiles are delivered this way. This practice has forced more truckers to take trips at all hours and at the last minute to make their deliveries on time.

#### People who work shifts

If we look only at full-time jobs, men work more night and rotating shifts, while women work more evening shifts and do more part-time work. However, full-time shiftworking women are not far behind in numbers. And more women are entering the workforce full time, so these numbers are changing quickly. Younger people are more likely to work shifts than older people. African-Americans do more shiftwork than Caucasian-Americans. Single people work more shifts than married people. If we look at married couples who each have paying jobs, about one-quarter to one-third of these couples have at least one partner who is a shiftworker. If we look at mothers with children at home, single mothers work shifts more often than married mothers.

#### Employee reasons to do shiftwork

Some workers actually prefer non-day work, but most do not seek out shiftwork. Reasons for employees choosing shiftwork include better pay, more available time during the day for



child care, more daylight hours for recreation, and more time to attend school. Some workers prefer the night shift because it is quieter and there are fewer supervisors. Usually, however, workers say they did not choose shiftwork. They do it either because it is required of the job, or no other job is available.

## 2. HOW TO EXAMINE WORK SCHEDULES

Shiftwork experts often are asked what is the best or worst work schedule. There is no simple answer to this question because there is no ideal schedule that fits every situation. Both good and bad points can be found in most work schedules. In this section, we suggest ways to examine work schedules to identify their advantages and disadvantages.

### Types of work schedules

There are hundreds of different shiftwork schedules. However, it is difficult to accurately count the many shiftwork schedules being used. No thorough records are kept by the federal government, trade organizations, or labor unions. Different schedules might be used by the same occupation, the same industry, or even the same workplace.

The most common shift schedule probably is 5 days on a single shift followed by 2 days off. If this is a rotating shift schedule, the worker will change to a new shift after the days off. Depending on the job, it is even possible to work 7, 10, or 14 days in a row. Offshore oil rig workers, for example, might work 2 weeks out on the rig followed by 2 weeks off at home.

Since so many different schedules exist, researchers have thought of ways to measure different features of the schedules. These features are used to study how work schedules might affect safety, health, or productivity. The features are listed in Table 1 with

explanations below.

### Work schedule features

We already have mentioned the time of the shift and whether shifts are permanent (fixed) or rotating. It also is important to consider:

- How long a shift might be.
  - How many shifts are worked before a rest day.
  - How many rest days are on weekends.
  - Whether there is overtime.
  - How much rest is taken between shifts.
  - How much rest is taken during the shift.
  - Whether the work schedule is regular and predictable.
- As we will explain, all of these

features can affect the amount of stress and fatigue a person feels because of the work schedule. If people experience too much stress and fatigue, then they might not do their jobs safely and efficiently. Or they might develop health problems. Here are some particulars about the different shift features.

**Time of shift:** Twenty-four hour operations usually are divided into 2 or 3 shifts. Start- and end-times depend on the length of the shift. Day shift (also called morning or first shift) starts around 5 to 8 am and ends around 2 to 6 pm. Evening shift (also called afternoon or second shift) starts around 2 to 6 pm and ends around 10 pm to 2 am. Night shift (also called third, “graveyard,” or “mid” shift) starts around 10 pm to 2 am and ends

Table 1.—Work schedule features

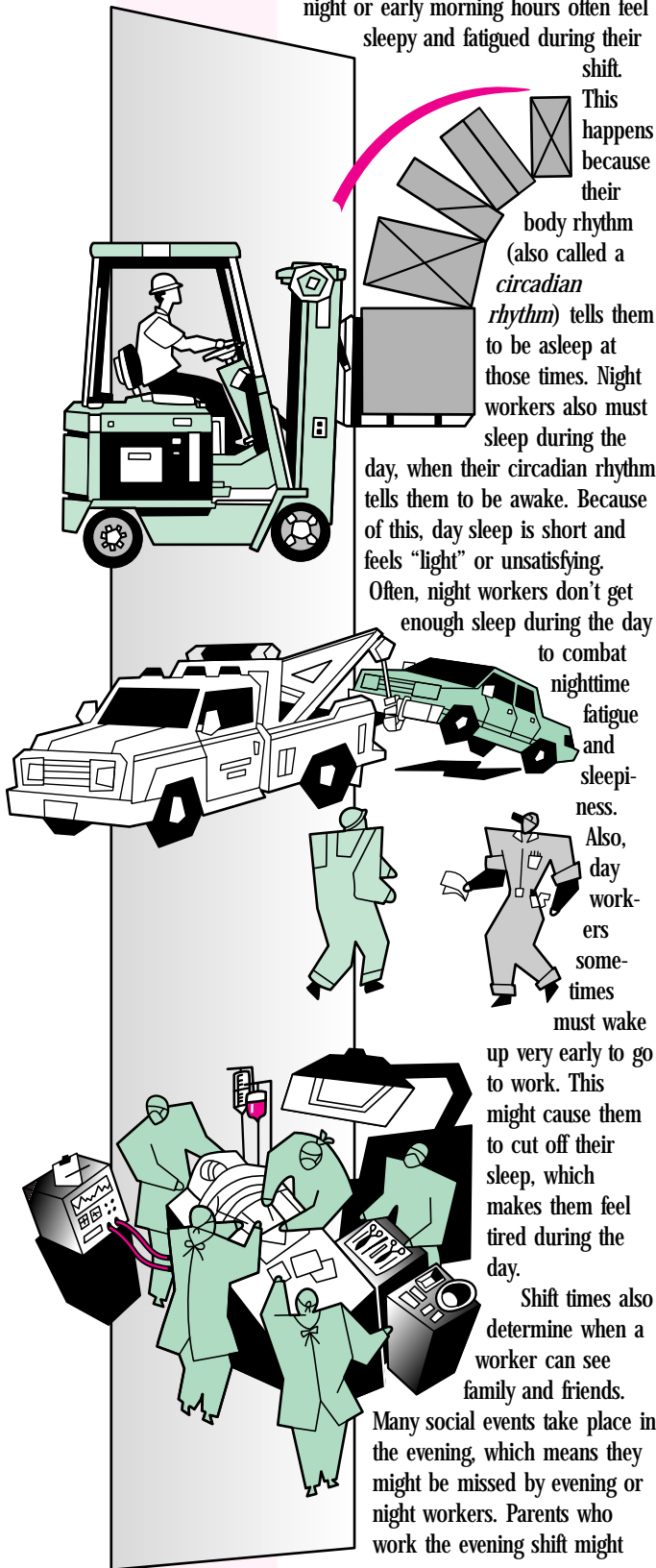
Feature	Particulars	Example
<b>Time of shift</b> ...	Day, evening or night	
<b>Shift rotation</b>		
Permanent.....	Fixed shift times (no rotation)	
Rotating.....	Changing shift times	
Speed .....	Number of workdays ..... Rapid: 2 days per shift before shift change ..... Slow: 21 days per shift	
Direction.....	Clockwise (forward ..... Clockwise: day to evening to night or counterclockwise (backward) change ..... Counter: day to night to evening	
<b>Work-rest ratios (or how much work before a rest)</b>		
Weekly .....	Number of workdays ..... 5 workdays/2 rest days to number of rest days .... 7 workdays/3 rest days	
	Overtime workdays	
Daily.....	Work hours to rest hrs. ... 8 hrs. work/ 16 hrs. rest 12 hrs. work/ 2 hrs. rest	
	Rest breaks within a day.. 12 hrs. work/ 2 hrs. rest	
	Overtime work hrs.	
<b>How regular or predictable?</b>		
	Can affect any other ..... Emergency or “on-call” part of the schedule ..... Unplanned overtime Demand-based scheduling or working off a “call board”	



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around 5 to 8 am.

Why is the time of shift important? Because people who work in the late night or early morning hours often feel sleepy and fatigued during their shift.



This happens because their body rhythm (also called a circadian rhythm) tells them to be asleep at those times. Night workers also must sleep during the day, when their circadian rhythm tells them to be awake. Because of this, day sleep is short and feels "light" or unsatisfying. Often, night workers don't get enough sleep during the day to combat nighttime fatigue and sleepiness. Also, day workers sometimes must wake up very early to go to work. This might cause them to cut off their sleep, which makes them feel tired during the day. Shift times also determine when a worker can see family and friends. Many social events take place in the evening, which means they might be missed by evening or night workers. Parents who work the evening shift might

not see their children during the week because they are at work when the kids return from school. If this happens too often, it can be stressful.

**Permanent versus rotating schedules:** We might think that permanent night workers adapt or get used to their work times. Usually, the longer a person does something, the easier it becomes. With experience, many night workers figure out tricks or personal methods to fight off some of the nighttime fatigue. However, research tells us that most permanent night workers never really get used to the schedule—there are many nights when they still feel tired and sleepy. Fatigue occurs because most night workers go back to a day schedule on their days off. This is not surprising because family and friends are active during the day. Also, many errands and chores (like getting the car fixed) must be done during the day. Because most night workers often return to a day schedule, they never completely allow their sleep and body rhythms to adapt to being awake at night. They also sleep less during the day, so they don't recover from fatigue. This fatigue can accumulate to unsafe levels.

