

THE CHALLENGE OF ENFORCING SAFETY RULES  
IN REMOTE HAZARDOUS WORK AREAS

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Are the safety rules in your work place effective? Do supervisors enforce them as they should? Do supervisors abide by these rules? Safety rules are an important aspect of many company safety programs, particularly if employees must work in an intrinsically hazardous environment such as a coal mine. However, for various reasons, supervisors sometimes fail to enforce safety rules (Arvey & Jones, 1985; Hartshorn, 1998). This paper presents some findings obtained from interviews with coal miners about why supervisors sometimes fail to enforce an important mine safety rule. It also contains a few suggestions addressing what could be done to help supervisors perform this job function more effectively.

The safety rule: Don't go underneath unsupported roof. The typical cycle of operations in a continuous coal mining section consists of two basic phases: (1) extracting the coal, and (2) supporting the roof. The roof is supported by inserting anchoring bolts that are usually 4 to 8 feet in length, and are usually spaced four or five feet apart. There is an interval between these two phases when it is possible for miners to go beyond the last row of roof bolts. If miners need to work under unsupported roof before it has been bolted, they should set temporary supports (i.e., mechanically operated safety jacks or wooden posts).

We know the following facts about unsupported roof:

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(1) One can easily determine where the area of unsupported roof is by examining the roof for bolts.

(2) Roof conditions are often quite varied within a mine. In some areas, it is unlikely that a miner will be harmed if under unsupported roof for a short time. However, it is impossible for miners to judge how soon an area of unsupported roof might fall.

(3) Nearly all miners know going beneath unsupported roof is prohibited by mine safety regulations and that many people have been killed while under unsupported roof.

Unfortunately, miners sometimes perceive the benefits of this behavior to be worth the risks. During the period 1992-96, 50 coal miners were killed by roof falls, and more than 5,000 were injured (McAteer and Reich, 1992-96). In most years, roof falls are the leading cause of fatalities among coal miners. Miners dramatically increase the chances of being harmed by a roof fall when they enter areas of the mine where the roof is not supported. Approximately one-half of all miners killed by roof falls are in an area where the roof is unsupported.

We performed a study to reveal reasons miners sometimes go under unsupported roof and to obtain miners' opinions about preventing this unsafe behavior. Interviews were conducted with 268 coal miners and 29 first-line supervisors at 6 different mining companies. As part of these interviews, employees were asked several questions concerning the enforcement of rules about avoiding areas of unsupported roof.

#### Expectations concerning noncompliance with a safety rule.

For company safety policies to have their intended effect, employees must have clear expectations about what types of action will be taken if they violate a safety rule. Consequences of violating a safety rule fall into two categories: formal and informal. Formal consequences

might include sanctions such as days off without pay, or written warnings. These actions are usually part of the company's written policies concerning employee conduct. However, supervisors sometimes use informal methods to discourage unsafe acts, such as talking to employees about the risks they are taking, or threatening the use of formal action if rule violations continue. Supervisors may attempt to influence employees via informal methods prior to utilizing the more formal disciplinary system specified by the organization. Thus a transition between the two might be viewed as a means of escalating negative influence.

Miners were asked a few questions to determine what their expectations were concerning the consequences of being found under unsupported roof. They were first asked, "Does this company have a policy about going under unsupported roof?" At each mine, miners almost always responded "yes". Next, miners were asked to explain the policy. Their comments suggest that virtually everyone realized going under unsupported roof was formally prohibited by the company; however, almost no one had a confident expectation about what formal action the company may take in response to employees who repeatedly disobeyed the rule.

There are several potential explanations for why miners did not have a confident expectation about what type of disciplinary action would be taken. When company safety officials were asked about this issue, they usually said decisions concerning the severity of the action had to be made on a case-by-case basis. Also, none of the companies in this study had a policy specifically dealing with working under unsupported roof (as opposed to other types of unsafe employee behavior).

Other factors that may prevent employees from having clear expectations about the consequences of violating a safety rule include:

- (1) The policy is too long and complicated for most employees to understand or remember.
- (2) The policy has not been regularly reviewed with employees.
- (3) The policy is rarely enforced.
- (4) Situations pertaining to the policy rarely arise.

