BULLETIN

HOLMES SAFETY ASSOCIATION

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SAFETY EFFICIENCY

MINERAL INDUSTRIES

HOLMES SAFETY ASSOCIATION
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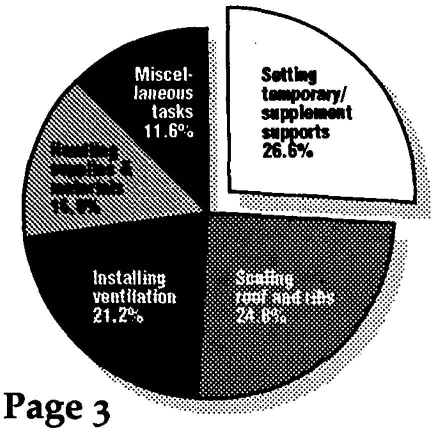
May-June 1994

HOLMES SAFETY ASSOCIATION
OPEN-PIT PETE

Contents



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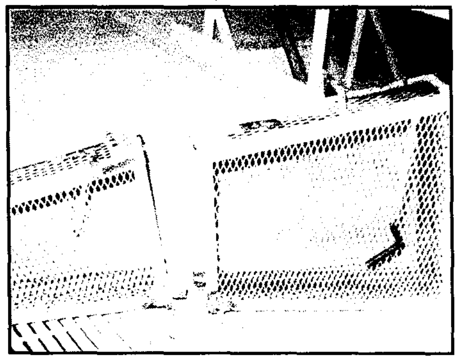

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Please note: The views and conclusions expressed in HSA Bulletin articles are those of the authors and should not be interpreted as representing official policy of the Mine Safety and Health Administration.

KEEP US IN CIRCULATION

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.

Welcome new members

NAME	CHAPTER NO.	LOCATION
Lang Brothers, Inc.	10787	Bridgeport, WV
Cummins/Onan	10788	Albany, NY
Tidewater Sand & Gravel, Inc.	10789	Oakland, CA
RMC Lonestar #110	10790	Marina, CA
Franklin Gravel	10791	Paradise, CA
Franklin Construction Co., Inc.	10792	Paradise, CA
Lens Creek No. 1	10793	Charleston, WV
Keystone Rehabilitation Systems, Inc.	10794	Indiana, PA
Coal City No. 1 Mine	10795	Coal City, WV
Narco, Inc.	10796	Smithers, WV
Scott Whipple Co.	10797	Logandale, NV
Randsburg Mining Investment	10798	Randsburg, CA
Summit Coal Co.	10799	Klingerstown, PA
Continental Lime, Inc.	10800	Townsend, MT
Basin Resources, Inc.	10801	Weston, CO
Lime Mountain Company	10802	Paso Robles, CA
Troesh Ready Mix, Inc.	10803	Santa Maria, CA
Viborg Sand & Gravel, Inc.	10804	Paso Robles, CA
Central Valley Ready Mix	10805	Sanger, CA
Sanger Pit & Mill	10806	Sanger, CA
Kettle River Operations	10807	Republic, WA
Rockwood Stone, Inc.	10808	Newport, MI
Tux Mineral Hill Mine	10809	Gardiner, MT
Puget Sound Surfacers, Inc.	10810	Forks, WA
Oak Hill Monoc #2	10811	Oak Hill, WV
Highwall Miner	10812	Elkview, WV
Belle Creek No. 1	10813	Canvas, WV
Oscar J. Boldt Construction Co.	10814	Cloquet, MN
Corona Industries Sand Project	10815	Corona, CA
Kasler Corporation	10816	San Bernardino, CA
Kanawha Stone Company	10817	Nitro, WV
National Mine Service Co.	10818	Grand Junction, CO
Flame Safety Supply	10819	Salt Lake City, UT
Trinidad State Junior College	10820	Trinidad, CO
Cimarron Mine	10821	Raton, NM
Phoenix Cement Co.	10822	Clarkdale, AZ
United Steel Workers #4880	10823	Benton, AR
Don Robinson Sand & Gravel Inc.	10824	Auburn, CA
United Rock Products	10825	Irwindale, CA
Mathiowetz Construction Co.	10826	Sleepy Eye, MN
Selective Services, Inc.	10827	Elkiew, WV
Holnam, Inc.	10828	Seattle, WA

There is still time to make plans to attend the JAHSA and HSA annual meeting in Lexington, Kentucky, on June 7-9, 1994. Further information can be found on page 13.

Roof bolting safety: pinpointing critical areas for training

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Introduction

Researchers at West Virginia University have been involved in a U.S. Bureau of Mines project aimed at eliminating hazards and reducing injuries in roof bolting operations. The basis of this study was the review and analysis of 2,083 roof bolting accidents reported in the West Virginia Safety Information System (WVSIS) for the period of 1983-87. This five year database provided sufficient accident information from a range of mines in different coal seams so that researchers could identify the most frequent job hazards that lead to injuries in roof bolting operations.

The term microanalysis was used to describe the analysis of the roof bolter accident reports. This analysis focused on the sequence of work activities performed by miners who were assigned roof bolting tasks. It involved a review of injury narratives and accident descriptions from accident reports, and the recoding of the accident situation according to typical work routines that occur during the roof bolting cycle.

The findings of the analysis showed this distribution of injuries:

1. Classified roof bolters and roof bolter helpers comprised about 82 percent (1,706) of the 2,083 roof bolting-related accidents. Miners in other job classifications who were injured while doing roof bolting work accounted for the remaining 18 percent (377) of the accidents.

Of the classified roof bolters only, about one fourth of the injuries occurred in work unrelated to roof bolting. Of this proportion, utility work (54 percent) and maintenance activities (16 percent) accounted for the majority of injuries in non-bolting work, followed by other section equipment (11 per cent), transportation (11 percent) and surface or other work activities (8 percent).

2. A majority (58.4 percent) of all roof bolting accidents occurred in one of four distinct work routines: I) face area preparation, 2) tramming, setting the Automatic Temporary Roof Supports (ATRS) and repositioning the boom and jacks, 3) drilling bolt holes, and 4) bolt installation. These work routines accounted for 1,217 of the roof bolting related injuries

For each of the work routines, researchers grouped the number of accidents and types of injuries to determine the average severity in terms of non-fatal days lost (NFDLs). Researchers then estimated the amount of time per task based on a series of time studies of roof bolting operations in nine mines. The element of time was the critical variable in developing risk indices which indicate the amount of time that workers are exposed to hazards for each of the four work routines.

3. Drilling bolt holes accounted for the largest number of injuries followed by installing bolts, tramming and face area preparation. However, the routine consisting of tramming, positioning the boom and jacks, and setting the ATRS had a larger percentage of lost time accidents and a higher average severity per accident. Drilling bolt holes was next followed by face area preparation.

The analysis identified many more bolting injuries that had occurred while roof bolting at the face. However, many of these accident narratives did not provide sufficient information to pinpoint the worker's activity at the time of injury. Thus, these incidents could not be reclassified as part of a particular work routine.

Roof bolting injuries by work routine

The WVSIS database provided a broad picture of the different tasks, varying mining conditions and equipment used in roof bolting. It also identified a range of accidents that tend to pose the most problems for roof bolters in terms of frequency of occurrence and severity of injury.

Of the four roof bolting routines, drilling bolt holes accounted for the largest number of injuries followed by installing bolts, tramming and then

Table 1.—Number of injuries by work routines at the face

Bolting work routine	Reported injuries Percent	Number
Face area preparation	18.2	222
Tram, Position, ATRS	23.3	284
Drilling holes	34.2	416
Installing bolts	24.2	295
Total	**100.0**	**1,217**

lace area preparation. Table 1 lists the four routines and the number of accidents for each. From the review of accident reports, researchers found that many injuries which could not be classified did fall into two categories, either drilling holes or inserting bolts. These routines, therefore, would actually account for a greater number of injuries.

The following are descriptions of the roof bolting routines:

Face area preparation

Face area preparation accounted for less than one fifth of all roof bolting accidents, but consisted of more injuries to the back than any of the other work routines. It is important to note that face area preparation includes activities (e.g., scaling or barring down loose top) which are performed throughout the roof bolting cycle, not only at the beginning of the cycle.

Figure l shows the job tasks that comprise the face area preparation routine. Three tasks in this routine made up 72.6 percent of the accidents. These were l) setting and removing temporary and supplemental supports, 2) scaling or barring down roof and ribs, and 3) installing curtain or handling other ventilation materials.

This routine is characterized by high percentage of overexertion injuries, especially as miners set and remove temporary and supplemental supports, or handle ventilation materials. In addition, falls of roof and rib rocks accounted for many injuries to miners who were scaling or barring down loose top and rib.

Tramming, positioning the boom/jacks, and setting the ATRS

In this work routine, two activities accounted for 65.8 percent of the accidents: tramming the roof bolting machine and positioning the boom and jacks. The task of setting the ATRS comprised

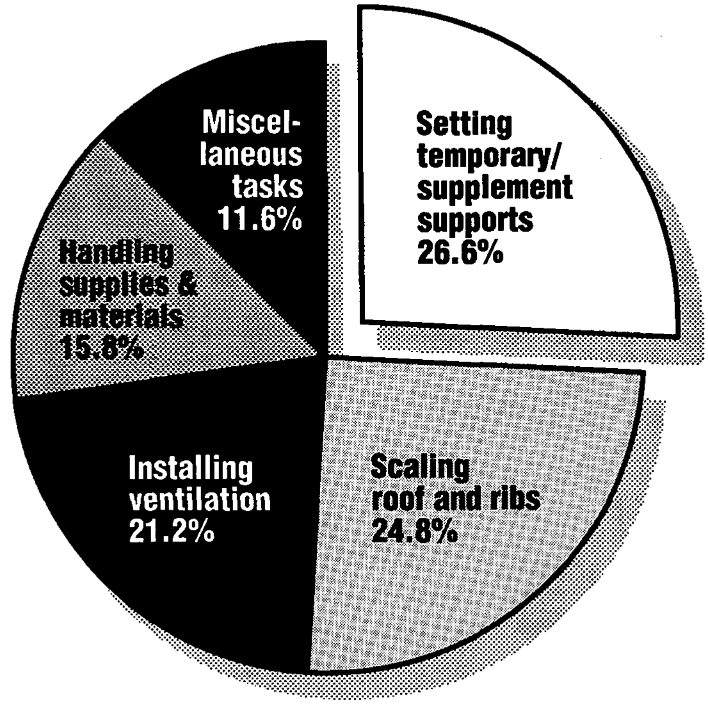

Figure 1.—Face area preparation injuries

14.8 percent of the accidents.

Accidents related to the use of the ATRS did increase on average during the five year sample period. ATRS related injuries accounted for only 10 percent of the accidents during 1983-84 compared to 18 percent between 1985-87. However, West Virginia mandated the use of the ATRS in 1983, and the percentage rise in accidents may be due to better reporting as well as an increased use of the protective machine component.

Figure 2 provides a picture of the most common work tasks that led to injuries in this work routine. The chest, hips, and trunk were the most common body part injured. These injuries were also the highest in average severity which was calculated as average number of days missed from work per accident. The two leading causes of injuries to these body parts were from falls of roof and rib (28 percent) and from strikes by equipment (27 percent).