People working rotating schedules face a similar situation. Because the shift times are always changing, they can never completely adapt to a set work schedule. Rotating schedules are often used because they are considered fairer to all workers. Everybody in the workforce takes their turn at both the popular and unpopular shifts. Rotating shiftworkers are always trying to get used to changing work times. This is not easy, which is why rotating shiftworkers have more complaints than other workers about physical health and psychological stress. Research has shown that rotating shifts have special features that might affect a person's ability to get used to the schedule. These features are explained below.

**Speed and direction of rotation:** Adapting to rotating shifts can be affected by the speed of rotation and the direction of rotation. Speed of

rotation means the number of consecutive day, evening, or night shifts before a shift change occurs. Direction of rotation means the order of shift change: A *forward* rotation is in the clockwise direction, from day to evening to night shift. A *backward* rotation is in the counterclockwise direction, from day to night to evening shift.

Different *rotation speeds* also affect a worker's ability to get used to change of shift times. We have already talked about the same situation under permanent versus rotating shifts. Longer rotations (for example, 3-4 weeks of working the same hours) are supposed to allow workers more time to get used to night shifts. However, workers usually return to a day schedule on their days off. A fast rotation (every 2 days, for example) allows no time to get used to night work. Some researchers prefer the fast rotation, because the worker quickly gets through the tough shifts and then has a couple of days off. Very fast rotations are used in Europe more than in America.

*Direction of rotation* can affect the ability of circadian (daily body) rhythms to adapt to the change in work times. Sleep, for example, is a circadian rhythm because each person sleeps for part of every day. Some researchers suggest that a forward, or clockwise, rotation is better for helping a worker adjust to new sleep times. This suggestion was made because it is easier to go to bed later and wake up later than earlier. Our body rhythms make us feel more awake and alert in the early evening. This makes it harder to fall asleep earlier. Backward rotations work against the body rhythm by forcing the worker to go to sleep earlier and earlier.

Although data is lacking, it seems that backward rotation schedules are used frequently in the U.S. It is not completely clear why. It is partly because of custom (We always did it this way) and partly because workers like the "long change." In the long change, workers pick up an extra day

off when going to evening shifts after night shifts. This happens because evening shift starts late in the day, which leaves most of that day free for non-work activities.

**Work-rest ratios (or how much work before a rest):** The more a person works, the less time he or she will have for rest. People who work an 8-hour shift will have 16 hours left in a day to do everything else, and also to get some rest. People who work a 12-hour shift have only 12 hours to do everything else and to rest. In this situation, the extra work hours mean more tiredness and less time for rest. This is a two-edged sword. For example, many times a worker's home responsibilities, such as taking care of children, cannot change from day to day. So, if workers do overtime or a 12-hour shift, they still must take care of home duties. Since these duties take the same amount of time every day, workers may sacrifice rest and sleep after a long workday. This example shows us how important the length of shift can be in terms of stress and fatigue.

When looking at work versus rest, we also must consider how many breaks are taken during the shift and the length of breaks. Depending on the type of work and length of the day, several short breaks might be better than a few long breaks. Short breaks might be better particularly for jobs requiring heavy physical labor.

How tired a worker is also depends partly on how many days in a row they work. Fatigue builds up over several workdays, as well as over a single workday. This happens especially when a person gets less sleep between workdays than on rest days. As we mentioned earlier, a worker might not get enough sleep between long workdays because of home responsibilities. So, if a person works several days in a row, i.e., 6-7, a good deal of sleep might be lost. Then the worker feels quite tired during the last one or two shifts.

**How regular or predictable?**

Most jobs have a very regular, set schedule. A worker usually knows the schedule ahead of time. Even if the shift times change, a worker will know several days beforehand. This makes it easy to schedule other non-work activities, such as making sure somebody is at home when the children get there. Other jobs are not so regular or predictable. For example, health care workers might respond to emergencies that keep them on the job much longer than expected or, they may be on call for such emergencies. At a factory, a breakdown or a last-minute call for a product might keep workers at the plant working overtime. Railroad workers sometimes work off a "call board." This means they can be assigned to a train at the last minute to move a "just-in-time" order of goods.

If workers cannot predict their schedules, it is difficult to get adequate rest. Maybe they just get to sleep when they are called back to work, or maybe they have just worked a long shift when an emergency happens. So, they stay at work a few more hours. Maybe they are on call and never get deep, satisfying sleep because they are always listening for the phone. Some people call this "sleeping with one eye open."

### 3. HEALTH AND SAFETY EFFECTS OF SHIFTWORK

We have mentioned several positive points about shiftwork. Because of shiftworkers, our society is kept moving 24 hours a day. To the worker, shiftwork might mean extra pay or more free hours during the daytime. We also mentioned that shiftwork schedules are demanding and likely to produce stress and fatigue. Here we summarize ways that shiftwork might affect safety, health, or ability to do the job. Some of these things happen very soon after starting shiftwork. We talk about these under *Immediate Effects*. Health changes take a longer time to appear. We talk about health under

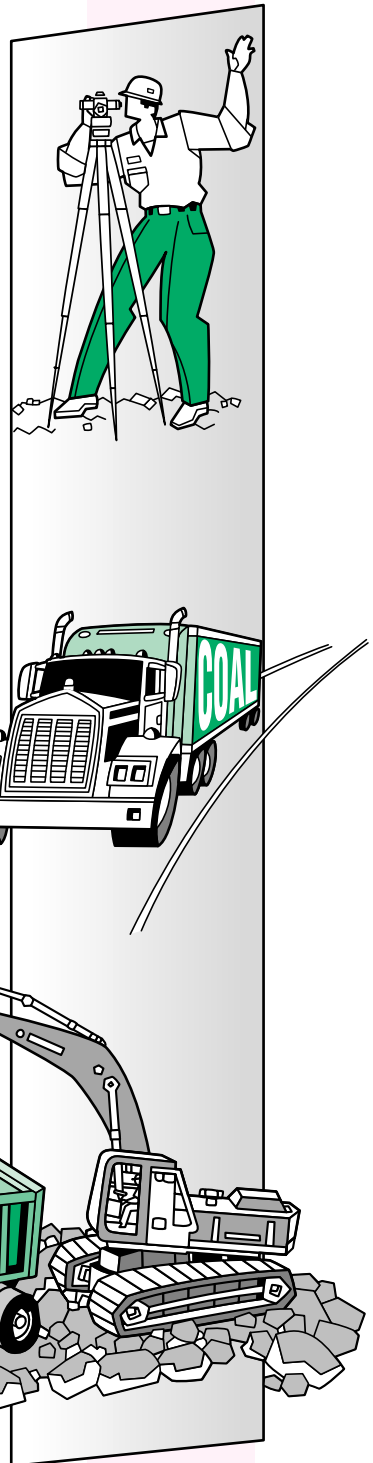
*Long-term health effects.*

#### IMMEDIATE EFFECTS

##### Sleep

Soon after starting shiftwork, people notice changes in their sleep. Night workers usually get the least amount of sleep. Evening shiftworkers get the most sleep, and day shiftworkers get a medium amount of sleep. Night workers are forced to sleep during the day, when their circadian rhythm makes them feel more awake. Day sleep is usually shorter than night sleep—sometimes two or three hours shorter. Day sleep also is lighter than night sleep. Day sleepers often say they don't sleep as deeply as they do at night. Because their sleep is lighter, they are easily awakened by sounds. This makes sleeping difficult. Since there is more activity during the day, there are more sounds to wake up the sleeping shiftworker. Both permanent night workers and rotating shiftworkers sleep worse when working nights. However, rotating shiftworkers sleep the least of all.

Sleep loss makes it much easier to fall asleep at inappropriate times. This affects a worker's ability to perform safely and efficiently. Sleepiness can affect performance both on and off the job. Driving to and from work is a major concern.



# 14

Sleepiness affects our ability to concentrate or pay attention, and driving requires us to pay attention at all times. So, if a person is sleepy, it is easier to have an accident. Several jobs, such as operating dangerous machinery, also require us to pay attention at all times. So

sleepiness can be risky in many different occupations. This risk is not simply a matter of falling completely asleep. After sleep loss, it is possible to have very brief periods of sleep that last only a few seconds. Most people may not even realize these short sleeps are happening. During those few seconds of sleep, they are not paying attention at all. If something dangerous happens at those times, the worker or somebody else could get seriously hurt.

### *Circadian rhythm, performance, and safety*

The circadian rhythm is a major body rhythm with regular ups and downs in the 24-hour day. Many systems in the body are very active at certain times of day, and not active at all at other times of day. Usually the most activity happens in late afternoon or early evening. For example, the body's ability to produce energy from food (metabolism) is highest in the afternoon to evening. The least activity usually happens in the middle of the night when most people are asleep. This is one reason people feel most active and alert around 4 to 6 pm, and sleepest at 4 to 6 am.

There also are personal differences in circadian rhythms. Some people are morning types or "larks." Morning people feel most active and alert early in the day. They usually go to bed early in the evening. Other people are

evening types or "owls." Evening people feel most active in late afternoon or evening, and like to stay up late into the night. Fishermen who are out on the water before dawn usually are morning types. Musicians who perform in the evening usually are evening types. Most people, however, are somewhere in-between the strict morning and evening types.