The person with the greatest potential to promote safe work practices is the first-line supervisor. The supervisor's statements and actions have as much (if not more) impact on the crew's behavior than formal company safety policy. Therefore, an attempt was made to assess miners' expectations about how their supervisor would react if he/she found them working under unsupported roof. Miners were given a card containing a list of five response options (see table 1) and asked to answer the following questions:

Question 1: Using one option on this response card, please tell me how likely it is that your supervisor would say something to you if he/she saw you working under unsupported roof.

Question 2: How likely is it that your supervisor would report your actions to someone else in management if he/she saw you working under unsupported roof twice within the same week?

Table 1 summarizes miners' responses to these two questions. The responses to Question 1

Table 1. Miners' ratings of how likely their supervisor would take an action in response to seeing them beneath unsupported roof under two sets of circumstances.

<b>Rating</b>	<b>Question 1: How likely supervisor would say something to you</b>	<b>Question 2: How likely supervisor would report you</b>
	<b>(%)</b>	<b>(%)</b>
Very Likely	68.9	33.8
Likely	21.3	19.2
Have no idea	3.1	22.1
Unlikely	4.0	16.9
Very Unlikely	2.7	8.0

suggest that an overwhelming majority of miners interviewed believe their supervisor would say something if he/she saw them working under unsupported roof. Conversely, a substantial number doubt their supervisor would report their actions to someone else in management if he/she saw them working under unsupported roof twice within the same week. Crew members who had been working for the same supervisor for a considerable period of time often held widely different views about how the supervisor would react to such a situation. Most crews clearly lacked a consensus opinion about what their supervisor would do. Some thought that the supervisor would initiate some type of formal action; others thought it was unlikely; several said they simply had no idea.

#### "Looking the other way"

At many large coal mines, higher-level mine managers seldom visit underground work sites. Consequently, the first-line supervisor is often the only person in a position to stop miners from violating company safety rules. Unfortunately, there are a variety of reasons why supervisors may wish to simply "look the other way," rather than stop someone from performing an unsafe act. To help determine the reasons supervisors may ignore miners who go beyond the edge of supported roof, crew supervisors were asked to indicate the extent to which they agreed or disagreed with eight statements. Supervisors were asked to respond to each statement using a six-point agree-disagree rating scale. Response options ranged from 1 for "strongly agree" to 6 for "strongly disagree." Table 2 lists each reason and shows the percentage of supervisors who agreed, as well as the mean value of their responses. Most supervisors disagreed with all but two of the eight statements.

Table 2. Percentage of supervisors agreeing that various reasons explain why supervisors sometimes ignore miners who go under unsupported roof.

<b>Reason</b>	<b>Agree (%)</b>	<b>Mean Value</b>
They are too busy taking care of production-related matters	73.1	3.08
Because foremen occasionally go under unsupported roof themselves, they don't say anything to others because they feel they would be viewed as having a double standard	65.4	2.96
They believe that it is very unlikely that the person will be hurt by a roof fall	46.4	3.73
They believe that if they reprimand a miner for being under unsupported roof, the person will become hostile and uncooperative	46.2	3.73
They think the union would object to the use of disciplinary action	41.2	4.00
They have tried talking people out of working under unsupported roof before, but they just wouldn't listen	34.6	4.23
They think that they should not interfere because they believe that the miner is aware of the risks he/she is taking	30.8	4.27
They doubt whether mine management would support the use of disciplinary action in such a situation	25.9	4.46

Seventy-three percent of the supervisors agreed with Reason # 5: "One of the main reasons supervisors sometimes ignore people who go under unsupported roof is that they are too busy taking care of production-related matters." This finding correlates with statements that supervisors made in response to an earlier interview question. When asked to explain why supervisors sometimes ignore miners who go under unsupported roof, the reason cited most frequently was the desire or pressure to mine an acceptable amount of coal. This suggests that upper management must stress the importance of avoiding unsupported roof in all situations. If crew supervisors believe that higher level managers want them or their crews to risk going under unsupported roof in some situations (e.g., to avoid falling behind in production), some will likely do so. If mine managers fail to regularly communicate the importance of avoiding unsupported roof, some supervisors may interpret this as an indication of apathy or even implicit approval.