Drilling bolt holes

The drilling work routine accounted for the largest number of roof bolting related injuries. Drilling of the bolt hole was the largest single cause of these accidents, and accounted for about two-thirds of the injuries. Rotating drill steels caused 40 percent of the injuries. Falls of rock

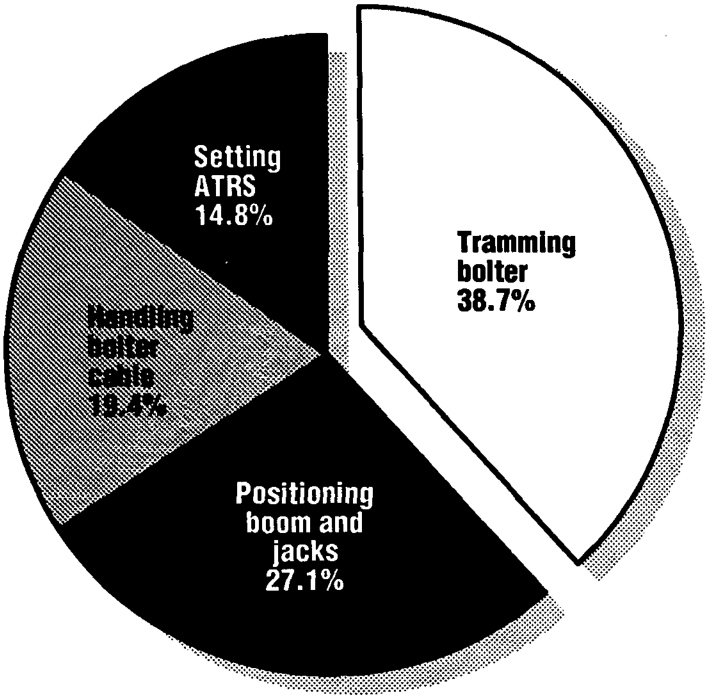

Figure 2.—Tramming, positioning, and setting ATRS injuries

from the roof and rib led to 29 percent. A large number of injuries resulted from the miner's attempts to remove a hung-up steel from the roof.

Figure 3 shows the distribution of accidents associated with drilling. The hands and fingers were the most common body parts injured with more than 50 percent resulting from moving machinery, most often the rotating steels. Injuries to the head and neck were also high, and about two-thirds of these were caused by falls of rock from the roof and rib and by flying objects.

Bolt installation

Work activities related to bolt installation represented the second most common source of injuries to roof bolters. Almost three-fourths of all injuries in this routine were from placing the bolt in the hole or from raising the drill head and spinning the bolt.

Figure 4 shows the percentage of accidents for each work task. A large number of the injuries associated with placing the bolt in hole (30 percent) occurred when the roof bolter straightened out the bolt after inserting it in the hole. Injuries from raising the mast and spinning the bolt resulted from pinch points involving fingers being smashed by the header block or roof plate. An additional number of injuries occurred when the miners were bending the bolt to prepare it for installation.

Back injuries in this work routine were high, second only to face area preparation. Back injuries occurred while roof bolters were bending bolts and lifting the bolt and glue tubes up to the roof. Injuries to the arm and shoulder were also high. These types of injuries primarily resulted from falls of pieces of rock from the roof and sprains or strains due to overexertion.

Developing risk indices

After compiling the information on frequency and type of injuries, the next logical step was to attempt to compare the four work routines by worker exposure time. The injury data analysis was combined with a series of time studies completed by the Industrial Engineering Department of West Virginia University.

This led to the development of risk indices. The risk indices help to 1) examine the average severity of accidents and 2) estimate the amount of miners' exposure time in each of the four bolting routines. The remaining section of this paper presents a summary of calculations made in an

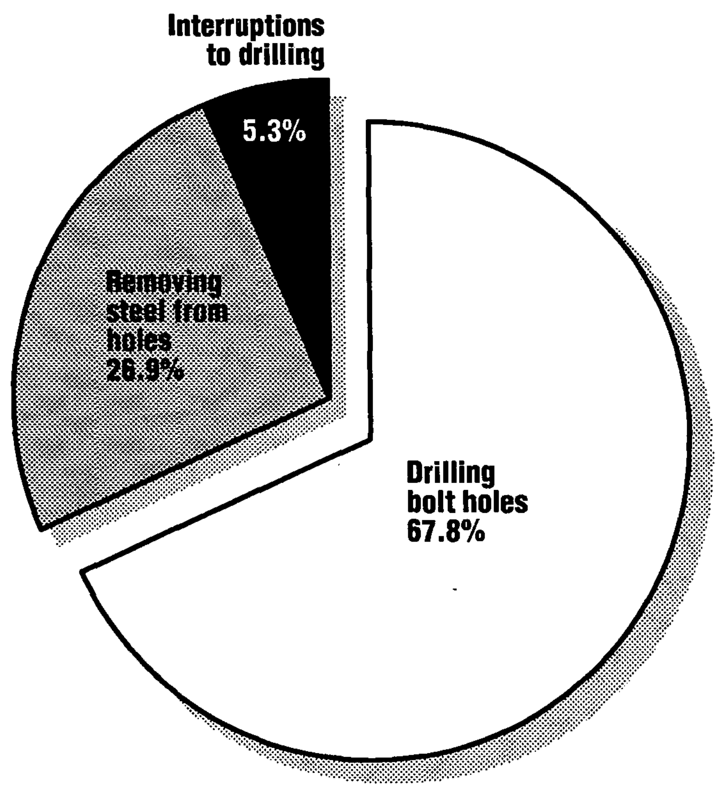

Figure 3.—Drilling holes injuries

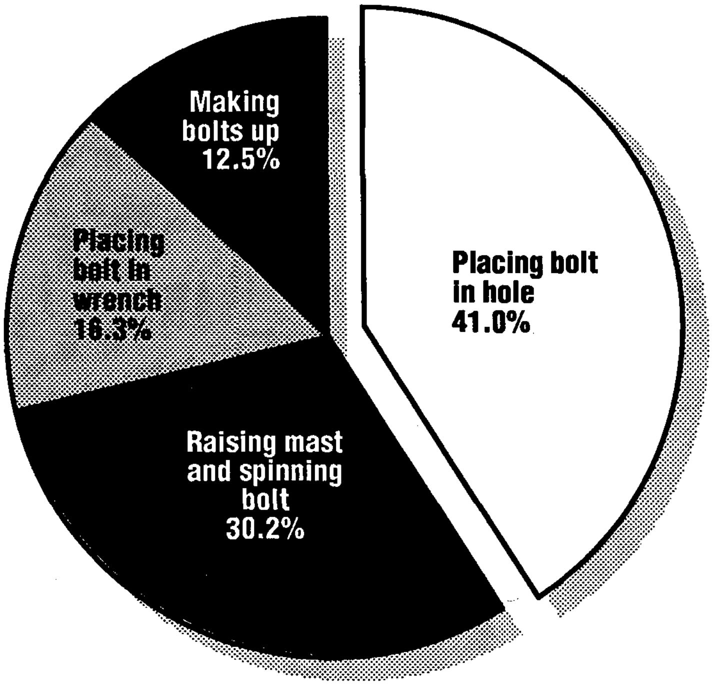

Figure 4.—Installing bolts injuries

earlier paper (Grayson, Layne, Althouse and Klishis, 1991).

The first step involved examining the amount of time (days lost) the miners missed from work. Table 2 displays the percentage of accidents that resulted in days lost from work for each work routine. It also shows the average number of days lost from work which gives the average severity per work routine.

The work routine that includes tramming, positioning the boom and jacks, and setting the ATRS ranked highest in percentage of lost-time accidents and average severity per accident. Drilling bolt holes was second highest in average severity, followed closely by face area preparation accidents.

The second step involved The use of time studies (Stobbe, Plummer, & Mariner, 1988). These time studies determined the average amount of time that bolters spent performing various work tasks. The average amount of time for miners to completely bolt a cut was about 26 minutes. Most of the observed mines were taking 20 foot cuts for production.

Of the 26-minute average, drilling bolt holes accounted for nearly one-third of the worker's total time. Bolt installation activities accounted for lowest amount of this time (17 percent) yet this work routine accounted for the second highest number of injuries. Table 3 shows the percentage of time that workers took to complete the tasks based on the 26-minute average for all routines.

With these time measurements, an incident index was developed. This index essentially consisted of a set of ratios, which compared the number of accidents occurring in each routine to the amount of time a worker spent (on average) performing those tasks. The ratios were calculated by dividing the percentage of accidents by the percentage of time for each of the work routines.

Table 3 lists the incidence index for the work routines. Bolt installation, as expected, ranked highest because this routine accounted for a large portion of accidents but only a small amount of the time needed to complete the tasks. Face area preparation had the lowest incident index; that is, it accounted for the lowest number of injuries and ranked second in the amount of time workers spend performing the work tasks.

Finally, a severity-weighted index was developed. This was done because the calculation for the incidence indices incorporates percentage of

Table 2.—Percent of accidents reporting NFDLs and average severity of injuries by bolting routine

Bolting work routine	% NFDL injuries	Average severity
Face area preparation	61.1	27.76
Tram, Position, ATRS	61.6	32.11
Drilling holes	58.1	27.98
Installing bolts	52.6	25.38

NFDL = Non-Fatal Days Lost

Table 3.—Incidence Index by Bolting Routine

Bolting work routine	% Total accidents	% Total time	Incidence index*
Face area preparation	18.2	26.58	0.68
Tram, Position, ATRS	23.3	22.78	1.02
Drilling holes	34.2	33.56	1.02
Installing bolts	24.2	17.08	1.42

**Incident Index = Percentage of total accidents divided by percentage of total time* accidents and time, but does not include the factor of average severity. A severity-weighted index was calculated by multiplying the incidence index by the average severity for each routine.

Table 4 shows the results for several of the routines. The bolting routine had the lowest average severity of 25.4 days per accident. However, this routine had the highest severity-weighted index primarily because of its high incident index. In comparing tramming and drilling, each routine had equal incidence indices but the higher average severity in the tramming led to a higher severity-weighted index.

Table 4.—Severity weighted index by bolting routine

Bolting work routine	Incidence index	Average severity	Severity-weighted index*
Face area preparation	0.68	27.76	18.88
Tram, Position, ATRS	1.02	32.11	32.75
Drilling holes	1.02	27.98	28.54
Installing bolts	1.42	25.38	36.04

**Severity Weighted Index = Incident index multiplied by average severity*

Conclusion

Roof bolting is an occupation which has long been considered one of the most hazardous occupations in the coal mining industry. For this reason, mine operators need to key in on specific bolting hazards and/or tasks and develop safer approaches.

The analysis of bolting injuries is a useful method for identifying risk and exposure for roof bolting operations. A close examination of injury narratives also pinpoints particularly hazardous tasks which have a high frequency of injuries. With this type of information, combined with time studies and other on-site observations, an index can be developed to measure the average severity in terms of time-lost for each bolting task.

These risk indices demonstrate that the combined use of work exposure time and injury data lead to a focused job safety analysis. These allow for comparisons of type of injury, frequency of injuries, worker exposure, and severity among the four major bolting routines.

This approach shows that mine operators can examine roof bolting accident data in tandem with observations in order to identify hazards and unsafe work practices. This helps to target potential problems in advance so that corrective steps may be taken to prevent accidents and reduce worker exposure.

References

Grayson, R.L., Layne, L.A., Althouse, R.C. & Klishis, MJ., Risk Indices for Roof Bolter Injuries Using Microanalysis, Trans. SME-AIME, forthcoming 1991.