The internal circadian rhythm affects how alert people feel. This affects their ability to perform. People perform best when alertness and internal body activity is high, and worst when alertness and activity are low. In the normal day-work, night-sleep situation, people work when the circadian rhythm is high and sleep when it is low. On average, this schedule is best for performance, which means it also is best for safety. When workers perform poorly, they are more likely to make errors that could lead to accidents or injuries.

When working the night shift, a person is at work when his or her circadian rhythm is low and asleep when it is high. Such a schedule means that a person is trying to stay alert when the circadian rhythm is low. On average, this is not the best time of day for performance. This low-point affects physical activity and the ability to concentrate. If a worker also has lost sleep, fatigue could combine with the circadian low-point to double the effect on one's ability to perform. Poor performance could affect both productivity and safety. Studies of errors and accidents at different times of day show an increased risk at night when the circadian rhythm is low and sleep has been lost.

### *Interference with social and family life*

Most social and family events happen during the evening or on weekends. Because shiftworkers are on the job in the evening or on weekends, or because they sleep during the day, they often miss out on social or family activities. When shiftworkers are asked

about problems with their work schedule, they usually say that the number one problem is missing family and friends. Most shiftworkers agree that sleep also is a problem, but sometimes they would rather lose a little sleep just to see other people, especially their spouse or children.

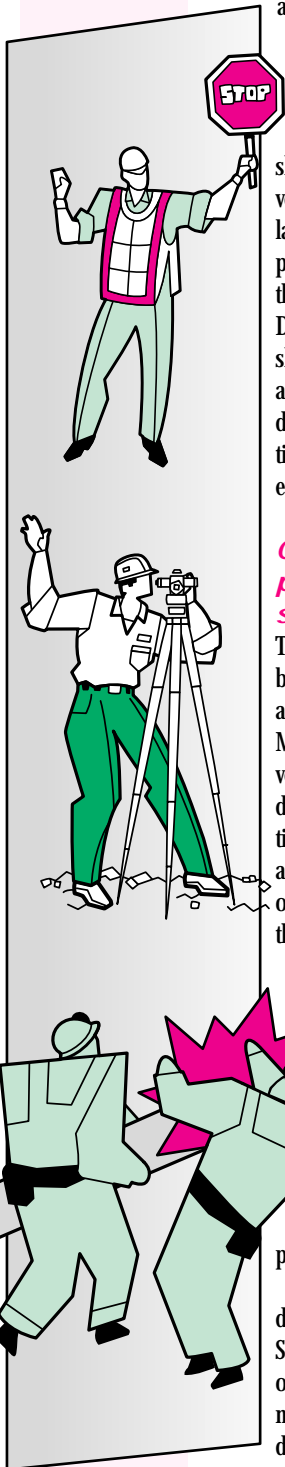
The amount of time shiftworkers spend with family and friends depends on their schedule. It also depends on their social and leisure activities and how flexible these activities are. Shiftwork interferes little with activities that are not on a strict time schedule. Gardening, woodworking, or fixing cars are these kinds of activities. Shiftwork does interfere with activities that are strictly scheduled, such as clubs or team sports. Shiftworkers often miss these activities because of work. Child care or visits to the children's school also can be a problem because of the work schedule.

A shiftwork schedule affects not only the worker but also the rest of the family. For example, children at play must be quiet during the day because the shiftworker is asleep.

### *Long-term health effects*

In the long run, it is possible for a demanding work schedule to affect a person's health. However, studying health problems in workers is difficult. If possible, workers will change jobs if they think the work is making them ill. A shiftworker might change to a day job for that reason. This is called the "healthy worker" or the "survivor" effect. Workers who stay on the job are those who can "take it." Because sick workers leave the job, it is much harder to show a relationship between job factors and poor health. Therefore, researchers have only fairly healthy shiftworkers to study.

With that in mind, it is not clear whether or not one's work schedule is the actual cause of health problems. But, workers who quit doing shiftwork often point to health problems as a major reason for quitting. Plus, a stressful schedule can combine with



other factors to hurt a person's health. If a person has other major stresses in life, such as a bad marriage or a loved one with a chronic illness, a demanding work schedule certainly won't help the situation. If a worker has poor health habits, such as using too much alcohol or tobacco, it will be more difficult to resist the stress of the work schedule. A demanding schedule also might aggravate an existing health problem.

**Digestive Problems:** Some research has suggested that shiftworkers have more upset stomachs, constipation, and stomach ulcers than day workers. Other research has not backed up this suggestion. But, there is always the problem of having only healthy workers to study. Digestive problems could be more common in shiftworkers because digestion follows a *circadian rhythm*. Usually people eat at regular times during the day. They also eliminate waste at regular times during the day. Shiftwork can interfere with regular eating and digestive patterns by

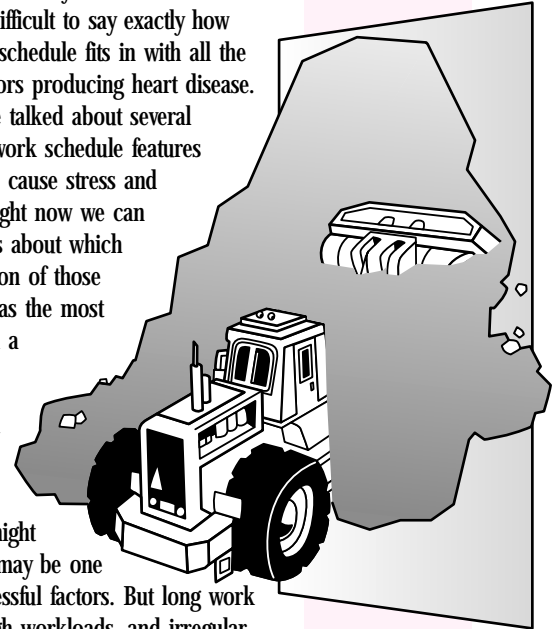
changing work and sleep times frequently. So, it is not surprising that this could lead to nausea and other stomach problems. However, digestive problems also could be caused by lack of nutritious food. For example, sometimes on night shifts only junk food from vending machines is available.

**Heart Disease:** Heart problems also have been noted more often among shiftworkers than day workers. For example, a Swedish study of paper mill workers in a small town revealed the following: Because the paper mill was the only employer in town, it was difficult for the employees to stop working shifts. Most of them had done shiftwork for most of their lives. Researchers found that the longer people worked shifts, the more likely they were to develop heart disease. However, the way in which the work schedule affects the heart is not at all clear. Work schedule stress might cause heart disease, but it is more likely a

combination of stress, diet, smoking and drinking habits, other life stresses, and family history of heart disease.

It is difficult to say exactly how the work schedule fits in with all the other factors producing heart disease. Earlier we talked about several different work schedule features that could cause stress and fatigue. Right now we can only guess about which combination of those features has the most impact on a person's health. Constantly shifting from a day to a night schedule may be one of the stressful factors. But long work hours, high workloads, and irregular schedules also can play a role.

*Reprinted from the NIOSH booklet **Plain Language About Shiftwork**, published July 1997.*



## Contract driller shocked when boom raised into power line; gas fire erupts

A driller at an Indiana stone co. was severely shocked March 26 when he was attempting to change drill bits and raised the mast of the drill into a 138,000-volt powerline.

Hitting the transmission line sent such a powerful burst of energy into the ground that it ruptured a 6-inch

natural gas line 15 feet below the surface, causing a fire.

The accident occurred at 2:24 p.m., but the fire burned until midnight. The Indiana Gas Co. was called in to cap the gas line and the fire burned for about an hour and a half after the line was capped.

The local fire chief complimented the mining company saying that the company evacuated the workers and everything was calm.

*Reprinted from the April 3, 1998 edition of **Mine Safety and Health News**. Copyright 1998 by Legal Publication Services.*

## Powerline contact causes burns to miner

A miner suffered electrical burns on April 15 at a sand and gravel operation in Edwardsville, Kan.

The miner, a mechanic who had just three and a half months experience, was hurt while helping to load a metal tank onto a flatbed

trailer. The crane being used to lift the tank used a wire cable. As the mechanic stood on the flatbed, he reached up with his right hand to steady the tank. At that point, the cable came into contact with a high voltage powerline and sent a charge

into his right arm, back, and right foot. His medical condition wasn't reported.

*Reprinted from the April 17, 1998 edition of **Mine Safety and Health News**. Copyright 1998 by Legal Publication Services.*

# 16

## Coal accident summary

### Fatal powered haulage accident

#### General information

The operation is a surface coal mine located in Arizona. The mine was opened in 1973 and has operated continuously to the present time. The mine employs 443 people, with 152 in the pits, 273 at the shops, warehouse and preparation plant, and 18 service and clerical workers. The mine operates three pits and produces coal three shifts per day, four to five days a week. Draglines and shovels remove the overburden and work six to seven days per week, three shifts per day. Coal is loaded by front end loaders and electric shovels and transported by truck to the preparation plant. Daily coal production is about 34,162 tons.

#### Description of accident

On Wednesday, October 15, 1997, at about 4:00 pm, the afternoon shift maintenance crew started their shift. The supervisor assigned two electricians, one of whom was the victim, to haul the 2570 Marion dragline swing motor on the 1989 Ford, F-900 flatbed truck (GVWR of 48,000 pounds) to the dragline in the J-19 pit. After making work assignments to other crew members, the foreman traveled to several job sites to check the progress of current repair work.