Most supervisors also agreed with Reason # 8: "Because supervisors occasionally go under unsupported roof themselves, they don't say anything to others because they feel they would be viewed as having a double standard." It is rather surprising that so many supervisors agreed with this statement. However, other sources of information seem to confirm the notion that crew supervisors sometimes go under unsupported roof themselves. During the interviews, several miners remarked that supervisors commit this unsafe act more often than anyone in the crew. Additionally, a study by Snyder (1986) suggests that the fatality rate for underground coal mine supervisors is significantly higher than that for the average mine production worker (0.10 versus 0.06 per 200,000 hours exposure). The reasons for this may include:

1. Supervisors feel that since they are accountable for the safety of their crew, they (instead of a crew member) should take the risks. One supervisor commented, "If something needs to be done under unsupported roof, I do it myself. I never send anyone else."
2. Supervisors feel production pressures more directly than crew members; they are held directly accountable for production.
3. Supervisors know that no one is going to criticize them. Usually, no one is around to see their actions (except perhaps a crew member), and crew members are unlikely to tell upper management that the supervisor is doing something he/she should not.

There are two reasons why it is very important that all supervisors genuinely believe that going under unsupported roof should be avoided regardless of the situation. First, it is difficult for management to control supervisor actions because other managers are rarely present to monitor their behavior. Second, supervisors' actions have a critical influence on their crew's willingness

to comply with safety rules. Crew supervisors must be aware that they serve as models and, consequently, they must follow all safety procedures.

How should supervisors respond?

One reason supervisors sometimes do nothing to correct unsafe behavior may be their uncertainty about appropriate actions given the circumstances surrounding the violation. To obtain some information regarding what supervisors should do when they see miners under unsupported roof, we asked miners and supervisors the following open-ended questions:

Question 1: What should a supervisor do the first time he/she sees someone working beyond the last row of roof supports?

Question 2: What should a supervisor do the second time he/she sees the same individual beyond the last row of roof supports?

Table 3 summarizes their replies to the first question. The vast majority thought the supervisor should simply say something to let the person know he/she is not allowed to go under

Table 3. Percentage of miners and supervisors who recommended that supervisors take various actions the first time they see someone beyond the last row of roof supports

<b>Response</b>	<b>Miners (%)</b>	<b>Supervisors (%)</b>
Tell him/her not to do it	92.0	86.2
Inform management	3.6	3.4
Issue a formal written warning	3.2	3.4
Recommend suspension	1.2	6.9
Total number of interviewees	251	29

unsupported roof, and leave it at that. Only 8 percent of the miners and 13.8 percent of the supervisors thought that supervisors should report the incident. Replies to the second question

are summarized in Table 4. These responses indicate that most miners thought the supervisor should, in some way, report the incident the second time an individual is seen under unsupported roof. Only 30.3 percent of the miners and 17.2 percent of the supervisors who responded thought that supervisors should not report the incident.

Table 4. Percentage of miners and supervisors who recommended that supervisors take various actions the second time they see the same individual beyond the last row of roof supports.

<b>Response</b>	<b>Miners (%)</b>	<b>Supervisors (%)</b>
Tell him/her not to do it	30.3	17.2
Inform management	28.3	20.7
Issue a formal written warning	19.3	31.0
Recommend suspension	16.9	13.8
Inform the mine safety committee or a union official	2.4	6.9
Recommend transferring the miner to a different job	1.6	3.4
Recommend discharge	1.2	6.9
Total number of interviewees	254	29

Interestingly, there appears to be some discrepancy between miners' responses to the questions about what supervisors should do versus what their supervisor actually would do the second time he/she saw them working under unsupported roof. Seventy percent of the miners thought that supervisors should inform management the second time. In contrast, only 53 percent thought it likely their supervisor would report their actions to management if he/she saw them under unsupported roof twice within the same week. There are at least two potential explanations for the discrepancy in these two percentages. This discrepancy could reflect a tendency for some miners to see their supervisor as too lenient on this issue, i.e., miners believe that their supervisor should take formal action, but think it is unlikely he/she would actually do so. However, miners

did not say anything during the interviews to suggest they viewed their supervisor as too lenient with those who violate safety rules. Rather, most said their supervisors were very concerned about the crew's safety, and would not allow miners to go under unsupported roof.