Stobbe, T.J., Plummer, R.W., & Mariner, T., ***Work Analysis In Underground Coal Mines: Implementation at the Roof Bolting Worksite, in An analysis of Underground Coal-Mine Accident Statistics and Worker Performance.*** *Bureau of Mines Cooperative Agreement No. C0167023 (unpublished) 1988.*

Acknowledgments

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The view and conclusions presented in this paper are those of the authors and should not be interpreted as representing the official policies of the Department of Interior's Bureau of Mines or the United States Government.

March 28, 1908; Hanna No. 1 Mine, Hanna, Wyoming; 59 killed

(From the Cheyenne Daily Leader, Mar. 29, 1908 and accounts given by men)

The first explosion at 2:59 pm, killed 18 men. The second explosion, 7 hours later, entombed rescuers led by the State mine inspector. The second explosion, much greater than the first, rocked the ground violently and caused already ruined entrances to crumble still further. Ordinarily 300 men would have been working in the mine but a fire on March 22 reduced the workforce. The flames were walled off but broke out anew, and only 18 experienced fire fighters went into the workings. After the second explosion, it was impossible to penetrate the workings because the fire had spread beyond control. The mine was sealed after 32 bodies were recovered, leaving 27 inside, and never reopened.

Reprinted from the 1960 edition of the U.S. Bureau of Mines' Bulletin 856, ***Historical Summary of Coal Mine Explosions in the U.S., 1810-1958.***

Holmes Safety Association monthly safety topic

Fatal electrical accident

GENERAL INFORMATION: A 32-year-old scoop operator/section foreman, with 7 years and 5 months of mining experience, was fatally electrocuted when he contacted an energized exposed power conductor which was lying in a puddle of water.

The operation is an underground coal mine which has four drift openings into the Hernshaw coalbed which averages 40 inches in height. Employment is provided for 43 persons, 40 of whom work underground. There are three production crews and two maintenance crews at this operation. Monday through Thursday, two of the production crews produce coal on two 10-hour shifts per day with one maintenance crew overlapping one production shift. Friday through Sunday, the third production crew produces coal with one 14-hour shift for two days and one 12-hour production shift for one day. The maintenance during those days is performed on 8-hour shifts. The mine produces an average of 780 tons of coal daily with one continuous-mining machlne. Coal is transported from the working section to the surface via belt conveyors. Miners and supplies are transported to the working section by battery-powered man trips.

DESCRIPTION OF ACCIDENT: The 003 section crew, under the supervision of the victim, scoop operator/section foreman, entered the mine via rubber-tired, battery-powered personnel carrier. The crew arrived on the section about 7:25 a.m. and began their normal duties. The victim made his inspection of the working faces for hazardous conditions on the section and then instructed the section crew to begin their daily production activities.

The No. 4 shuttle car was not in service due to trailing-cable problems. The victim instructed the shuttle car operator to help on the continuous-mining machine. About noon, the shuttle car operator was instructed to begin his normal duties as shuttle-car operator.

Work continued without incident until 2:15 p.m., when the shuttle car operator again experienced trailing-cable problems on the shuttle car. This problem was found to be a severed power conductor. The section electrician repaired the trailing cable again.

The shuttle car operator again resumed hauling coal with the No. 4 shuttle car when problems developed with a wheel unit, and the section electrician had to go to the surface at 4 pm to obtain parts to repair it. He arrived back on the section about 5:15 pm and began repairing the wheel unit.

The continuous miner operator stated that the victim had helped in the working faces setting timbers nearly all day. He noted that the victim seemed to be in good health and in a cheerful state of mind, without any complaint of being sick.

About 5:05 pm, the victim left the continuous miner on a three-wheeled man trip to go to the section coal feeder.

The shuttle car operator stated that he began hauling coal after his shuttle car was repaired sometime after 5 pm and that he saw the victim talking on the mine phone. The phone was located between Nos. 3 and 4 entries in the crosscut near the section coal feeder. The shuttle car operator and No. 2 shuttle car operator saw the victim moving around the section coal feeder and conveyor tailpiece. The shuttle car operator was dumping his load of coal onto the section coal feeder from the No. 4 to No. 3 entry crosscut, and No. 2 shuttle car operator was dumping head on from the No. 3 entry. The operator's compartment of each shuttle car was located on the standard side. During the next couple of trips, the shuttle car operators both noticed that the victim's cap light was shining on the mine roof and had not moved. No. 2 shuttle car operator got off his shuttle car to investigate, and he found the victim lying on the mine floor. He stopped the No. 1 shuttle car operator as he was traveling by the section power center and told him to deenergize the section coal feeder. The No. 2 shuttle car operator stated that he thought that the victim may have been electrocuted, and he wanted the power removed before he went to the victim. Other miners located on the section were then summoned to help.

The continuous miner operator/helper, and the section electrician arrived at the section coal feeder and began to help. The section electrician, who is an emergency medical technician, checked for vital signs and found none. He said that the victim was lying on power cables beside the section coal feeder, so the victim was moved to a location in front of the section coal feeder. The No. 2 shuttle car operator then went to get the section first-aid box. The section electrician and the continuous miner operator performed cardiopulmonary resuscitation on the victim and, with No. 2 shuttle car operator's assistance, loaded the victim on the battery-powered man trip and transported him to the surface.

The victim was transported to the hospital where he was pronounced dead at 6:40 pm.

CONCLUSION: The accident occurred due to management's failure to assure that, after being damaged, electrical cables were effectively insulated, sealed so as to exclude moisture, and hung on insulators. The accident and resultant fatality occurred when the victim was performing general work around the section coal feeder and came in contact with an exposed energized power conductor.

On the 003 section, 575-volts AC, three-phase, resistance-grounded power was supplied from the section power center to the section coal feeder, the No. 1 shuttle car, the No. 2 shuttle car, the No. 4 shuttle car, and the roof-bolting machine. At the time of the accident, the No. 4 shuttle car was not in use. The section power center also provided 995-volts AC, three-phase, resistance-grounded power to the continuous-mining machine. Also available at the section power center were 480-volts AC, three-phase, resistance-grounded power, 240-volts AC single-phase power, and 120-volts AC single-phase power circuits. Testing revealed that the grounded phase protection and ground-check monitors operated properly on all three-phase circuits supplying power to the section equipment.

The cable supplying 575-volts AC power to the 003 section coal feeder was composed of approximately 50 feet of No. 6 AWG, 2 KV, type G-GC flat cable and approximately 300 feet of 2/0 AWG, 2 KV, type G-GC flat cable. There were two areas where the cable was damaged to the extent that energized power conductors were exposed. One of the areas was near the splice of the No. 6 cable to the 2/0 cable and was located against the coal rib near the section power center. The other damaged area was located immediately adjacent to the section coal feeder, very near the surface level of a puddle of water. This area was damaged to the extent that one phase conductor was exposed. The victim was found on the opposite side of this puddle, approximately 4 feet away from the damaged area of cable. It is presumed that the victim contacted the damaged area of this cable.

The victim was found lying on a damaged area of the energized 120 volt AC control circuit cable for the No. 2 conveyor belt. The outer cable jacket was damaged to the extent that the inner conductor insulation was exposed, and one power conductor appeared to have a small hole in the insulation. However, testing revealed that there were no exposed power conductors in this damaged area of the cable.

The lack of electrical burns is consistent with low-/medium-voltage electrocution with a large area of contact.

The beltman, stated that he had been shocked by the belt stoppage switch which was positioned beside the section coal feeder in the area where the victim was found. At the time of the investigation, the belt stoppage switch had been repaired.

Study of supervisors reveals need for more extensive training efforts

More than 20 percent of supervisors surveyed [in OSHA-regulated industries] receive NO on-going training on safety matters

By Keith Krout

The supervisor's importance to safety has been well documented, since as early as 1967. The National Safety Council (NSC) then surveyed 148 safety experts, who identified several problem areas, including top management involvement, records, and others. The study determined that supervisor participation was the most important ingredient in an effective safety program.[1]

The importance of safety participation is evident in every action the supervisor takes. Every hour requires the supervisor to be actively concerned about safety. This includes everything, down to issuing day-today operational instructions. Weber simply states, "The importance of the supervisor cannot be overstated."[2]

With this in mind, a survey was published in the May 1993 issue of *Occupational Health and Safety (OH&S)* to evaluate current safety training activities and related information. This is a summary of that study.

The study

A questionnaire was developed and distributed to safety professionals via [*OH&S*] magazine. Readers were asked to duplicate the questionnaire and distribute copies to their line supervisors. The surveys were collected by the safety professional and forwarded to the magazine, which then provided the raw data to the author. This established a "blind" to minimize bias.

Readers from various industries returned 206 surveys completed by their supervisors. A response rate is unavailable since the total number of surveys distributed cannot be calculated.

This survey has one noteworthy bias: the supervisors who completed the survey work with a safety professional who took the time to copy, distribute, collect and forward the questionnaires. These supervisors are likely to have better opportunities to obtain the safety training and programming that this survey is trying to evaluate and identify.

Of those surveyed, the average age was 40 (39.82), and 86.03 percent were male. Interestingly, the population reported an average of 11.58 years of experience in a supervisory position. Training was provided on an average of once every 8.56 weeks for those fortunate enough to be in a training program.

One alarming statistic was that the average supervisor supervised 28.74 people. This number was skewed by 10 responses that indicated they supervised more than 100 employees. It is possible that these were completed by middle managers and not front-line supervisors. But eliminating these responses from the population still yielded an average of 20.49 employees supervised. This is very high, and probably too high. In weighing supervisors' work requirements, it seems that being able to know and understand the personal and motivational aspects of more than 20 people is a bit much.

Questions addressing the supervisors' understanding of their safety responsibilities also yielded interesting statistics. According to responses, 91.75 percent completely understand their responsibilities; 8.25 percent *do not*. Only 67.03 percent understood the safety professional's function in their work environments. A similar question revealed that just 58.06 percent completely understand the occupational nurse's job function.

For the safety professional, this lack of recognition could be significant. Let's say you are in a meeting with ten supervisors. According to this survey, at least three of the supervisors don't understand why you are there and what you do. As a "consultant" to the supervisor, it is important for the supervisor to know what you do before you can help them!

Training

The survey's primary objective was to look at training provided to supervisors. The survey presented 23 different safety programs and activities and asked several questions regarding each. The 'Summary of Responses Chart' presents a tabulation of the results. The last column of the chart averages the supervisors' subjective perceptions regarding effectiveness of training in various areas.

Additional comments about nine of the 23 areas are as follows:

• ***Ergonomics.*** This was rated the least effective of all programs. Only 54 percent of the supervisors believe they even need an ergonomic program. Only 33 percent report being trained in ergonomics. Merely 35 percent even *have* an ergonomics program.

One supervisor commented, "What? [Ergonomics is] not in my dictionary!" but was savvy enough to correct the term "Safety Inspection" to "Safety Audit."

With OSHA working on an ergonomics standard, and carpal tunnel syndrome turning into the disease of the 1990s, every supervisor will have to know what ergonomics means soon.