The two electricians loaded the dragline swing motor on the flatbed of the F-900 Ford truck. The total weight of the Marion dragline swing motor assembly is:

Swing motor ..... 19,100 pounds  
Brake assembly .... 3,100 pounds  
Brake wheel ..... 1,100 pounds  
Total weight..... 23,300 pounds

The motor was loaded in the upright position, with the brake assembly at the top. A 3/8-inch chain, 30 feet long, was installed from side to side of the truck bed in an effort to secure the motor and prevent

movement during transport. The chain tension was taken up with two 3/8-inch boomers (chain slack adjusters). The motor was also positioned on a 4-inch tubular steel frame stand that measured 4 feet by 4 feet and stood about 15 inches above the top surface of the truck flatbed. The stand was not secured to the truck bed, and slid/tipped over during the accident. The dragline swing motor assembly was secured to the stand with a 3/4-inch piece of hemp rope. The hemp rope did not break during the accident.

After the dragline swing motor was loaded, the victim drove the F-900 Ford flatbed toward the job site. The other electrician followed in a pickup truck about 50 feet behind the victim. At about 5:30 pm, while descending the ramp where the grade was about 14%, the other electrician observed the following conditions: The swing motor bounced up and down and broke the 3/8-inch chain. The swing motor fell forward and forced a guard (headache rack) into the truck cab and crushed the cab. The guard was constructed of 3-inch tubular steel and expanded metal facing. The guard was 92 inches wide by 54 inches high. The three support structures of the guard were welded to the 3/16-inch surface metal plating on the truck flatbed. There was a 17-inch high by 20-inch long steel support plate (brace) spot welded to both outside support structures. The resulting impact fatally crushed the victim against the steering wheel. The force of the impact broke out the rear truck window, crushed both doors, damaged the truck exhaust tube, bent forward the left side of the truck cab, both seats in the cab, and the steering wheel. The Ford F-900 was traveling at about 5 miles per hour and coasted to a stop at the

level bottom of the J-19 pit. The first person at the accident scene found the diesel engine running with the transmission in second gear. The truck had coasted to a stop on the level ground of the pit. It was determined that the accelerator pedal must have been depressed for the truck to have continued moving in second gear. Help was summoned by the pit foreman. The company emergency medical technician arrived on the scene, examined the victim and found no pulse, a crushed chest and no vital signs. The victim was removed from the truck and transported by company ambulance to the mine site medical facility, where he was pronounced dead by the Criminal Investigator for the police department.

#### Conclusion

The cause of the accident was management's failure to require the 23,300 pound swing motor assembly to be secured properly on the bed of the flatbed truck. The motor and assembly were set on a steel stand that were not secured to the truck bed. The 8'-3" long motor was loaded in the upright position and one 3/8-inch chain, 30 feet in length, with two 3/8-inch boomers (chain slack adjusters) used to secure the load so it would not slide from side to side and cause the truck to tip over. Statements by the victim's co-worker and immediate supervisor indicated that in Nov. 1997 the victim and co-worker had volunteered for crane training that included rigging instruction but had never received this training.

*Edited by Fred Bigio from an MSHA Accident Report.*



# Metal and Nonmetal accident summary

## Fatal powered haulage accident

### General information

A 50 year-old loadout lead man was seriously injured at about 10:00 am on October 20, 1997, when he was run over by a locomotive while cleaning the railroad scale. He died as a result of his injuries at about 3:00 am the following day. The victim had a total of 24 years mining experience at this mine, the last 10 years as a loadout lead man.

The mine was a crushed stone operation and normally operated one, 10-hour shift, five days a week. Total employment was 39 persons.

Stone was quarried by drilling and blasting multiple benches. Broken material was crushed, sized, and stockpiled for sale as construction aggregate. Approximately 80% of the finished product was shipped by rail.

### Description of accident

On the day of the accident, the victim reported for work at 6:30 am, his usual starting time. He worked at various tasks related to his job as loadout lead man which included cleaning railcars in preparation for loading and overseeing loadout procedures.

By 8:00 am, a coworker had parked the locomotive about three feet from the scale, with the rear of the engine toward the scale to enable the victim to use the locomotive's air supply. The locomotive involved in the accident was a 125-ton, ALCO, RS-1 I, company number 7589, powered by an 8400-cubic-inch diesel engine. An air compressor mounted at the rear of the locomotive crank shaft provided 760 cfm of air. On the

day of the accident, the locomotive was parked three feet from the scale. The brakes had not been set, and the locomotive was not blocked against motion. One brake shoe had been removed from the right side of the front truck.

By 8:30 am, ten railcars had been loaded and dropped to the front of the locomotive.

The scale consisted of a shallow pit containing 12, 8" x 12" steel I-beams that were perpendicular to the railroad tracks. The I-beams were spaced evenly at 12" intervals for the length of the scale, which was 12'. Metal cover plates, placed between the I-beams to prevent debris from falling into the scale, had been removed so the area beneath them could be cleaned.

At about 10:00 am the victim was seated at the end of the scale on a cross beam between the rails with his back to the locomotive, blowing debris from the scale. The victim was using a fiber re-enforced rubber hose, about 54' long, to blow debris from the scale, I-beams, and rail assembly. This hose was attached to the air compressor circuit on the locomotive. A laborer was using the backhoe to clean material beside the pit.

At the same time, four more railcars were loaded and released. The cars rolled from the bins a short distance and stopped, blocking an access road. The four cars were about 200' from the ten previously loaded railcars.

The loadout area was 1,000' from the scale. Of this distance, 850' sloped at a 0.02% decline and then leveled off for about 200' at the scale.

Rail cars were loaded from bins

in the plant, one at a time, then turned loose or pushed with a front-end loader so they would roll toward the locomotive in front of the scale. Fourteen railcars had been loaded on the day of the accident, each with about 110 tons of crushed stone. The brakes had not been set on any of the cars. The loadout crew was unaware that the scale was being cleaned when they were releasing the cars.

A loader operator saw that the road was blocked by the cars and pushed them with his loader so they would roll on down the track. The four cars hit the other 10 and pushed the locomotive over the victim.

The laborer ran to the mine office to summon help. The quality control inspector and emergency medical technician, returned with the laborer. The victim was pinned under the locomotive. The locomotive was moved and the brake linkage cut away with a torch so the victim could be removed.

The local rescue squad took the victim to a hospital where he died the following day.

### Conclusion

The accident was caused by failure to communicate to the loadout crew to discontinue coupling cars while work was being performed in front of the locomotive. Failure to set the brakes and block the locomotive against movement contributed to the severity of the accident.

*Edited by Fred Bigio from an MSHA Accident Report dated 20 October 1997.*

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## Coal-mine non-injury accident

On March 12, 1997, a dozer operator was pushing coal on a multi-feeder stockpile at a central preparation plant. The stockpile was equipped with both overhead sight balls positioned above each of the seven feeder locations and with flashing colored lights to indicate which feeders were operating.

During the morning the feeders were operated for about 4 hours. The No. 4 feeder periodically was not feeding coal, thus a void was suspected. As the dozer operator was moving coal away from the toe of the stock pile and pushing to the No. 3 feeder, the dozer passed too close to the No. 4 feeder. A void collapsed and the dozer slid into the cavity, rear-end first, and was buried beneath 15 feet of raw coal. The dozer operator's compartment was fully enclosed and equipped with an overhead emergency compartment containing a flashlight and an SCSR. The dozer's FM radio remained operative and communication with the entrapped operator was maintained throughout the recovery. The SCSR was not needed. Two nearby dozers were sent to the site and after 1:45, the dozer operator was recovered unharmed.

*Reprinted directly from the MSHA Website (including images): [www.msha.gov](http://www.msha.gov).*



▶ In this photo the blade of the buried dozer is exposed. The operator, working within a fully enclosed compartment, was unharmed and communicated via radio throughout the recovery process.

▶ In the lower photo, the operator's compartment is revealed and the operator was recovered unharmed.

▶ Far right, left-to-right: Robert Crumrine, Asst. Dist. Mgr., Dist. 3; Jerry Marolt, Prep. Plant Superintendent; David Hooper, Mine Safety Comm.; Tony King, Chmn., Mine Safety Comm.; Gary Dimmerling, General Manager, Central Ohio Coal Company.

## Central Ohio Coal receives award

Robert L. Crumrine, Assistant District Manager, District 3, presented a plaque from the Holmes Safety Association Mid-Ohio Chapter to the Central Ohio Coal Company Prep Plant employees for working 1,440 days without a lost-time accident. This was accomplished because of team work between management and the UMWA employees.



## MSHA Academy will hold Construction Safety Workshop

On June 9-11, 1998, the Academy will present a three-day training workshop on Construction Safety. This training is designed to prepare MSHA inspectors to perform workshops, courses, or seminars pertaining to mine site construction safety. This material is based on accidents and fatalities that have happened in construction work at mine sites. This workshop will follow the format of the **SHARP** (Surface Haulage Accident Reduction Program) training given to the haulage specialist from each district.

