



*Investigation of a*

# Slip/Fall

*Accident*



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health



# Investigation of a Slip/Fall Accident

## Instructor's Copy

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## **Introduction**

This document contains most of the materials needed to use the exercise. The main part of the document is the instructor's copy. It tells how to use the exercise, presents the objectives, the master answer sheet, the scoring key, and discussion notes to be used following the exercise. The next section summarizes results from field tests of the exercise, and reports the miners' evaluation of the activity. The last part of this document is three appendices. Appendix A is the exercise problem booklet. This booklet can be duplicated locally. The booklets are reusable. One is needed for every person in the classroom. Appendix B is the answer sheet and the trainee's questionnaire. Copies of this answer sheet must have the latent image (invisible) ink answers that appear in Appendix C printed on them.<sup>1</sup> Answer sheets are consumable. One is needed for each person or each small group of persons who work the exercise.

## **Exercise Summary**

Read this section first. It determines if the exercise is appropriate for your classes. If you choose to use the exercise, examine the table of contents and review the remainder of this document.

Type:	Latent image
Audience:	Supervisors, Safety Personnel and Accident Investigators
Length:	Eight questions (30 minutes for administration plus 30 for discussion)
Skills:	Developing a strategy or plan to prevent slips and falls Following correct procedures in conducting an accident investigation Preventing unsafe work practices Recognizing and instituting hazard controls in the section Identifying and implementing safe work procedures
Location:	Underground coal mine section
Problem:	You have been the general mine foreman at White Rock Mine for 4 years and have worked at this mine for 12 years. The mine superintendent calls you into his office. He gives you an accident report of an employee in 4-G section who was injured while carrying rock dust bags from the rock dust car to a battery powered scoop. It is several days after the accident and the mine superintendent assigns you and the safety supervisor to thoroughly investigate the accident to determine all the contributing factors. Your job is to make specific recommendations to prevent future slipping/tripping accidents.

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<sup>1</sup>You can do this yourself if you have the proper equipment, or you may obtain copies of preprinted latent image answer sheets from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA (412-386-5901) or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov) .

### **How to Use This Exercise**

1. Look at the performance objectives. Decide if the exercise is relevant for your annual refresher class.
2. Work through the exercise with the special pen and score your responses.
3. Read the master answer sheet for the exercise. Look at all the answers.
4. Read the "Instructor's Discussion Notes" for the exercise.
5. Become thoroughly familiar with the problem so that you can present it to your class without reading it. Put the figures on an overhead projector so you can use these to help explain the problem.
6. When you present the exercise to the class:
  - Explain that the answers from class members will be used to improve the exercise in the future.
  - Give each person an exercise booklet, an answer sheet, and a pen.
  - Demonstrate how to select and mark answers using the special pen.
  - Go over the instructions for working the exercise with the whole group.
  - Explain the problem making sure everyone understands the problem situation.
  - Have the class members work the exercise.
  - When the class members finish, have them figure up their score using the instructions at the end of the exercise.
  - When everyone has finished, discuss the exercise. Let class members discuss the merits of each answer. Add your own ideas.

### Performance Objectives

Objective number	Capability verb(s)	Description of required performance and conditions under which it is to occur
1 IT <sup>1</sup>	Identify	methods for gathering information about a slip/fall accident given a brief accident description
2 HR/SW procedures	Recognize	reasons a worker might not assume responsibility for good housekeeping and compliance to safe work
3 MH	Discriminate Identify	from among managers statement and behaviors those traits that effect promoting safe work practices
4 MS	Evaluate Judge	likelihood that housekeeping and safety in the section will improve given information about the foreman's management style (e.g. method of work assignment, tolerance of unsafe behavior and conditions)
5 SW	Choose Select Identify	interventions likely to prevent future injuries to a specific mine worker given information about worker's history, working conditions in the section, and observations of managers and workers behavior
6 HR	Identify Recognize	factors that contribute to slips and falls in a mine section given information about housekeeping policies and practices, management style and behavior, and workers accountability for safety
7 SW	Select	recommendations likely to improve safety for a given mine section including changes in management behavior, housekeeping practices, and shared accountability among management and workers

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<sup>3</sup> Skill and knowledge domain abbreviations:

IT = Investigation Technique  
 HR = Hazard Recognition  
 SW = Safe Work Practices  
 MH = Material Handling  
 MS = Management Style

## Master Answer Sheet for Investigation of a Slip/Fall Accident

Use this answer sheet to mark your selections. Rub the special pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need. The last part of the message will tell you what to do next.