• *Accident investigations.* OSHA mandates the investigation of recordables (at least). Supervi-

Summary of responses on specific safety programs

	Does your facility have this program?	Have you ever been trained on this topic?	Have you ever trained your people on this topic?	Does your facility need this program?	On a scale from 1-9 rate the effectiveness of this program
Program/Activities	**Percent answering "YES"**				**Average**
Safety rules	99%	90%	87%	90%	7.16
Materials handling	92%	92%	80%	90%	6.70
Hazard communication	93%	88%	77%	85%	6.81
MSDS	90%	85%	74%	79%	6.79
Evacuation	65%	61%	55%	62%	6.41
Hearing	78%	64%	62%	76%	6.41
Forklift	59%	39%	32%	53%	5.86
Lockout	66%	61%	52%	62%	7.00
Orientation	90%	75%	67%	80%	6.61
Respirator	62%	53%	44%	65%	5.90
Confined spaces	40%	35%	29%	49%	5.06
Fire extinguisher	65%	55%	42%	62%	6.58
Ergonomics	35%	33%	26%	54%	4.66
Safety incentives	72%	66%	62%	78%	6.61
Accident investigation	96%	74%	50%	90%	6.89
Safety meetings	90%	76%	76%	87%	7.23
Inspections	91%	71%	65%	86%	7.06
Discipline	81%	65%	60%	77%	6.55
Workers' Compensation	89%	43%	32%	78%	5.67
First aid	90%	74%	62%	86%	6.77
Restrictive duty	79%	46%	41%	73%	5.92
OSHA inspector	46%	24%	16%	53%	4.83
PPE	94%	83%	81%	84%	7.44

sors do these every day. Yet 26 percent report not being trained for accident investigations.

Management complains of unwarranted lawsuits, yet more than one fourth of our supervisors have no training on properly investigating an accident.

Supervisors rated training in this area as the sixth most beneficial.

- *Hazard communication.* Hazard Communication, which by its very nature demands training, remains one of OSHA's most cited standards. Yet 12 percent indicate that they have not been trained on this topic, and 23 percent have not trained their employees.

The response regarding Material Safety Data Sheets, as shown in the chart, reveals similar results.

- *OSHA inspections.* In general, safety professionals understand the importance of cooperating with an OSHA inspector. But handling an inspection can be a delicate issue, and the interaction between the company and inspector should be appropriately managed.

What if the safety professional is absent the day an inspector arrives? Just 24 percent of respondents had been trained about OSHA inspections. With fines up to $70,000 per violation, it's risky to have an untrained individual handling the inspection. In a recent case, one company's employee simply invited an OSHA inspector to "look around" before management was informed.

- *Personal protective equipment (PPE).* Training on PPE was rated the most beneficial. Eighty-four percent recognized the need for this program, and 81 percent said that they have trained their employees on PPE usage.
- *Internal inspections.* We rely on the supervisor to manage their departments effectively This includes identifying potential hazards as they go about routine business. While this was rated the fourth most effective program, just 29 percent indicated they have been trained on how to perform a department audit. Since we rely so heavily on supervisors for the audits, we must ensure that they understand the philosophy and techniques involved.
- *Workers' compensation.* Complaints often surface in the corporate environment about the liberal court systems and the influence of lawyers on the workers' compensation system. Unfortunately, only 43 percent of respondents have ever been trained in the workers' compensation system, and only 32 percent said that they have trained their employees.

Supervisors cannot explain a program they don't understand. If they don't explain the system to employees, who will? Attorneys. More importantly, will attorneys explain the law in a way that is not likely to cost either the employee or employer money? Probably not.

- *Evacuations.* This is an often overlooked program, because it typically is not utilized. We try to emphasize it because of the extreme possibilities.

Astoundingly, just 55 percent have trained their employees regarding evacuations with 61 percent indicating they have been trained.

One of the most startling findings was that only 62 percent felt they even needed an evacuation program. The 56 employees who were injured and families of the 25 who died in the Imperial Food Products plant fire in Hamlet, N.C., in September 1991, might disagree, as they lived through the tragedy that can occur when an evacuation fails.

- *Safety meetings.* Safety professionals have promoted the importance of the safety meeting for a long time. It would appear that the message has been received and accepted. It was rated the second most effective program, and 87 percent believe they need to utilize this managerial tool. The safety professional has been successful in supporting this effort, as 76 percent of supervisors say they have been trained on the safety meeting process.

Discussion

The study showed that more than 20 percent of our supervisors have *no ongoing* training. This clearly demonstrates the need for more supervisory training.

More safety training can only help our supervisors. As the NSC says, "It is the job of the safety professional to help supervisors gain whatever information is available that will make their safety efforts more productive."[3]

Where do we go from here? First, establish the objectives of the training program. The NSC suggests seven:[3]

- Involve supervisors in the company's accident prevention program
- Establish the supervisor as the key person in preventing accidents.
- Get supervisors to understand their safety responsibilities.
- Provide information on occupational health hazards, causes of accidents and prevention methods.
- Give supervisors an opportunity to develop accident-prevention solutions based on experience with current problems.
- Help supervisors gain skill in accident prevention activities.
- Help supervisors keep their own departments safe.

Use these as a starting point to develop objectives, keeping in mind your professional and strategic company needs.

The next step is to assess the company's safety training needs, particularly for supervisors. The best way is to ask them what will help them. Give them a survey with the topics, and let them know that you want to help them by providing training on the topics which are most important to them. Then ask them to rank which topics would be most beneficial.

Then provide the training, on-site or off-site.

Clark's recent study demonstrates how critical it is to make sure employees buy into a program: "Trainees were more motivated to learn when they perceived that their training would be related to performance in their current job or provide them with the opportunity for future advancement."[4]

Summary.

It is critical to ensure our supervisors are prepared for the daily struggles that challenge them. As safety professionals, we must address these safety issues to help ensure their success, which will ensure our own. Many topics were not even believed to be relevant. Topics such as evacuation are of absolute life-and-death importance.

This study demonstrates the need for more training and analyzes some of the specific needs. Most importantly, it outlines specific objectives for safety training programs.

Safety awareness among our supervisors has certainly come a long way, but more work remains for the safety professional.

Keith Krout is vice president of safety services for Workcare Resources in Dyersburg, Tenn.

References:

[1] *Planek, T., Industrial Safety Study,* ***National Safety News,*** *Aug. 1967, p. 60-63.*

[2] *Weber, O., The Front-Line Supervisor's Role In Safety,* ***Professional Safety,*** *May 1992, p. 34-39.*

[3] *The National Safety Council, Accident Prevention Manual for Industrial Operations,* ***Administration and Programs.*** *9th Ed., 1988, p. 185-188.*

[4] *Clark, C., Dobbins, G., and Ladd, R., Exploratory Field Study of Training Motivation,* ***Group & Organization Management,*** *Sept. 1993, p. 292-307.*

Reminder: JAHSA and HSA to hold annual meeting

The Joseph A. Holmes Safety Association and the Holmes Safety Association will hold their annual business meeting at the Radisson Hotel in Lexington, Ky., on June 7-9, 1994. Our agenda includes many timely safety topics which we feel will be of great interest and well worthwhile to participants. Make your reservations today.

Lodging at the Radisson will be $52 SINGLE—$62 DOUBLE. Make your lodging reservations directly with the Radisson by calling 606-231-9000 or 1-800-333-3333. It is highly recommended that all reservations be guaranteed either by advanced deposit of one night's lodging or by credit card. We have reserved a block of 150 rooms which will be held until May 11—be sure to indicate you are attending the Holmes Safety Association Meeting.

A meeting registration fee of $65 per person will be required. Guests and spouses not attending the conference meeting but who will attend the evening meals will be required to pay a $35 fee to cover banquet costs.

Holmes Safety Association monthly safety topic

Fatal explosives and breaking agents accident

GENERAL INFORMATION: A 54-year-old hang-up man with 28-1/2 years of experience was fatally injured by an explosion of a spool of about 750 feet of Primacord that was welded to the roll-bar of his boss buggy.

The operation was an underground iron ore mine with an associated mill complex that employed 73 employees, of which 18 worked underground. The mine operated one eight-hour shift, five days a week.

Access to the underground portion of the mine was through the number one shaft which was about 2,500 feet deep. This served as the primary personnel and service shaft. The number two shaft, about the same depth, was used to hoist ore and served as a secondary escape shaft.

The mining method used in this multilevel mine was sub-level caving to recover caved pillars, with access drifts at various levels. Conventional methods were used to drill and blast the rock. For most of the mine the blasted ore was mucked and transported by rubber tired diesel load-haul-dump scooptrams to dump points. It then passed through raises between levels to the primary crusher feeder and then fed onto a conveyor system, and transported to skip loading for hoisting to the surface.

DESCRIPTION OF ACCIDENT: The victim, a load, haul, dump/hang-up person, reported for work at 6:30 am, his regular starting time. He met his co-workers and foreman in the shaft tunnel enroute to the 2400 level.

At about 7:20 a.m., the scooptram operator, encountered a large boulder in the 38 PLX drift draw point and reported it to the victim. At about 7:30 am, the victim moved the jumbo drill into the PLX 38 drift, drilled the boulder, moved the jumbo out, and returned on the boss buggy to load and shoot the boulder.

It is believed that the victim drove the boss buggy into PLX 38 drift close to the area where the boulder had been drilled. He loaded two drill holes and used Primacord to tie them together, taped on a capped fuse, and lit it. The Primacord was not cut between the loaded round and the spool, and it freely unreeled behind the victim as he drove out of the drift. The scooptram operator saw him stop at the intersection of PLX 40 drift. When the fused cap detonated the intended shot, it also detonated the Primacord back to the boss buggy, causing the entire spool of Primacord to explode.

The scooptram operator saw a flash that looked like a ball of fire and heard an unusual blast. When the dust settled, he could no longer see the victim. He dismounted his scooptram and went to the accident site. The victim's feet were up on the running board, and his head was buried in the mud. He immediately started digging to uncover the victim's head and cleared the mud from his face and mouth. He went for help and summoned miners working nearby. The three of them placed the victim on a stretcher. The victim was alive and speaking to the crew as they transported him to the surface.

Two other workers met the crew on the surface and loaded the victim into the company ambulance and proceeded to the hospital. The victim expired at about 9:30 a.m. the same day.

CONCLUSION: The victim apparently failed to cut the Primacord supply spool from the blasthole detonating cord immediately after positioning the explosive.

Contributing causes to the accident were the company's failure to provide the proper equipment to transport explosives, and their failure to require a second person to be present at the site when a safety fuse was lit.

The Holmes Safety Association urges you to...

PLEASE drive GENTLY!

Schools will be closed for summer vacation soon

MSHA/NIOSH ground silica mill study

By: Autio, G.E. and Gigliotti, S.J., P.E.

Abstract

A ground silica mill study is underway between the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH). The purpose of the study is to determine the prevalence of silicosis at a selected group of mills, to evaluate the environmental levels of silica dust, and to determine the effectiveness of dust controls and respirator programs. Ground silica has a high percentage of crystalline silica, is small in particle size, very abrasive, and creates a severe health hazard if workers are not protected from overexposures. NIOSH will conduct the medical evaluations of miners at nine MSHA-selected ground silica mills and MSHA will conduct the environmental evaluations. The study will be conducted in cooperation with the National Industrial Sand Association (NISA) who represents eight of the nine mills. Labor union representatives and miner representatives have also been notified of the study. At the conclusion of each investigation, MSHA will issue a report including both the environmental and medical results. A summary report will also be issued by MSHA. This paper will discuss goals and objectives of the joint study, provide an overview of the protocol agreed upon between MSHA and NIOSH, and discuss silica dust exposure levels measured at the nine mills between 1988 to 1993.

Introduction

This paper discusses a joint study between the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) at nine MSHA-selected ground silica mills. The objectives of the study are to determine the prevalence of silicosis in current and former employees at the selected group of mills, to evaluate the exposure levels of employees to respirable silica dust, and to evaluate the effectiveness of both dust controls and respiratory protection programs in use at the operations. The study was started in February 1993 and is scheduled for completion by 1995. By the end of 1993, MSHA and NIOSH will have evaluated six of the selected mills.