### TOPICS TO BE COVERED:

#### **30 CFR (Applicable Sections of Parts 56, 57, 77) Handling**

##### **Materials**

- Cranes
- Conveyors
- Forklifts
- Warehousing
- Fall protection

##### **Powered haulage**

- Walk around inspections

##### **Maintenance**

- Shops
- Field repairs
- Tire and rim

##### **Electrical**

- Lock out and tag out

##### **Slips and Falls**

- Walkways
- Handrails
- Emergency cords

##### **Personal protective equipment Scaffolding**

This workshop will be limited to 24 students. If you have questions, please contact Ed Newcomb (304-256-3213).

## Union Bridge recognized for safety record

No Union Bridge Laboratory employee has ever sustained a lost time accident during the 72 years that safety records have been kept (since 1926). Despite the fact that these employees work daily with strong chemicals and enter the quarry and plant production areas for sampling and quality control purposes numerous times each shift, there has never been a serious incident involving any of them.

To celebrate the attainment of 2-1/2 million safe employee-hours, the plant's Safety Ownership Committee sponsored a luncheon and awards presentation for all current, former, and retired Laboratory employees. In his remarks, MSHA's Jim Petrie praised the group's personnel, their safe work practices and the culture that made possible the Lab's extraordinary safety record. Other speakers, such as plant manager David Roush



and former Laboratory Supervisor Herb Weller, addressed the 30 and 40 year terms of service of many Lab employees and remembered the leadership of Ed Trankley, a Holmes Association awardee of days gone by who oversaw the Lab for a

large percentage of this record.

*Submitted by: L. Harvey Kirk III, CSP, Safety & Training-Supervisor, Phone: (410) 775-1008  
Lehigh Portland Cement Company, Union Bridge Operations, 117 South Main Street, PO Box 1100, Union Bridge, MD 21791,  
Telephone: 410-775-1000, FAX: 410-775-1009.*

◀ Present in the accompanying photo are:  
Front row: Jim Petrie (MSHA), Leroy Stitely, Ray Selby, Dave Honeycutt, Don Wilson  
Middle row: Mike Caricofe, Bud Kelly, Jeff Stull, Ken Keefer, Dick Claypoole, Charlie Eyler  
Back row: Herb Weller, Rick Staley, Sterling Derr, George Hemler, Jeff Hook

## MSHA Academy to host Surface Haulage Safety Seminar

A Surface Haulage Safety Seminar is scheduled for July 7-9, 1998, at the National Mine Health and Safety Academy in Beckley, West Virginia. Manufacturers of surface haulage equipment and systems and consultants to the mining industry will be invited to provide presenters at this event. There will be presentations from MSHA Technical Support

personnel with expertise in surface haulage safety.

The presentations will be offered several times throughout each day to allow as many people as possible to attend.

Seminar topics include many of the factors that have been identified as creating surface haulage accidents: Haulroad Design and Maintenance,

Equipment Maintenance, Dump Sites, Crane and Conveyor Operation, Loading and Unloading Materials, and Traffic Control.

For more information contact Jan Keaton at 304-256-3234, e-mail: [jkeaton@msha.gov](mailto:jkeaton@msha.gov), or fax 304-256-3247.

## NIOSH—Pittsburgh Research Laboratory to hold seminars

The Pittsburgh Research Laboratory of NIOSH has announced its intention to hold two mine safety and health technology transfer seminars on June 17 and again on June 24. The subject for both seminars will be "Improving Safety During Extended Cut Mining"

The first seminar will be on Wednesday, June 17 in Charleston, WV at the Charleston Marriott Town Center. The second will be on the

following Wednesday, June 24 in Evansville, IN at the Evansville Airport Marriott.

There is no cost to register for the seminars and they are open to anyone interested in attending.

Topics include:

- Ground Control Hazards
- Effects of Mine Planning on Safety
- MSHA Ventilation and Ground Control

- State Fatality Reports
- Operator Positioning Studies
- Operational Activities for Optimum Safety and Production
- Training for Crosscut Safety
- Applicable Emerging Technologies

*For additional information, please contact: Joy Lamars, NIOSH—Pittsburgh Research Laboratory, P.O. Box 18070, Pittsburgh, PA 15236. Phone: (412) 892-6472*

## Cement quarry blasting hurls rocks onto houses and cars

A cement company's March 25 blasting project went wrong and damaged two homes, cars, and several lawns in Northampton County, Pa.

"I could hear the glass dropping," said Sadie Hixon, after pieces of rock landed on her roof and shattered a window. "It scared the daylight out of me. I think I screamed three times."

Police said debris from the quarry was blasted from the work site at about 12:35 p.m. and struck

two homes and a gazebo near the site, and two cars driving on Route 248. He said rock blown from the cement company measured as large as 1-1/2 feet by 10 inches.

Hixon said quarry representatives had already put tar on her roof and said they would be back to replace shingles. She said she was fortunate, noting that the house owned by her neighbor, Denise Brooks, had more damage.

Brooks said she and her family were lucky they weren't home at the

time. The rocks put two holes in the roof and damaged the family's only bathroom. She said there is an L-shaped crack in the bathroom ceiling, and the family can't use the shower.

A spokeswoman for the quarry said the company is investigating the blast. She said the company has provisions to help families whose homes were damaged by the debris.

*Reprinted from the April 3, 1998 edition of Mine Safety and Health News. Copyright 1998 by Legal Publication Services.*

# Murderous rapids and frontier gunslinging

Death on the trails of the 1898 Klondike Gold Rush became a common occurrence, as over 100,000 individuals from around the world dropped what they were doing and “stampeded” toward Canada’s mysterious Yukon.

While dreams of gold propelled them forward, thousands of miles of wilderness, murderous rapids, mind-numbing cold and frontier gunslinging stopped many dead in their tracks.

Of the thirty thousand who made it to Dawson City, only a handful took substantial amounts of gold out of the Yukon.

And of these, the story of the man who owned the richest claim per square foot ever staked in the Yukon is typical: Dick Lowe came from the Black Hills gold country, struck it rich in the Klondike, became an alcoholic, married a dancehall girl, blew his cash and died penniless in San Francisco.

Despite its death toll, the world-famous Klondike Gold Rush is remembered fondly as the last and greatest of its kind.

It brought an end to a global depression which historians say was sharper, though shorter, than the great 1930s depression. It rekindled the smoldering dream of Western Canadian settlement, with Vancouver doubling, and Edmonton tripling their respective populations.

And today, ironically, “there is even a ‘family entertainment park’ outside San Francisco which features the Yukon among ‘five historic American areas.’”

## Rabbit Creek gets a name change

It would still be called Rabbit Creek today, but history had other plans for the small tributary of the Klondike River, tucked away in one of the most remote regions of the world.

It would soon become known

around the globe as the gold-laden Bonanza Creek.

On August 17, 1896, Skookum Jim and Tagish Charlie, members of the Tagish First Nations people, prospected for gold with George Carmack, a California man who had moved to the Yukon and joined the Tagish band, marrying Jim’s sister, Kate.

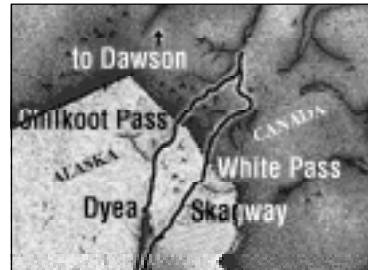
The trio had panned creeks before. This day was like many before it. But it would be like none that followed. It would become known forevermore as “Discovery Day.” According to legend, Carmack was led to the gold when he dreamed of king salmon with gleaming gold nugget eyes swimming in blue-green water.

The trio struck it rich that day. They discovered gold, staked their claims and quickly renamed the creek Bonanza. They would become immortalized as the codiscoverers of gold which, by today’s standards, would be worth over a billion dollars.

Word of The Bonanza Discovery spread fast among northern prospectors, but the Arctic winter was on its way, limiting the news leaving the Yukon and the number of gold seekers entering by way of avalanche-prone mountain passes. So it wasn’t until 1897-’98 that thousands descended on Dawson at the meeting point between the Yukon and Klondike Rivers.

Headlines such as “SHIP’S IN WITH A TON OF SOLID GOLD ON BOARD” had flashed across continents when the steamships Excelsior and Portland carried Klondike gold into San Francisco and Seattle.

Up and down the Pacific seaboard, steamships were soon swamped with requests. In British Columbia and Alberta, outfitters ran out of supplies as a steady stream of adventurers from eastern Canadian cities poured from rail cars.



◀ Map of the Yukon Territory and the Chilkoot Pass—where so many Klondikers came to grief.

## Klondicitis had struck—Risking death on the routes

Bonanza Creek was no roadside attraction on a much-traveled route.

Rather, its gold-laden waters trickled through a wilderness guarded by mountains where, during the winter, temperatures regularly plummeted to 50 below.

So when the first stampedeers poured enthusiastically from steamships into Skagway, Alaska, or hit the trails and rivers north of Edmonton, Alberta, they didn’t have a clue that they’d soon be fighting for their lives.

In Skagway, Soapy Smith, former king of the Denver underworld, shattered their naivete with bullets. His personal army of three hundred gangsters raped, pillaged, and murdered indiscriminately.