Research on attribution theory suggests that this discrepancy may reflect a tendency for some miners to think their supervisor would be more likely to excuse them for going under unsupported roof rather than someone else. Social psychologists have documented the existence of a self-other bias in the attributions people make about the reasons for undesirable or deviant behaviors (Jones & Nisbett, 1972). According to attribution theory, people tend to attribute such behaviors to some faulty internal characteristic of the person when someone else performed the behavior (e.g., the person was too foolish or lazy to avoid the unsupported roof). However, people attempt to protect self-esteem by accounting for their own actions in terms of external causes that absolve them of any blame (e.g., I was unaware that I was under unsupported roof, or I was faced with an "emergency" or unusual circumstance and had no other option). This might explain why some miners are more inclined to think their supervisor would excuse an unsafe act if committed by themselves rather than someone else. Because miners may tend to assume that their own actions could be justified, they may believe their supervisor would excuse the transgression.

In addition to having clear expectations about the consequences of violating company safety rules, employees must believe that the policy is fair and consistently enforced. Arvey and Jones (1985) note that punished individuals form judgments about the fairness of the punishment, and this perception guides their responses to the punishment. Perceptions of inequity must be minimized; inequity can lead to employee behavior that is detrimental to the organization and to other employees, e.g., frustration, apathy, absenteeism, sabotage, or theft. Arvey and Jones

propose that judgments about the fairness of disciplinary actions are likely to be based on (1) the individual's knowledge about the actual rule infraction committed, (2) whether the punishment somehow "fits the crime," and (3) whether other employees have committed similar offenses, yet gone unpunished.

The following methods might help improve compliance with safety rules and minimize the negative side effects often associated with rule enforcement:

(1) Solicit input from supervisors and representatives from the hourly work force in formulating policies to deal with workers who violate safety rules. Employees are less likely to object to the use of disciplinary actions when employee representatives have helped develop the policy and have voiced support for it.

(2) A clear policy concerning employee safety-related behavior is needed. This policy should (a) clearly delineate the conditions under which various negative sanctions will be applied, (b) explain why it is important--to both the company and the employee--that individuals comply with safety rules; and (c) be communicated regularly to the work force.

(3) Supervisors should be trained in proper procedures for correcting unsafe employee behavior. They should be shown role models interacting with employees found violating a safety rule and should participate in role-playing exercises on how to handle these situations.

Supervisors should know how important it is to *never* ignore employees found violating safety rules. When supervisors disregard this behavior, they send an implicit message to employees saying they either do not care about compliance with the rule or may actually condone violating the rule in some circumstances.

(4) The consequences of violating a safety rule should be applied soon after the infraction and should be applied fairly and consistently--from situation to situation and person to person.

### Conclusion

It is often easier to prevent employees from performing unsafe acts through manipulations of the work environment than through disciplinary action or motivational programs. Accident prevention programs must seek to identify reasons for the unsafe behavior and to redesign the work environment (e.g., tools, equipment, physical surroundings) to shield or remove employees from sources of harm and to prevent situations that may prompt unsafe acts. Unfortunately, in several industries (including underground coal mining), the work environment is innately hazardous, rapidly changing, and unpredictable--making it difficult, perhaps impossible, to fully protect employees by environmental manipulations. In these situations, companies must have effective safety policies. These policies must specify what is expected of employees and the consequences of violating rules. However, formulating good safety policies is only the first step. For policies to be effective, they must be clearly communicated to all employees and supervisors. They must understand the policies and believe the company genuinely expects compliance--even if it means sacrificing production or other company goals. In addition, first-line supervisors must never ignore unsafe behavior. If left unchecked, small or infrequent rule violations tend to grow into more serious and more frequent violations. Supervisors must also know that their actions speak louder than words. They cannot expect others to comply with a safety rule if they sometimes break the rule themselves.

In work areas that can be regularly monitored by company officials other than the first-line supervisor, an ineffective supervisor can be identified and appropriate actions taken. However, in

work areas not easily monitored, it is crucial that all first-line supervisors (1) understand procedures for correcting employees found violating safety rules, and (2) understand the importance of regularly encouraging employees to abide by safety policies. Unfortunately, if supervisors in remote work areas do not possess these qualifications, management may not become aware of their inadequacies until after a tragedy occurs.

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