Background

In 1990, NIOSH conducted a study using records of four member companies of the National Industrial Sand Association (NISA) to determine the feasibility of using company records to conduct a prospective study of the relationship between individual cumulative quartz exposure and radiographic evidence of silicosis in industrial sand workers. NIOSH concluded that the records and information available were not adequate to conduct a study.

However, as part of the feasibility study NIOSH found a 27% prevalence of small opacities on x-ray, in workers with more than twenty years of work experience. To determine this prevalence, NIOSH used information from a review of respiratory surveillance records obtained from company files. NIOSH in the feasibility study did not reevaluate the films.

Following the NIOSH study, NISA had the films considered positive in the NIOSH feasibility study reinterpreted by a panel of three radiologists certified by NIOSH as B-Readers. The films were reinterpreted in a designed radiologic reevaluation trial to confirm or refute the information contained in the NIOSH report. The NISA panel of radiologists found that when these films were reinterpreted in a controlled setting, that roughly half (13%-15%) of the workers with over twenty years tenure, had films suggestive of changes consistent with silicosis.

The prevalence of silicosis in both the NIOSH feasibility study and the NISA reevaluation trial identify a much greater number of silicosis cases than the number reported to MSHA under Title 30 of the Code of Federal Regulations (CFR), Part

50. Under the Part 50 regulation mine operators report to MSHA accidents, injuries, occupational illnesses, employment and production. Three of the four facilities in the NIOSH feasibility study had or previously had a grinding mill where ground silica was produced. Ground silica has a high percentage of crystalline silica, is small in particle size, is very abrasive and creates a severe health hazard if workers are not protected from overexposure. Consequently, MSHA asked NIOSH to participate in a study to look at the prevalence of silicosis at selected ground silica mills. At about the same time NISA approached MSHA to conduct a similar cooperative study with NISA. MSHA decided to combine the resources of all three parties MSHA, NIOSH and NISA.

Selection criteria

Across the United States, sixteen mills were identified as ground silica operations. Of these, nine were selected to be included in the study. MSHA selected these ground silica mills based on one or more of the following criteria: (1) one or more outstanding violations of MSHA's respirable silica standard and a history of overexposure to respirable silica; (2) size of the mills, both large and small, based on the number of employees; (3) use of advanced dust control technology; and (4) a representative number of ground silica mills from each of the Metal and Nonmetal Mine Safety and Health Districts. In late 1991, when the selections were made, six of the sixteen mills were selected based on criteria number one, the other three mills had no outstanding respirable silica violations. One of the remaining mills was selected because of the advanced dust control technology used and it is the largest mill. The other two operations, one large and one small, were selected using criteria two and four.

Overview of protocol

During the medical portion of the study, NIOSH will radiographically examine current and former employees at the nine selected ground silica mills for evidence of silicosis. Posterior-anterior radiographs will be taken, randomly mixed, and independently classified for pneumoconiosis according to the 1980 International Labor Office (ILO) system by three NIOSH certified B-Readers. The median reading will be used to report an abnormality. A chest x-ray showing opacities of profusion category ≥1/0 in a ground silica mill worker will be categorized as consistent with silicosis. The B-Readers will not be informed of any exposure history and the films will be masked of identifying information. The same B-Readers will be used throughout the study. Participants with a recent chest x-ray (within one year of the current NIOSH survey) can provide the chest x-ray to NIOSH to be read, rather than have a new chest x-ray taken during this study. All participants will receive written notification of their chest x-ray results. Persons found to have abnormal chest radiographs will be encouraged to consult their personal physician. NIOSH will administer a questionnaire to obtain occupational history, demographic information, respiratory symptoms, and smoking history.

NIOSH will also evaluate the pulmonary function status of the study participants through spirometry testing, conforming to the American Thoracic Society's criteria for screening spirometry.

All participants will receive written notification of their spirometry results. Persons found to have abnormal results will be encouraged to consult with their personal physician.

NIOSH will review personnel and medical records of current and former workers who have worked at least one year since 1970. The review will be made to obtain diagnoses suggestive of silicosis and detailed work histories.

MSHA will determine the exposure levels of employees at the nine ground silica mills by sampling all job classifications in the mill portion of the operation. MSHA will also obtain and compare records of past respirable silica dust sampling performed by MSHA and the ground silica mill operators. Any overexposure to respirable silica dust determined from MSHA samples, will be cited under MSHA regulations.

MSHA will evaluate the effectiveness of dust controls in the selected mills. The performance of dust collection systems will be measured and maintenance, housekeeping, and work practices will be evaluated.

MSHA will evaluate respiratory protection programs at each of the ground silica mills. The programs will be evaluated to determine if they meet the minimum requirements of the American National Standards Institute (ANSI) Z88.2-1969, Practices For Respiratory

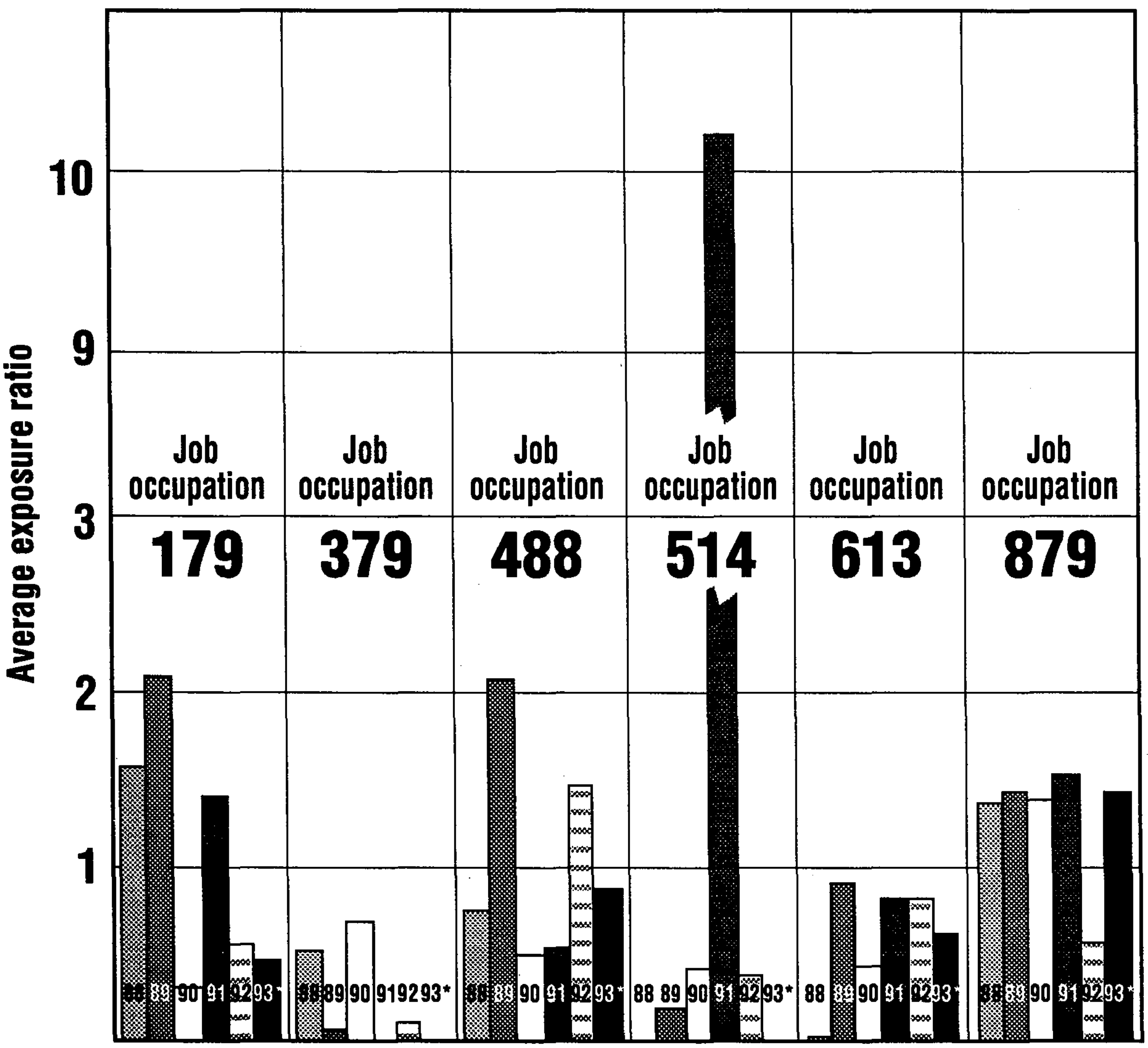
Protection. For its standard on respiratory protection programs, MSHA adopted by reference the ANSI Z88.2-1969 standard under 30 CFR, Part 56/57.5005.

Table 1.—Various job occupations at the nine ground silica mills

Job code	Job description
179	Ball, rod, or pebble mill operator
379	Dryer operator; kiln operator
488	Dry screening plant operator
514	Laboratory technician
613	Clean up man
879	Bagging or packaging operations worker

Figure 1.—Job versus exposure ratio 1988–1993*

(excluding respiratory protection)



Job occupation (minimum 12 samples, 1988-1993)

Exposure ratio = C/(E • 1.2)