At the base of the treacherous Chilkoot Pass, North West Mounted Police officer Sam Steele described the scene:

“Neither law nor order prevailed, honest persons had no protection from the gang of rascals who plied their nefarious trade. Might was right; murder, robbery and petty theft were common occurrences.”

The alternative White Pass, to the east, was soon dubbed Dead Horse Trail, characterized by the stench of rotting horses which were strewn across it for miles.

Many men lost their minds on the Dead Horse Trail. Others lost their lives

# 22

Typical two-man operation with wood-fired water pump; note sluice boxes lying about and the mine entry behind the man at the left.

as a diet of rotten horse flesh led to raging fever. Screams of pain echoed through the canyons like deranged spirits throughout the winter of 1897.

And the overland and river routes from Edmonton, advertised by the city's leading businessmen and politicians as the fastest trip to Dawson, took up to three grueling years. Hundreds who left from Edmonton were drowned by the mighty Mackenzie River or frozen solid by the Arctic winter.

To set out as a stamper during the Klondike Gold Rush of 1897-'98 was indeed to risk death on the routes.

## *Mining the miners in Dawson City*

Those who survived avalanches, beat starvation and willed themselves through nightmarish circumstances eventually found themselves on a ridge above Dawson City.

From here they gazed down, bleary-eyed, at a collection of tents in a lake of mud which had instantly become the largest city west of Winnipeg and north of San Francisco.

Dawson soon developed the raunchy character of a 19th century frontier town, its ragged streets and rowdy saloons becoming the centre of the Klondike Gold Rush. In 1898, fortunes were won and lost as dancehall girls performed high kicks in the Monte Carlo, the Opera House (complete with saloon and gambling tables), and the Palace Grand (capacity: 2,200).

The North West Mounted Police maintained law and order in Dawson. Although they tolerated rampant prostitution and gambling, murder was conspicuously absent, left to towns on the American side of the Chilkoot Pass, in Soapy Smith's Sheep Town, Skagway and Dyea.

The Canadian federal government in Ottawa soon made the Yukon a distinct territory. After all, the hard-drinking miners in Dawson City could themselves be mined as a source of revenue through liquor taxation. On June 13th, 1898, the Yukon Territory was officially



opened for business.

Few of those who had dreamed of locating the motherlode actually cashed in gold dust, let alone nuggets. Many had instead dug within themselves and found an entrepreneurial streak that would help them mine the miners, and survive.

Dawson's preeminence in the north lasted for one more year. Then, suddenly, in 1899, like a giant nomadic tribe, the dreamers and survivors, locked in a transient symbiosis, streamed out of Dawson City without a glance back.

They were off to the beaches of Nome, Alaska, hundreds of uncharted miles to the west, near the Bering Strait, where it was rumored the sand was speckled with flakes of gold.

## *Shrouded in myths and legends*

The Klondike Gold Rush attracted tens of thousands of drifters and dreamers of the late nineteenth century. It was triggered by newspaper coverage during an era of sensationalist journalism. As Canadian author Pierre Berton writes in his bestselling classic and winner of the Governor General's Award for Non-Fiction, *KLONDIKE*: "...and the story, written by an ingenious reporter named Beriah Brown, coined the phrase that flashed round the world: "At 3 o'clock this morning the steamer Portland from St. Michael [bound] for Seattle, passed

up the sound with more than a ton of solid gold on board..." Brown had reckoned that the weight of the gold dust would sound more dramatic than its value. His instinct was right. By evening, the phrase "a ton of gold" was being published by newspapers all around the world.

The information might have been fact or fiction. It didn't matter to the 100,000 stampers who set out immediately for the Klondike. And ever since, the Klondike Gold Rush has been shrouded in mythology. Here are a few "nuggets of fact and fiction" surrounding the Gold Rush.

## *Martha Louise Black*

Abandoned by her first husband en route to the Klondike in 1898, she hiked over the Chilkoot Pass, sailed pregnant down the Yukon River in a homemade boat to Dawson, bore her child in a log cabin, raised money, bought a sawmill, bossed 16 men on a mining claim, married George Black who became Yukon's Member of Parliament and upon his illness ran for, and won, his seat. Martha Black became Yukon's first, and Canada's second, woman Member of Parliament.

## *Diamond Tooth Gertie*

Now the name of the gambling hall in Dawson City, Diamond Tooth Gertie (Gertie Lovejoy) was a bona fide Yukon dance hall queen. Her nickname came

from the sparkling diamond she had wedged between her two front teeth. She made a fortune unloading the miners of their gold nuggets.

**The Bishop who ate his boots**

This story was the inspiration for the famous scene in Charlie Chaplin's movie "The Gold Rush." Lost in an ice fog at -40°F with no more provisions, Bishop Stringer hit on the idea of boiling his and his companion's sealskin and walrus sole boots for seven hours, then drinking the broth. According to the Bishop, it was "tough and stringy, but palatable and fairly satisfying." The Bishop lost 50 pounds, but eventually found his way to a Native village where he was nursed back to health

**Belinda Mulrone**

On arriving in the Klondike, she threw her last 50 cents into the Yukon River, swearing she would never need such small change again. She began her quest for riches by selling rubber boots, cotton goods, and hot water bottles at a 600% profit. She built a roadhouse at Bonanza Creek, owned six mining properties by the end of the year, and eventually built the Fairview Hotel, one of the swankiest establishments in Dawson City.

**He worked for the richest man in the Klondike**

Thomas Andrew Firth grew up in Ontario. After a brief trip to Pennsylvania during his late teens, he disappeared from family records, resurfacing to join the Klondike Gold Rush at the age of 31. Shortly after the Portland steamed into Seattle harbor in 1897, carrying Klondike gold, Firth climbed aboard another ship with a couple of friends, and set out for the Klondike. He didn't find gold in the Klondike, but he did found the Firth Insurance Agency Brokerage in 1906. It is still run today by family.



◀ Near left: The all-important job of weighing out a seasons worth of gold nuggets scoured from the Klondike. Far left: There were a small number of adventurous women who heeded the call of gold fever as this mixed group of sports enthusiasts can attest to.

**CHILKOOT TRAIL SUPPLIES—then**

Photos of a human chain of stampedeers trudging up the Chilkoot Pass have come to symbolize the Klondike Gold Rush.

In 1897-'98, the North West Mounted Police set up a border crossing into Canada at the summit of the Chilkoot. They ordered every stampeder to carry a year's worth

of supplies. After all, there was no turning back once they were into the Klondike, and commerce was limited, to say the least.

As a result, many stampedeers struggling up the mountain rampart were bent double under the weight of their packs, which typically contained the following:

**1898 Chilkoot Trail supplies: McDougall and Secord Klondike outfit list:**

**Clothing:**

- 2 suits heavy knit underwear
- 6 pairs wool socks
- 1 pairs heavy moccasins
- 2 pairs german stockings
- 2 heavy flannel overshirts
- 1 heavy woollen sweater
- 1 pair overalls
- 2 pairs 12-lb. blankets
- 1 waterproof blanket
- 1 dozen bandana handkerchiefs
- 1 stiff brim cowboy hat
- 1 pair hip rubber boots
- 1 pair prospectors' high land boots
- 1 mackinaw, coat, pants, shirt
- 1 pair heavy buck mitts, lined
- 1 pair unlined leather gloves
- 1 duck coat, pants, vest
- 6 towels
- 1 pocket matchbox, buttons, needles and thread, comb, mirror, toothbrush, mosquito netting, etc.
- 1 dunnage bag
- 1 sleeping bag
- 1 medicine chest
- pack saddles
- complete horses tack
- flat sleighs

**Food:**

- 100 lbs. navy beans
- 150 lbs. bacon
- 400 lbs. flour
- 40 lbs. rolled oats
- 20 lbs. corn meal
- 10 lbs. rice
- 25 lbs. sugar
- 10 lbs. tea
- 20 lbs. coffee
- 10 lbs. baking powder
- 20 lbs. salt
- 1 lb. pepper
- 2 lbs. baking soda
- 1/2 lb. mustard
- 1/4 lb. vinegar
- 2 doz. [tins] condensed milk
- 20 lbs. evaporated potatoes
- 5 lbs. evaporated onions
- 6 tins (4 oz.) extract beef
- 75 lbs. evaporated fruits
- 4 pkgs. yeast cakes
- 20 lbs. candles
- 1 pkg. tin matches
- 6 cakes borax
- 6 lbs. laundry soap
- 1/2 lb. ground ginger
- 25 lbs. hard tack
- 1 lb. citric acid
- 2 bottles jamaica ginger

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

# Holmes Safety Association Proposed constitution changes

## SECTION 11. EXECUTIVE COMMITTEE FUNCTIONS

(a) **COMPOSITION.** The Executive Committee shall be composed of the following: representatives from each state council, representatives from district councils, at large representatives from each of the interest groups to wit: (1) organized labor, (2) industry management, (3) state enforcement agencies, (4) federal agencies, and (5) manufacturers, suppliers or insurance groups, academia and contractors.