**Question A** (Select as MANY as you think are correct.)

1. [ The foreman's knowledge and perceptions are important. Correct! ]
2. [ Correct! His knowledge and perceptions are important. ]
3. [ Correct! The co-workers may provide information that is useful for  
[ understanding the factors that contributed to this accident. ]
4. [ He was not involved in this accident. ]
5. [ Useful information can be obtained in this manner. Correct! ]
6. [ He has little knowledge and few facts about this situation. ]
7. [ John and the section EMT who treated his injury both say he was  
[ wearing a hard hat, hard toed boots, metatarsals, safety glasses and  
[ heavy gloves. Correct! ]
8. [ You need to investigate the accident first, not the person. Prejudging  
[ the person can prevent finding all contributing factors. ]
9. [ Asking the right questions should proceed independent of  
[ personalities. You need to investigate the accident first, not the person.  
[ Prejudging the person can prevent finding all contributing factors. ]

**Question B** (Select as MANY as you think are correct.)

10. [ Correct! John may feel this way, but safety and hazard recognition and ]  
[ corrective action is John's, and everyone's, responsibility when ]  
[ performing a task. ]
11. [ John should know the job and the hazards better than anyone. He has ]  
[ the responsibility to take the initiative to correct problems and ask for ]  
[ help when needed. Correct! ]  
[ ]
12. [ Correct! It is foolish to risk injury to himself simply because the boss ]  
[ failed to tell him to correct a hazard that he could have corrected ]  
[ himself. ]
13. [ John knew the hazards but did nothing to correct them. Some ]  
[ additional training may be helpful, but observing, coaching, frequent ]  
[ monitoring, reminders, and feedback from the foreman are also ]  
[ necessary. ]

**Question C** (Select as MANY as you think are correct.)

14. [ You do not have enough information to determine all of the contributing ]  
[ factors of the accident. Jumping to this conclusion may stop you from ]  
[ looking for additional causes. ]
15. [ One should never make this useless judgement. When this judgement ]  
[ is made, people stop looking for contributing factors. ]
16. [ Saying "Be careful" does not demonstrate a serious concern for safety. ]  
[ Actions speak louder than words. ]
17. [ Correct! This should prompt you to ask Bruce how he normally deals ]  
[ with hazards like this. ]
18. [ At the present time you do not have enough information to make your ]  
[ report. Correct! ]
19. [ Training records must be examined before you make this judgment. ]  
[ However, having a piece of paper in the file does not guarantee an ]  
[ individual will perform as trained, or that adequate task training took ]  
[ place. ]

**Question D** (Select as MANY as you think are correct.)

20. [ Bruce needs to demonstrate by actions, and assist and direct his ]  
[ miners in correcting problems, not only by making speeches. ]  
[ ]
21. [ Bruce's actions speak much louder than his words. Correct! ]  
[ ]
22. [ John may need more supervision than some miners, and he may have ]  
[ needed help in correcting the problem. Correct! ]
23. [ Correct! A good foreman monitors workers frequently, instructs, and ]  
[ follows up until he or she is confident the person will consistently ]  
[ perform the job in a safe manner. ]
24. [ Safe work habits require not only initial instruction , but also observing, ]  
[ coaching, frequent monitoring, reminders, and feedback. ]

**Question E** (Select as MANY as you think are correct.)

25. [ Correct! Specific job assignments are needed so workers know what ]  
[ to do and who is to do it. ]
26. [ Data from this mine show that 15-20% of the total accidents involve ]  
[ housekeeping as a contributing factor. The rate on this section is likely ]  
[ to be higher than elsewhere if housekeeping is not improved. Correct! ]
27. [ Job assignments need to be specific and followed up if housekeeping ]  
[ is to improve and accident rates are to decline. Correct! ]
28. [ Perhaps, but this is unlikely because the foreman needs to learn some ]  
[ basic supervisory skills in order to become more effective. ]  
[ ]
29. [ Correct! Bruce is not the only foreman who is responsible for this ]  
[ section. ]

**Question F** (Select as MANY as you think are correct.)

30. [ These observations may identify problems with tools, equipment, work ]  
[ procedures or John's failure to consider safety in performing tasks. ]  
[ Correct! ]
31. [ This training can start John thinking about how he could have ]  
[ prevented those accidents and the type of thinking he must use in the ]  
[ future. This is a first step in getting John to accept personal ]  
[ responsibility for his own safety. Correct! ]
32. [ Disciplining an employee after an accident may be counter productive. ]  
[ Monitoring and correcting work habits at the time they occur is more ]  
[ productive. ]
33. [ Correct! This might reveal a physical or medical condition which could ]  
[ have been a contributing factor in the accident. ]
34. [ If John is successful in this, it is a first step in helping him assume ]  
[ responsibility and prevent accidents to himself and others. Correct! ]
35. [ Correct! This would contribute to reducing John's accident risk. ]  
[ ]