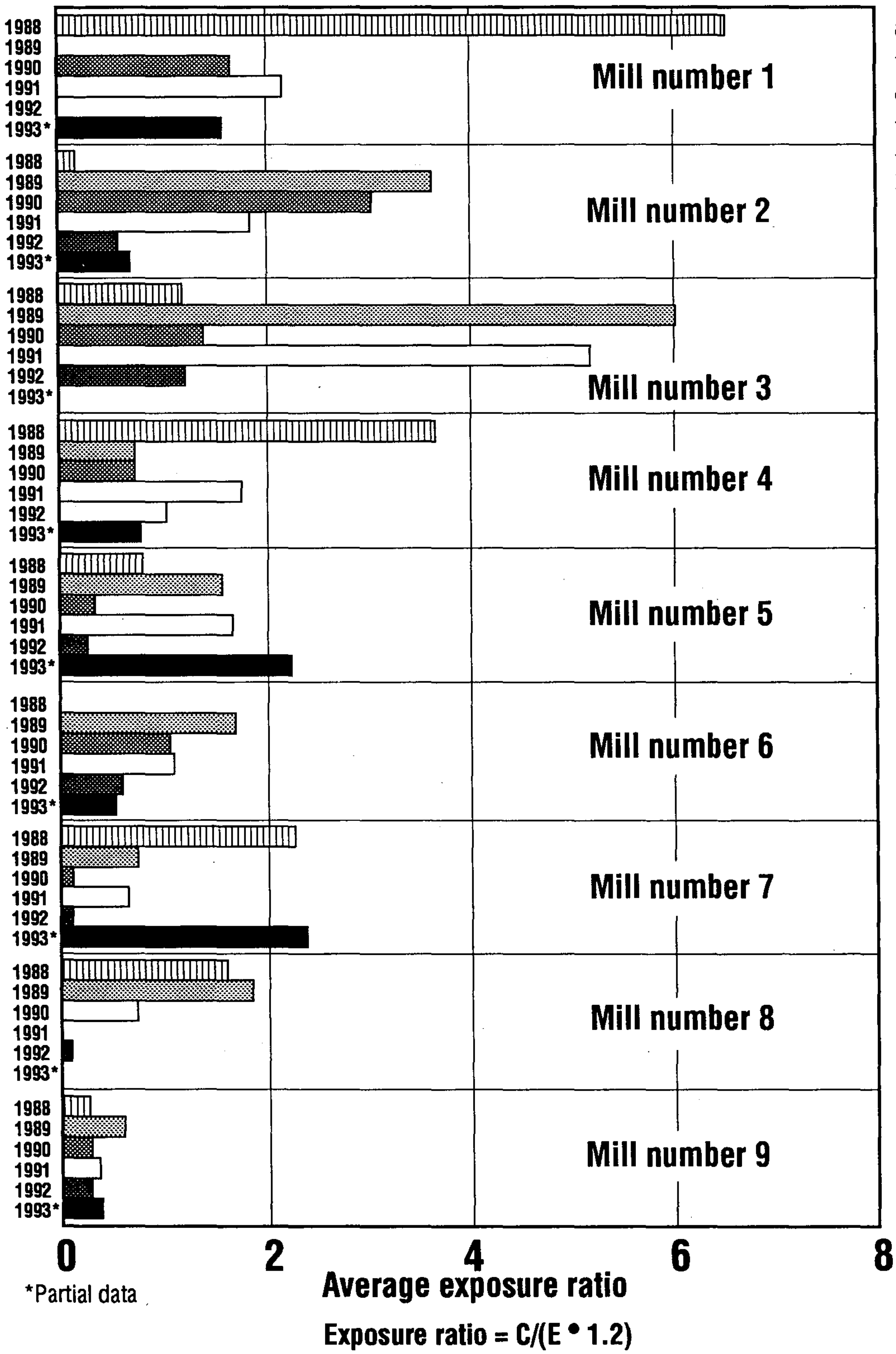
*Partial data

MSHA will issue reports combining findings of NIOSH and MSHA for each of the nine ground silica mills as well as a summary report. Each agency will review and comment on all reports prior to release. Individual mill reports and summary reports will be provided to the industry associations, national unions representing workers in the ground silica industry, participating mill management and employee representatives, and other interested parties.

Addendum to protocol

NIOSH will collect some additional information at two of the

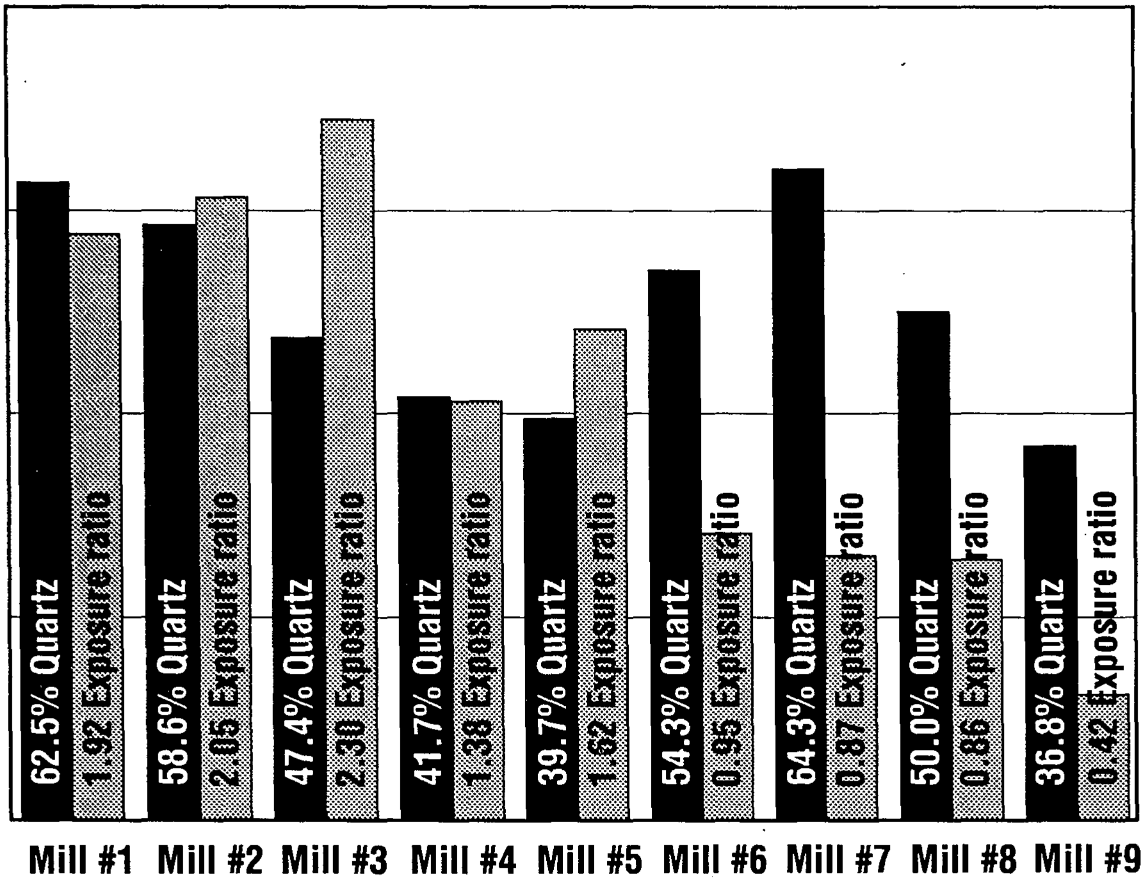
Figure 2.—Mill versus exposure ratio 1988-1993*
(excluding respiratory protection)



nine ground silica mills in the study. This information will not be included in MSHA/NIOSH reports. In 1979, NIOSH provided technical assistance to MSHA at these two operations. Through medical and environmental surveys, NIOSH determined that a significant health hazard existed at these mills due to overexposure to respirable quartz. Forty-four percent of workers with greater than a year experience in one mill were found to have x-ray evidence of silicosis. In the other mill, 27% of current and former workers with greater than one year of experience were found to have x-ray evidence of silicosis. In sixty five current and former workers with greater than one year exposure studied in the two mills, seven cases of progressive massive fibrosis were discovered by NIOSH.

NIOSH will estimate the incidence of new cases of silicosis among workers at the two mills by comparing the x-rays of current and former workers with those previously taken in 1979 to identify any new cases of silicosis developing since 1979. NIOSH will compare the prevalence estimates of silicosis found in the 1979 Technical Assistance surveys of the two ground silica mills to the current estimates of prevalence for those two mills. X-rays taken by NIOSH in 1979 will be reclassified according to the 1980 ILO classification system. The films taken in 1979 were classified using the 1971 ILO classification system. NIOSH will evaluate the change in spirometry results among the workers previously examined in 1979 by comparing an individuals worker's 1979 results to those obtained in this study. Finally NIOSH will

Figure 3.—Mill versus quartz and exposure ratio 1988-1993 (excluding respiratory protection



Exposure ratio = C/(E • 1.2) *Partial data

review the implementation of recommendations made in the 1979 NIOSH Technical Assistance survey reports by reviewing company industrial hygiene records, company respiratory protection programs, employee medical and personnel records and product bag labels.

Silica dust exposure levels

As stated above, one of MSHA's responsibilities in the protocol is to obtain and compare records of past respirable silica dust sampling performed by MSHA and the ground silica operators. This comparison will show if measured exposure levels taken by MSHA and mill operators are approximately the same. This paper, however, reflects analysis of MSHA's sampling only since company records are still being obtained. A database containing samples of respirable silica dust collected by MSHA inspectors at the nine MSHA-selected ground silica mills from 1988 to 1993 was analyzed. Only a portion of the data for 1993 was available. The analysis relates mills, job occupations, and years to exposure ratio and gives the average percent quartz for each mill. The exposure ratio is calculated by dividing the dust concentration measured over a full shift, i.e., the shift weighted average (SWA) by the exposure limit or threshold limit value (TLV) times an error factor of 1.2. The error factor is used when citations are issued to ensure that the sample is over the exposure limit with 95 percent confidence. If the exposure ratio exceeds unity (>1.0) then noncompliance is indicated. All nine mills have respirator programs and MSHA enforces respirator protection programs where overexposures occur. The exposure ratio used in figures 1-3, however, excludes the protection provided by respirators worn by employees. Figure 1 shows the average yearly exposure ratio for six different job occupations affected by the grinding portion of the nine mills. Job occupations are listed in Table 1. Each occupation was sampled at least 12 times and as many as 243 times between 1988 and 1993. The bagging or packaging operations worker (job occupation #879) had consistently the highest average annual exposure ratio of the six occupations. The dryer operator/kiln operator (#379) and the clean up man (#613) did not exceed unity for any year.

The remaining occupations: ball, rod, or pebble mill operator (#179); dry screening plant operator (#488); and laboratory technician (#514) had average annual exposure ratios above and below unity. The large peak in the sampling data for occupation #514 is mostly the result of one sample taken in 1991 that greatly exceeded the exposure ratio.

Figure 2 is a graph of each mill versus average annual exposure ratio. Mill #9 did not exceed unity in any year. Mills 2, 3, 4, 6, and 8 show a downward trend in the average annual exposure ratio starting in 1991. The remaining mills (1, 5, and 7) had average annual exposure ratios above and below unity. Figure 3 shows each mill versus average exposure ratio and average percent quartz from 1988 to 1993. Average percent quartz ranges from 37 to 64 percent. Mills 1, 2, and 3 have a relatively high average percentage of quartz and have an average exposure ratio greater than 1.0. In contrast, mills 6, 7, and 8 have a relatively high average percentage of quartz but have an average exposure ratio less than 1.0.

MSHA's analysis shows that it is possible to grind silica and meet Federal Standards. One of the variables that effects compliance is the percentage of quartz. Generally, the higher the percentage of quartz the more difficult it will be to comply due to a lower TLV. However, from the analysis it is shown that it is possible to comply even with a high percentage of quartz. Job occupations with the highest exposure ratios and the variance of exposure ratios from year to year for each job occupation is also shown by MSHA's analysis.

Summary

MSHA is conducting a nine mill study to determine the effectiveness of various dust control measures and to provide an estimate of the prevalence of silicosis associated with silica grinding mills. MSHA has requested technical assistance from NIOSH as part of this nation-wide study. Ultimately, MSHA will use this information to better protect workers from exposure to the hazards associated with ground silica.

Guarding ergonomics—making them *"user friendly"*

Robert C. Peterson, PE, Lone Star Industries, Inc.

Guarding moving parts of machinery is one of the basic safety procedures in the mining industry. If these guards never had to be removed they could be made an original part (cast or welded) of the machine at the factory. Most of the time, though, these guards cover something that must be replaced or repaired (v-belts, drive chains, shafts, etc.). This procedure requires the guard to be handled, which can lead to back injuries, hands being pinched, or the guard dropping on a foot. Once repairs or replacement are completed, the guard must be put back on. The same injuries can occur. There is also the potential of damage to the guard during the removal or installation process. The guard may no longer adequately protect workers from the moving parts.

Instead of building guards that are heavy, awkward, and take three strong men and a boy to lift, why not make them "user friendly"? The items below and on the next page are three ideas for simple, yet effective, moving parts barriers.

The first is a chain drive guard (Fig. 1). It is made of two halves with handles to facilitate removal and installation. The two halves are held to the mounting plate and each other with pins instead of bolts. This avoids loss of bolts which normally result in an improp-

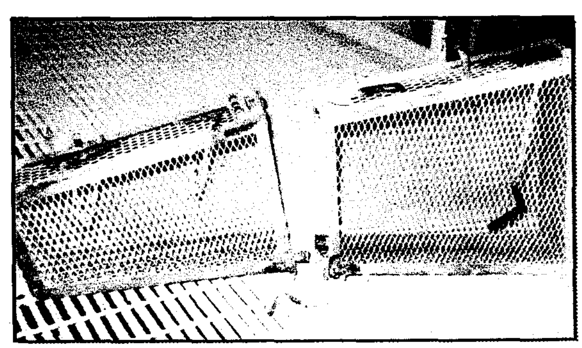


Figure 1.—Chain drive guard halves removed to show configuration.