(b) **DUTIES.** The Executive Committee shall be the overseer of the National Holmes Safety Association. No business shall occur before the membership in the regular session until the Executive Committee has reviewed and recommended such. The Executive Committee shall hold at least one meeting each year at a designated time and place by the President. The Executive Committee shall plan and promote national accident prevention campaigns and provide suitable trophies for the winners. It shall supervise the activities of the Holmes Safety Association. The Executive Committee shall have authority to employ such clerical and other assistants as may be necessary to carry out the responsibilities and duties of the National Council. At least one regularly scheduled meeting of the Executive Committee for conducting business shall occur before the regular annual spring meeting of the National Council. The designated time and place of the meeting will be selected by the President from the appropriate zone as noted in Section 11. (d). Other meetings of the Executive Committee may be called by the President, or at the request of any five members of the Executive Committee, held at a suitable time and place after written notice to its members at least thirty days before the meeting.

(c) **QUORUM FOR BUSINESS.** There shall be a minimum of twenty members of the Executive Committee present before any business of the Executive Committee shall be deemed official. This shall not prevent the Secretary/Treasurer from paying any obligations of this Association which have been properly presented for payment when a quorum is not available.

(d) **SELECTION OF ANNUAL MEETING SITE.** In order to reflect the national scope of the Holmes Safety Association, the Annual Society spring meeting location should be rotated among the following four zones listed below. Annual meeting site location will be rotated in the following order: Zone 1, Zone 2, Zone 3, and Zone 4. Each year, at the annual spring meeting, representatives from the following four zones may petition the Executive

Committee to consider their particular location as a meeting site for the next meeting in their particular zone. Should no representative of a particular zone desire to host the next annual meeting, the annual meeting site will be rotated to the next zone.

### ZONE 1

Mississippi ..... Louisiana ..... Arkansas  
Florida ..... Tennessee  
South Carolina ..... Kentucky  
West Virginia ..... Alabama  
North Carolina ..... Virginia ..... Georgia  
Washington, DC ..... Maryland

### ZONE 2

Washington ..... Oregon ..... Idaho  
Montana ..... Wyoming ..... North Dakota  
South Dakota ..... Nebraska ..... Minnesota  
Iowa ..... Alaska ..... Missouri  
Wisconsin ..... Illinois

### ZONE 3

Michigan ..... Indiana ..... Pennsylvania  
Ohio ..... New Jersey ..... Delaware  
New York ..... Rhode Island  
Massachusetts ..... Connecticut  
New Hampshire ..... Vermont  
Maine

### ZONE 4

California ..... Nevada ..... Utah  
Arizona ..... New Mexico ..... Colorado  
Kansas ..... Oklahoma ..... Texas  
Hawaii

## SECTION 12. COMMITTEE FORMATION

The committee structure shall be presidential appointed consisting of five members from the Executive Committee, one of whom shall serve as chairperson. Committee members should represent each of the five interest groups (1) organized labor (2) industry management (3) state enforcement agencies (4) federal agencies and (5) manufacturers, suppliers or insurance groups, academia and contractors. Representation from each interest group shall be a primary consideration for all committee involvement. The president may appoint an appropriate number of executive committee members to a specified committee as necessary, when representation of an interest group is unavailable. The president shall appoint the Committee with each member of the Committee representing a different state, and designate a chairperson.

## SECTION 13. COMMITTEE DUTIES

(a) **NOMINATING COMMITTEE.** The Nominating Committee shall review all

nominations and recommend nominees for all elective offices, for members of the Executive Committee, and for representatives on the Board of Directors of the Joseph A. Holmes Association. All nominations shall be recommended by at least one member of the Executive Committee, a district council or a state council. Nominations shall be submitted to the secretary/treasurer on or before March 31. The secretary/treasurer shall forward all nominations to the chairperson and members of the nominating committee no later than April 15. The chairperson shall communicate with the members prior to the National Council Meeting and prepare a proposed slate for presentation to the Executive Committee. Upon the recommendation of the Executive Committee, the slate shall be presented to the National Council meeting for a voice vote and approval by a majority of those present. Meetings of the Nominating Committee shall be called by the chairperson at a convenient time prior to the National Council Meeting.

(b) **FINANCE COMMITTEE.** The Finance Committee shall conduct periodic reviews of the Association's actual and budgeted expenses, make recommendations for the investment of surplus funds, recommendations to reallocate budgeted funds, and any recommendations that may be deemed necessary to assure the fiscal integrity of the Association. The Secretary/Treasurer shall not be a member of the finance Committee but shall attend its meetings.

(c) **AUDIT COMMITTEE.** The Auditing Committee shall at least once a year examine and audit the funds and securities belonging to the National Council and report thereon at the annual spring meeting of the National Council. The Secretary/Treasurer shall not be a member of the Auditing Committee but shall attend its meeting.

(d) **SCHOLARSHIP COMMITTEE.** Scholarship for Mining Committee will administer the Scholarship Program through established procedures and guidelines, with the approval of the executive committee. The Scholarship program will be financed through specified donations to the scholarship for mining fund. The National secretary/Treasurer will receive funds and maintain a separate account for this purpose and provide the executive committee with an annual report for review and approval.

(e) **PROGRAM COMMITTEE.** The Program Committee is formulated to develop and coordinate the Annual National meeting in accordance with an identified zone outlined in Section 11 (d). The committee will arrange all appropriate accommodations as necessary



in fulfilling safety educational objectives related to mining interests. The chairperson may delegate specific Program components of interest to committee members and strive in a collective effort to accomplish informational goals. A committee representative shall report the Program Committee's current status and future progression strategies for the following national meetings.

(f) **REVITALIZATION COMMITTEE.** The Revitalization Committee shall plan, develop and promote meetings to encourage active membership throughout the states mentioned in Section 11 (d). Committee members are to assist in the promotion of safety educational emphasis by organizing, producing and distributing informational media to enhance communications among interested parties. The committee will identify potential growth areas and provide assistance towards establishing new or reviving existing chapters and councils as necessary. A committee representative shall report the current status and future progression strategies concerning Revitalization efforts.

(g) **AWARDS COMMITTEE.** The Awards Committee shall review all referred award applications and recommend approval or disapproval according to their specified criteria. The chairperson is to correspond with the National Secretary / Treasurer and the committee members in disseminating award applications submitted. Each

committee member shall respond to the chairperson as award applications are received and evaluated. The committee shall monitor award activities and may suggest potential improvements for the recognition of industry safety efforts as necessary.

(h) **CONSTITUTION COMMITTEE.** The Constitution Committee shall monitor all active committee activities in reference to existing Constitution guidelines. The chairperson along with constitution committee members may recommend amendment development to the By-laws or Constitution (identified in section 13 (i) to reflect current association evolutions. The committee shall report all amendment proposals and committee activity relative to the By-laws and Constitution.

(i) **AMENDMENTS TO THE CONSTITUTION OR BY-LAWS**

(1) **AMENDMENT PROPOSAL.** The Constitution and By-laws may be amended by submitting proposals and supporting rationale to the National Secretary before the National meeting. All proposed amendments must include an endorsement by a member of the Executive Committee or receive official support of a District Council with copies of the minutes sent to the National Secretary / Treasurer. All proposed amendments must reach the National Secretary / Treasurer by January 31 of each year. The Secretary shall mail copies of such proposals with a response

form to the members of the Executive Committee and officers. The response form shall provide a means of showing support for or against the proposal, space for comments and be returned to the National Secretary / Treasurer by a specified date. If a majority of at least 20 of the responses show support for the proposal, the National Secretary / Treasurer shall cause the proposal to be published in the Holmes Safety "Bulletin" for two consecutive months before the national meeting to allow comments from the membership. All comments received shall be copied and distributed to the members of the Executive Committee and officers at or before the Executive Committee session of the National Meeting. After any needed discussion, the President shall call for a vote of the Executive Committee. With a majority vote of the Executive Committee, the proposal shall be recommended for a vote by the members present at the National Council meeting.

(2) **VOTING OF THE MEMBERSHIP**

Proposals recommended by the Executive Committee by paragraph (1) shall be accepted upon two-thirds majority votes of those present at the national Meeting if at least 20 members of the Executive Committee shall be present in the General Session of the National Council meeting. Such results shall be published in the next edition of the "Bulletin."

## January 30, 1904; Maple Hill Colliery; Mahomoy City, Pa.; 5 killed

(From Reports of the Inspector of Coal Mines of the Anthracite Coal Regions of Pennsylvania, 1904, p. 264)

On January 30, five machinists were killed in Maple Hill No. 2 shaft. The top man says that they all came up and fired a blast, making the sump. Then they went down again to fire another round, leaving the laborers on top. One man soon returned to the surface again saying that he wanted four sticks of dynamite and two exploders, which he received from the top man. He took them with him and went down again. He held them in his hand. The exploders were fastened in the dynamite ready to be used before he left the top of the shaft. The top man said that the bucket had just about reached the bottom when there was a signal given to the engineer to hoist men. When the bucket was up about 275 feet

from the bottom there was an explosion, and when... [the bucket] landed there was no one on it. The hose which was in the bucket was partly hanging out of it and was torn. There was also in the bucket one monkey wrench, one manifold, one 18 inch steel point, all of which were broken except the 18 inch point. In making a personal examination I found six rivets blown out of the bucket and the bottom bulged out. I also found pieces of oil cloth clothes on the timber about 275 feet from the bottom. On examining the bottom of the shaft I found that a round of shots had been fired in the sump. There were also five holes in the hitch in the northwest corner which were charged and two holes charged

in the northeast corner hitch, and 6 sticks of dynamite on a loose rock connected by wire ready to be fired with the battery. In my opinion the dynamite and exploders had not been used, but were in the bucket with the men ascending the shaft. The supposition is that one of the tools found in the bucket fell on the exploder, which was fastened to the dynamite in the bottom of the bucket, causing the explosion. Five men were found dead at the bottom of the shaft.