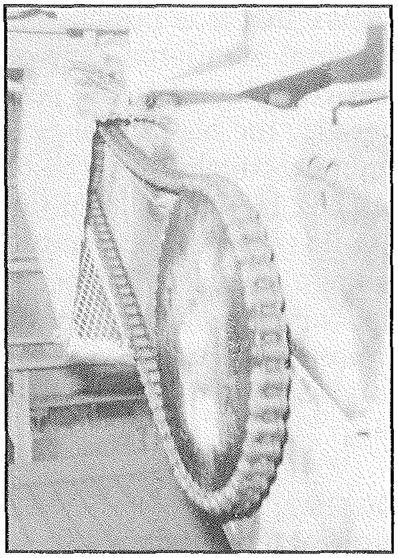


Figure 2.—One half of chain guard in place.

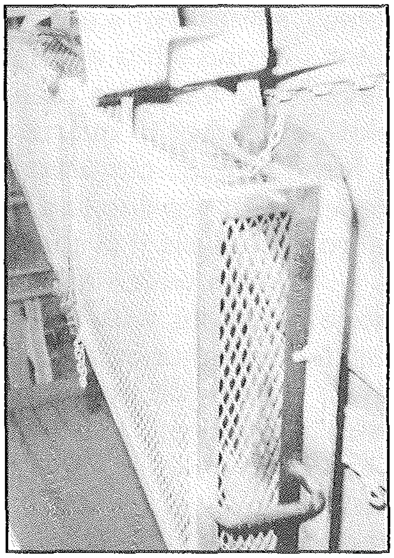


Figure 3.—Placement of second half completes chain guard.

erly replaced guard. The "split" design means only half the weight must be handled at one time (Fig. 2). This also aids in getting the guard back on easily in tight spots. Once the guard is in place (Fig. 3) the two halves can be pinned together.

The next barrier protects the coupling between a motor and gearbox. Instead of the usual half-dome of expanded metal (which often is not very sturdy and can be difficult to keep in place) this design consists of a three sided box with a handle on top (Figs. 4 and 5). The guard is secured in place by a pin on both sides and, once in place, provides a substantial but easily removed barrier (Fig. 6).

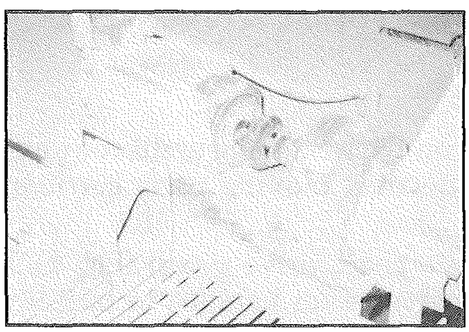


Figure 4.—Coupling guard removed for illustration.

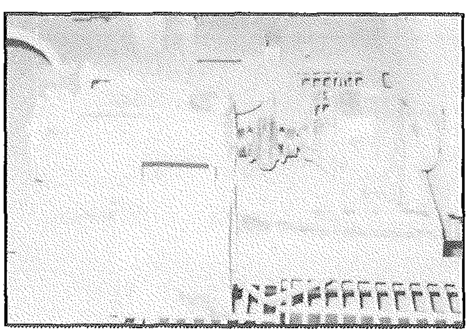


Figure 5.—Coupling guard viewed from side.

The third example is a guard for a power take-off (PTO) shaft on a shredder (Fig. 7). Made from a piece of flexible plastic suction hose split length-wise, it is fitted around the shaft and secured at both ends. The flex in the hose allows for the change in the PTO shaft length when the shredder is raised or lowered. The guard not only covers the U-joints, but also the entire length of shaft (Fig. 8).

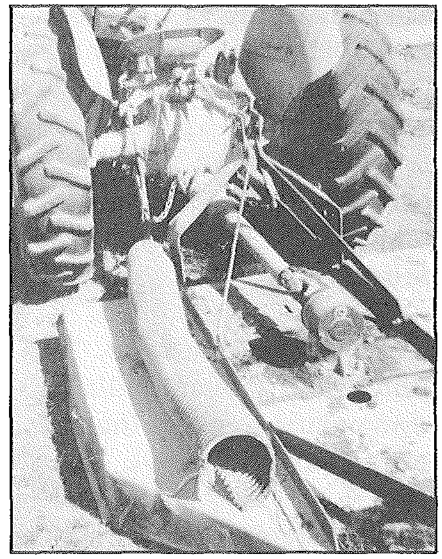


Figure 7.—Power take-off shaft guard removed.

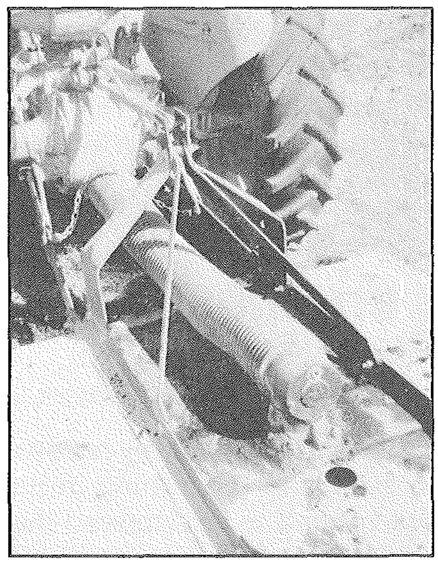


Figure 8.—Power take-off shaft guard in place.

All of the above guards required a minimum of additional fabrication time over conventional ones. Damaged sections of two piece guards can be repaired without having to remake the whole guard.

Guards that are easy to handle suffer less damage when removed and are more likely to be put back on correctly.

Guards that are on properly prevent injuries and save lives!

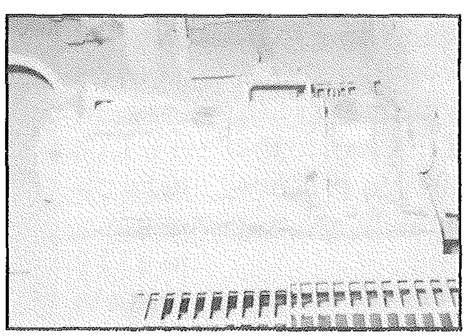
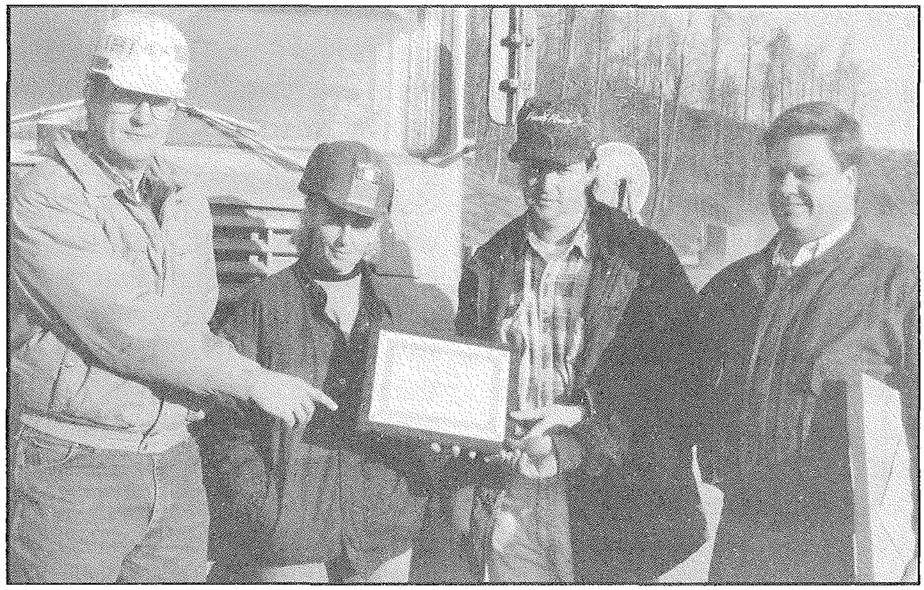


Figure 6.—Coupling guard in place.

Gary Wolfe nominated by Kanawha Valley District Council for the National Holmes Safety Medal of Honor Award

The Kanawha Valley District Council as well as Jim Vencill, MSHA, Education and Training Specialist; Jerry Sumpter, MSHA, Accident Investigator; and John Baugh, MSHA, Supervisory Coal Mine Safety and Health Inspector, has recommended that Gary Wolfe be considered for the National Holmes Safety Medal of Honor Award (Type "A") for putting his own life on the line in order to save the life of a co-worker.



Pictured left-to-right: Rick Blankenship, Foreman Dunn Coal & Dock; Alicia Cantley, equipment operator; Gary Wolfe; and John Baugh, MSHA.

On December 14, 1993, during an equipment mine fire, Gary Wolfe, employee of Dunn Coal and Dock, assisted a co-worker in escaping from a rock truck that was engulfed in flames after fuel or oil sprayed on the turbo-charger and became ignited by the hot manifold. The victim barely escaped the burning truck's cab, went to the ladder to disembark from the burning truck, and fell to the ground sustaining injuries. Gary Wolfe, working in the immediate area, observed what had happened, ran to the scene of the accident and helped the victim to a safe area. The rock truck was completely engulfed in flames at this time. The fuel tanks had been filled prior to starting their regular duties and there was a danger of the fuel tanks and rubber tires exploding causing further injuries and/or life threatening risks. Gary Wolfe acted in a remarkable manner in assisting and saving the life of his co-worker at great risk to his own.

In addition to saving the life of a co-worker, Gary Wolfe, several months earlier, was involved in a haulage accident investigation and recommended the use of Australian barriers to stop runaway haulage trucks. After the barrier installation, there have been four instances where the barriers prevented damage and injuries to haulage trucks and their drivers.

Gary Wolfe truly deserves special recognition for going above and beyond the call of duty.

William D. Summers, President, Kanawha Valley District Council, HSA

March 26, 1930; Yukon Mine, Arnettsville, West Virginia; 12 killed

(From Bureau of Mines report by R.D. Currie)

A coal dust explosion killed 12 men in the affected area, 9 right off 1 main, at 2:06 am. A fireboss in an adjoining area felt the vibration and then encountered smoke; a machineman felt the pressure wave and brought out the first report. Officials were notified and assistance called. Ventilation was soon reestablished in the area, and the bodies were recovered without use of apparatus.

A fall in a pillar area raised a dust cloud, probably mixed with gas, that was ignited by an arc from a cable-reel locomotive. Rock dust was not used, and water was not applied to allay the dust.

Reprinted from the U.S. Bureau of Mines' Bulletin 856.

Average annual fatality rate

In the District of Columbia and five states—Alabama, Connecticut, Maryland, Michigan, and South Carolina—homicide was the leading cause of workplace death for the decade 1980-1989, according to a report released by the National Institute for Occupational Safety and Health (NIOSH).

Although data for New York are incomplete, NIOSH estimates indicate that homicide may also be the leading cause of work-related death in that state.

The report, *"Fatal Injuries to Workers in the United States, 1980-1989: A Decade of Surveillance,"* contains the most comprehensive statistics to date on workplace fatalities in each state and across the nation.

The study reveals that work-related injuries claimed the lives of 63,589 workers during the 10-year period, with homicide claiming 7,603 of these lives. While the leading cause of death varies by state, job-related motor vehicle crashes, machine-related incidents and homicides emerged as the leading killers overall.

"Our job begins with the identification of these problems. We must continue the fight for worker safety and new enthusiasm, and realize that this is truly something that affects us all," said HHS Secretary Donna E. Shalala.

The state whose workers were at highest risk of dying on the job were Alaska (34.8 deaths per 100,000 workers), Wyoming (29.0), Montana (20.9), Idaho (16.7), and West Virginia (15.7). The states with the lowest rates of fatal workplace injuries are Connecticut (1.8) and Massachusetts (2.3).

The mining industry had the highest average annual fatality rate per 100,000 workers (31.9), followed by construction (25.6), transportation/communication/public utilities (23.3), and agriculture/forestry/fishing (18.3). Black workers had the highest fatality rate (6.5), while the largest number of deaths was among white workers. Eighty percent of occupational death victims were white, 11 percent were black, 6 percent were Hispanic, 2 percent were Asian and Pacific Islanders, less than 1 percent were American Indians/Alaska Natives, and 1 percent of the cases were of other or unknown race/ethnicity.

"NIOSH urges each state to examine the hazards threatening its workers and act now to prevent future tragedies," said the Centers for Disease Control and Prevention Director David Satcher, M.D. NIOSH is an arm of the CDC within the U.S. Public Health Service, HHS.

Executive summary

Death from work-related injuries is a major public health problem. The National Institute for Occupational Safety and Health collects and automates death certificates from the 52 vital statistics reporting units in the 50 states, New York City, and the District of Columbia for workers 16 years of age or older who died as a result of work-related injury. Analysis of occupational injury deaths by demographic, employment, and injury characteristics facilitates effective use of resources aimed at preventing injuries in the workplace. In looking at these data, it is important to note the distinction between rates and actual number of deaths. Rates depict the risk faced by workers, and numbers indicate the magnitude of the problem or the number of lives that would be saved if these injuries had been prevented.

- From 1980 through 1989, 63,689 workers died from injuries sustained while working; 62,289 (93%) were workers in the civilian labor force.
- For 1980 through 1989, the average annual occupational fatality rate for the U.S. civilian work force was 7.0 per 100,000 workers.
- The leading causes of occupational injury death in the United States were motor vehicle crashes (23%), machine-related incidents (14%), homicides (12%), falls (10%), electrocutions (7%), and being struck by falling objects (7%).
- Leading causes of death vary by gender, the leading cause of death for females were homicide (41%), while homicide accounted for 10% of the occupational injury deaths among males.
- Eighty percent of those who died from occupational injury were white, 11% were black, 6% were Hispanic, 2% were Asian and Pacific Islanders, less than 1% were American Indians/Alaska Natives, and 1% of the cases were of other or unknown race/ethnicity.

ethnicity.

- Black workers had the highest fatality rate per 100,000 workers (6.5), followed by whites (5.8) and workers of other races (4.9).
- The age group with the largest number of occupational injury fatalities was the 25-29 year-old age group (14%), followed by the 30-34 year-old age group (13%), and the 20-24 year-old age group (12%).
- Workers 65 years and older had the highest fatality rate of all age groups, with 14.6 deaths per 100,000 workers. Workers 65 years and older also had the highest rates of work-related injury death in every occupation division and in every industry division *except* mining.
- The fatality rate for males (9.8 per 100,000 workers) was 12 times higher than that for females (0.8 per 100,000 workers).
- Civilian fatal occupational injuries decreased 23% from 7,406 in 1980 to 5,714 in 1989.
- The average annual fatality rate per 100,000 civilian workers also decreased, from 8.9 in 1980 to 5.6 in 1989—a 37% decrease.
- The largest number of fatalities occurred in the construction (18%), transportation/public utilities (18%), manufacturing (14%), and agriculture/forestry/fishing (12%) industry divisions.
- *The mining industry had the highest* average annual fatality rate per 100,000 workers (31.9); followed by construction (25.6), transportation/communication/public utilities (23.3), and agriculture/forestry/fishing (18.3).
- The occupation divisions with the largest number of fatalities were precision production/craft/repair (19%), transportation/material movers (19%), laborers (13%), and farmers/foresters/fishers (12%).
- The occupation division of transportation/material movers had the highest average annual fatality rate per 100,000 workers (25.6); followed by farmers/foresters/fishers (21.3), laborers (17.2), and precision production/craft/repair occupations (9.3).
- The greatest number of fatal occupational injuries occurred in Texas (6,664), California (6,623), Florida (3,581), Illinois (2,853), and Pennsylvania (2,564).
- The states with the highest occupational injury fatality rates for the private sector were Alaska (34.8), Wyoming (29.0), Montana (20.9), Idaho (16.7), and West Virginia (15.7).

Surveillance data such as those gathered through the National Traumatic Occupational Fatalities system, allow the description of the nature and magnitude of the occupational injury problem in the U.S., the identification of potential risk factors, the generation of hypotheses for further research, and the setting of research and prevention priorities. These data provide the foundation for the next decade of research and prevention efforts aimed at reducing fatal injuries to workers in the U.S.

*Reprinted from the Department of Health and Human Services's November 1993 issue of **HHS News**.*

Holmes Safety Association—proposed constitution changes

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 3. is herein proposed to be amended by the addition of paragraph (b) as follows:

SECTION 3. EXECUTIVE COMMITTEE

(a) The National Council officers, together with representatives of participating organizations and representatives from each mining area having active state councils, district councils or chapters, shall constitute the Executive Committee.

(b) Members of the Executive Committee who, in the interim of their membership, retire (in good standing) from their position as an authorized representative of an interest group as specified in Section 11.(a) shall retain their post as Emeritus Member of the Executive Committee for the remainder of their elected term. Thereafter, such Emeritus Member's status of continued participation on the Executive Committee is welcomed and encouraged as an attendant and non-voting member and to serve in any capacity so appointed or assigned by the President, except for such post which explicitly calls for a duly authorized representative of an interest group as specified in Section 11.(a).

Supporting Rationale

The above proposal is simply based on the belief that members who retire from given interest groups should be recognized within the bylaws and that their continued participation on the Executive Committee is welcomed and encouraged. Given same, the bylaws should be clear on the scarce limitation of their continued participation.

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 6. is herein proposed to be amended by the addition of paragraph (b) as follows:

SECTION 6. VACANCIES AND MEETING ABSENCES

(a) All vacancies, occurring during the year through resignation, death, or removal of elected officers, members of the Executive Committee, or representatives on the Board of Directors of the Joseph A. Holmes Safety Association, shall be filled by the President by appointment for the unexpired term.

(b) Vice Presidents and Executive Committee members must actively participate in the Holmes Safety Association. Vice Presidents and, Executive Committee members who fail to attend at least 2 consecutive Holmes Safety Association National meetings will be contacted by the Secretary/Treasurer by certified mail to determine their interest in remaining as a member of the Executive Committee. This matter, including the reason for their absence will be brought before the next scheduled meeting of the Executive Committee to determine if their membership in the Executive Committee should continue. Individuals will be notified by the Secretary/Treasurer of the decision of the Executive Committee.

Supporting Rationale

This proposal is submitted on the basis that there are a few given members on the Executive Committee who are inordinately absent from meetings. This change is proposed to insure active participation of the Executive Committee members and to determine their interest in remaining as members of the Executive Committee.

SECTION 11. EXECUTIVE COMMITTEE

(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 of five members of the Executive Committee, held at a suitable time and place after written notice to its members at least 30 days before the meeting.

Supporting Rationale

Thirty days notice rather than 10 days notice would give Executive Committee members more time to secure flights to the meeting and possibly at a more economical cost.

SECTION 11 (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 One, Zone Two, Zone Three, Zone Four. 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
Missouri	Tennessee	Alabama
Kentucky	West Virginia	Virginia
North Carolina	South Carolina	Georgia
Florida		

ZONE 2

Washington	Oregon	Idaho
Montana	Wyoming	North Dakota
South Dakota	Nebraska	Minnesota
Iowa	Alaska	

ZONE 3

Wisconsin	Michigan	Illinois
Indiana	Pennsylvania	Ohio
New Jersey	Delaware	New York
Rhode Island	Massachusetts	Connecticut
New Hampshire	Vermont	Maine
Maryland		

ZONE 4

California	Nevada	Utah
Arizona	New Mexico	Colorado
Kansas	Oklahoma	Texas
Hawaii		

Supporting Rationale

By moving the location of the Holmes Safety Association annual meeting to the four zones listed, more members and families would be able to participate.

In accordance with Section 15. of the Holmes Safety Association Bylaws, Section 12. is herein proposed to be amended as follows:

SECTION 12. NOMINATING COMMITTEE

(a) **FORMATION.** The Nominating Committee shall consist of five members from the Executive Committee, one of whom shall serve as chairman. The Nominating Committee will include: one member from industry labor; one member from industry management; one member from a state agency; one member from a federal agency; and one member from manufacturers, suppliers or insurance groups. The President shall appoint the Nominating Committee with each member of the Committee representing a different state, and designate a Chairman.

Supporting Rationale

This proposal is simply based on the belief that while the President should retain the exclusive right of appointing the Nominating Committee and its chairman, the bylaws should guide the diversity of its membership among the states represented.

SECTION 13. FINANCE COMMITTEE

The Finance Committee shall consist of 5 members appointed by the president, who are familiar with finances and investments. The committee shall have one representative from each of the five interest groups as specified in Section 11 (a). The Finance Committee shall recommend to the Executive Committee proper means of securing requisite funds for the needs of the National Council. The Finance Committee shall furnish the Secretary/Treasurer and the Executive Committee with such financial statements and information as may be necessary for the proper functioning of the National Council. The President shall appoint the Committee representing a different state, and designate a chairman. The Secretary/Treasurer shall not be a member of the Finance Committee but shall attend its meetings.

SECTION 14. AUDITING COMMITTEE

The Auditing Committee shall consist of 5 members, appointed by the president. The committee shall have one representative from each of the 5 interest groups as specified in Section 11 (a). At least once each year the Auditing Committee shall 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 President shall appoint the Committee representing a different state, and designate a chairman. The Secretary/Treasurer shall not be a member of the Auditing Committee but shall attend its meetings.

Supporting Rationale

Changing membership to five members would enable each interest group to be represented.

Harry Tuggle, 1st Vice President, Holmes Safety Association

Send your comments to:
Mr. Joseph Sbaffoni
% Pennsylvania Deep Mine Safety
100 New Salem Road, Room 167
Uniontown, PA 15401

THE LAST WORD...

"If at first you don't succeed, you'll get a lot of free advice from folks who didn't succeed either."

"A person shouldn't allow yesterday to use up too much of today."

"The person who makes a mistake and doesn't correct it thereby makes another mistake."

"You cannot do a kindness too soon, because you never know how soon it may be too late."

"Some people put out nothing but a chill, and wonder why the world is cold."

"By the time we get to greener pastures we can't climb the fence."

"Blessed are they who were not satisfied to leave well enough alone. All the progress the world has made, we owe to them."

"Force may subdue, but love wins."

"If something goes wrong, it is more important to talk about who will fix it than who is to blame."

"Nothing is opened by mistake more than the mouth."

"Your reputation might be damaged by the opinion of others. Only you yourself can damage your character."

"If your batting average is high enough, the big league will find you."

NOTICE: We welcome any materials that you submit to the Holmes Safety Association 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 1994 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

Phone: (703) 235-1400