Reprinted from **Historical Documentation of Major Coal Mine Disasters in the United States Not Classified as Gas or Dust: 1846-1962**, U.S. Bureau of Mines, Bulletin No. 616.

## THE LAST WORD...

**“If you think you can, you can. And if you think you can’t, you’re right.”**—Mary Kay Ash

**“Lots of folks confuse bad management with destiny.”**—Kin Hubbard

**“To love and be loved is to feel the sun from both sides.”**—David Viscott, M.D.

**“There are no shortcuts to any place worth going”**—Beverly Sills

**“Kind words can be short and easy to speak, but their echoes are truly endless.”**—Mother Teresa

**“Spring is nature’s way of saying, ‘Let’s party!’”**—Robin Williams

**“Children have more need of models than of critics.”**—Carolyn Coats

**“You can’t put a price tag on love, but you can on all its accessories.”**—Melanie Clark

**“Happiness makes up in height for what it lacks in length.”**—Robert Frost

**“The best way to win an argument is to begin by being right.”**—Jill Ruckelshaus

**“Tomorrow is often the busiest day of the week.”**—Spanish proverb

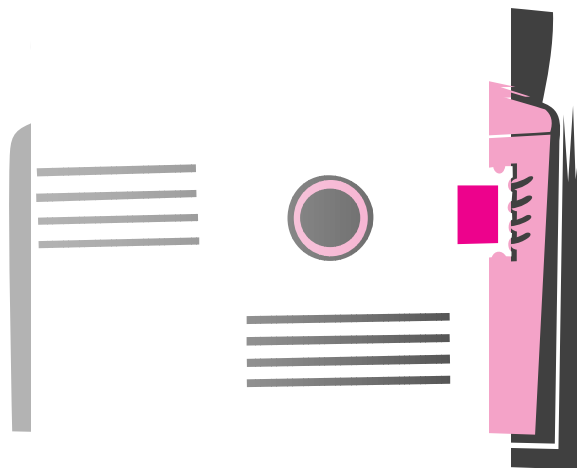
**NOTICE:** We welcome any materials that you submit to the Holmes Safety Association Bulletin. For more information visit the MSHA Home Page at [www.msha.gov](http://www.msha.gov). We **DESPERATELY** need color photographs suitable for use on the front cover of the *Bulletin*. We cannot guarantee that 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).



# Holmes Safety Association Officers and Executive Committee 1997-1998

<i>Officer</i>	<i>Name</i>	<i>Representing</i>	<i>State</i>
<b>President</b> .....	<b>Roger Carlson</b> .....	<b>Labor</b> .....	<b>MN</b>
<b>First Vice President</b> .....	<b>Gary Moore</b> .....	<b>Mgmt.</b> .....	<b>NM</b>
<b>Second Vice President</b> .....	<b>Steve Lipe</b> .....	<b>Supplier</b> .....	<b>AZ</b>
<b>Third Vice President</b> .....	<b>Joseph Sbaffoni</b> .....	<b>State</b> .....	<b>PA</b>
<b>Fourth Vice President</b> .....	<b>Doyle Fink</b> .....	<b>Federal</b> .....	<b>TX</b>
<b>Secretary-Treasurer</b> .....	<b>Robert Glatter</b> .....	<b>Federal</b> .....	<b>VA</b>

<i>Name</i>	<i>Representing</i>	<i>State</i>	<i>Name</i>	<i>Representing</i>	<i>State</i>	<i>Name</i>	<i>Representing</i>	<i>State</i>
Jesse Cole .....	Federal	WV	Bill Holder .....	Mgmt.	NM	William Garay .....	State	PA
John Collins .....	Federal	OH	Glen Hood .....	Mgmt.	TX	Lee Graham .....	State	KS
Don Conrad .....	Federal	PA	Robert Johnson .....	Mgmt.	CO	Tom Gregorich .....	State	MN
Dave Couillard .....	Federal	MN	Joe Kinnikin .....	Mgmt.	NM	Tony Grbac .....	State	WV
Robert Crumrine .....	Federal	OH	George Krug .....	Mgmt.	FL	Ben Hart .....	State	FL
Ron Deaton .....	Federal	KY	Pete Kuhn .....	Mgmt.	WY	Paul Hummel .....	State	PA
Bruce Dial .....	Federal	WV	Joseph Lamonica .....	Mgmt.	DC	Phillip Johnson .....	State	KY
Jim Hackworth .....	Federal	VA	Kevin LeGrand .....	Mgmt.	IA	Debbie Kendrick .....	State	AK
Patrick Hurley .....	Federal	VA	Ernest Marcum .....	Mgmt.	WV	Douglas Martin .....	State	AZ
Whitey Jacobson .....	Federal	TX	J. Blair McGill .....	Mgmt.	PA	Gilbert Meira .....	State	NM
Jerry Johnson .....	Federal	WV	Jon Merrifield .....	Mgmt.	OH	Jim Myer .....	State	OH
Jack A. Kuzar .....	Federal	CO	Bill Moser .....	Mgmt.	WV	Glen Rasco .....	State	GA
Rexford Music .....	Federal	KY	Kevin Myers .....	Mgmt.	KY	Ed Sinner .....	State	OR
Joseph Pavlovich .....	Federal	KY	Myron Nehrebecki .....	Mgmt.	PA	Richard Stickler .....	State	PA
Leland Payne .....	Federal	KY	Greg Oster .....	Mgmt.	MN	Bonita Stocks .....	State	AR
James Petrie .....	Federal	PA	Richie Phillips .....	Mgmt.	KY	Ron Umshied .....	State	MT
John Radomsky .....	Federal	MN	Richard Radakovich .....	Mgmt.	PA	Sam Vancil .....	State	IL
Bob Randolph .....	Federal	PA	David Rebuck .....	Mgmt.	PA	Michael Weaver .....	State	ID
Mel Remington .....	Federal	PA	Ray Rucker .....	Mgmt.	TX	Mark Wharton .....	State	CO
Martin Rosta .....	Federal	AL	Subash Sethi .....	Mgmt.	NM	Alan Cook .....	Supplier	AZ
James Salois .....	Federal	MN	Nancy Staley .....	Mgmt.	MI	Steve Walker .....	Supplier	WV
Donna Schorr .....	Federal	PA	Cheryl Suzio .....	Mgmt.	CT	Bruce McDermit .....	Supplier	PA
John Shutack .....	Federal	VA	Steve Taylor .....	Mgmt.	TX	Chuck Edwards .....	Supplier	PA
Judy Tate .....	Federal	TX	Penny Traver .....	Mgmt.	MI	Shea Kirkpatrick .....	Supplier	CA
Timothy Thompson .....	Federal	WV	William Vance .....	Mgmt.	NM	Alex Bacho .....	Emeritus	MD
Glenn Tinney .....	Federal	PA	Frank Salas .....	Labor	AZ	Vern Demich .....	Emeritus	PA
Lloyd Armstrong .....	Mgmt.	MN	Harry Tuggle .....	Labor	PA	Ford B. Ford .....	Emeritus	VA
H.L. Boling .....	Mgmt.	AZ	Joe Main .....	Labor	DC	William Hoover .....	Emeritus	AZ
Richard Burns .....	Mgmt.	WY	Doug Conaway .....	State	WV	Ronald Keaton .....	Emeritus	WV
Robert Coker .....	Mgmt.	TX	Ron Cunningham .....	State	OK	Richard Machesky .....	Emeritus	PA
Gary Cook .....	Mgmt.	NM	Steve Dunn .....	State	MO	Irmadell Pugh .....	Emeritus	WV
William Craig .....	Mgmt.	WY	Bob Novello .....	State	TX	Al Simonson .....	Emeritus	MN
Jim Dean .....	Mgmt.	WV	Marino Franchini .....	State	NY	Harry Thompson .....	Emeritus	PA
Chuck Gessner .....	Mgmt.	AZ	John Franklin .....	State	KY	Tom Ward, Jr. ....	Emeritus	PA
Matt Hindman .....	Mgmt.	PA	Larry Frisbie .....	State	WA			

*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:**

- **May 20-21, Kansas Shoot-out Regional Mine Rescue Contest, Hutchinson Community College Campus, Hutchinson, KS**
- **May 27-29, Southwest Safety Conference/Expo, Phoenix Civic Plaza, Phoenix, AZ**
- **Jun. 3-5, 5th Annual Western Mine Safety & Health Workshop, Denver, CO**
- **Jun. 9-11, Longwall USA '98, Lawrence Convention Center, Pittsburgh, PA**
- **Jun. 21-24, 1998 Natl. Mt. Meeting—HSA/NASMA/MIA, Tampa Hyatt, Tampa, FL**
- **Jul. 7-9, Metal/Nonmetal National Mine Rescue Contest, Convention Ctr., Las Vegas, NV**