**Question G** (Select as MANY as you think are correct.)

36. [ Everyone tolerated this risky situation for a long time. Correct! ]
37. [ Correct! Specific job assignments with good follow-up by the foreman ]  
[ could improve this situation. ]
38. [ The hazard should have been corrected earlier and the walkway ]  
[ maintained. Correct! ]
39. [ Correct! Any worker on this section on any shift could have easily fixed ]  
[ the mud hole and prevented the accident. ]
40. [ Correct! A good plan would include specific assignments. ]
41. [ Attitude is very difficult to measure. This is a judgment on your part and is ]  
[ not factual. ]
42. [ Although he told his workers to "Be careful!", housekeeping was poor, ]  
[ and the mud hole remained for a week. Correct! ]
43. [ This attitude was self-destructive and dangerous to John and his ]  
[ co-workers. Correct! ]

**Question H** (Select as MANY as you think are correct.)

- 44. [ Correct! The foreman should not assume the employees will ]  
[ automatically think about the safety aspects of the job. He should ]  
[ instruct employees in recognizing and correcting hazards and monitor ]  
[ their performance. ]
- 45. [ Correct! Foremen must take action to eliminate unsafe situations. ]
- 46. [ This clearly teaches Bruce what to do so that his management and ]  
[ accident prevention skills can improve. Correct! ]
- 47. [ Correct! This is a good opportunity for them to make sure the ]  
[ procedures are current and up to date. ]
- 48. [ This is a first step in improving housekeeping. Follow-up means ]  
[ checking frequently, encouraging good performance, and correcting ]  
[ problems. Correct! ]
- 49. [ This should be used as a last resort to correct his work habits if other ]  
[ measures fail. Not correcting hazards is not acceptable. ]
- 50. [ Correct! A structured investigation for all lost time accidents is a good ]  
[ safety practice. ]
- 51. [ If you work him weekends, it would likely alienate him and could lead ]  
[ him to becoming a rebel. This will not teach him the skills he needs. ]
- 52. [ Correct! Good supervisors at all levels monitor performance and ]  
[ provide constructive feedback. ]
- 53. [ This is a good opportunity to present a real issue to everyone else in ]  
[ the mine. Correct! ]

END OF PROBLEM

### **Scoring your performance**

1. Count the total number of responses you colored in that were marked "Correct". Write this number in the first blank on the answer sheet.
2. Count the total number of "incorrect" responses you colored in. Subtract this number from 16. Write the difference in the second blank on the answer sheet.
3. Add the numbers on blanks one and two.
4. The best score is 53. The worst score is 0.

## **Instructor's Discussion Notes**

Use the information presented here and on the master answer sheet, your own ideas and experience, and those of the miners in your class, to discuss the exercise after it is completed. Group discussion can strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the miners. After they have worked the exercise, miners enjoy discussing the problem. They also frequently think of better ways to respond to a problem than those listed among the answers. The purpose of the exercise is to help miners think about and remember basic knowledge and skills they may someday need to deal with an emergency. The discussion following the exercise can contribute to this goal and tailor the exercise content to the needs of the group you are training.

It is helpful to show overhead transparencies of the master answer sheet during the discussion while the miners look at their problem booklets. This allows you to lead the group through the exercise and to disclose and discuss all the answers to each question. Most of the information about why particular answers are correct or incorrect is given on the master answer sheet.

The following notes provide additional information for you to discuss with your class. Read through and think about the notes before the class. Don't read the notes to the class members. This would be boring and ineffective. Rather, incorporate the ideas you find here with your own ideas and make these points at the appropriate place in the discussion of the exercise.

**Question A** - Answers 1, 2, 3, 5 and 7 are correct. The section foreman can give you insight into his role as supervisor and reflect his safety concerns (1). John's interview will supply you with pertinent information surrounding the accident (2). Co-workers can be an excellent source of information in determining the contributing factors leading to the accident (3). By actually visiting the site where the accident took place (5), physical factors contributing to the accident can often be identified. It is important to determine if personal protective equipment was in use (7) for planning your preventive recommendations. The purpose of an investigation is not to fix blame or find fault, but rather to identify contributing factors and to implement safety strategies that could reduce future similar incidents. There are two categories of contributing factors. One is an unsafe act which is defined as any action which permitted or occasioned the occurrence of the accident. The other category is an unsafe condition which is any physical condition or circumstance which permitted or occasioned the occurrence of the accident. There may be several contributing factors in each category that lead to the accident. The mine superintendent (4), and dispatcher (6) were not present at the time of the accident and had no connection to the incident, so there is no need to talk to them now. Although you may consult personnel files in an attempt to determine additional contributing factors leading to the accident, now is not the time because it would cloud the investigator's objectivity (8). The investigation is independent of personalities. Prejudging a person interferes with an investigation (9).

**Question B** - Answers 10, 11, and 12 are the correct choices. John may feel he must be specifically directed to correct unsafe hazards, but safety and hazard recognition

are everyone's responsibility (10). John is most knowledgeable of his job and it is his responsibility to either correct unsafe conditions or bring them to the attention of his supervisor for correction (11). John has an obligation to himself and his fellow workers to correct hazards observed in the workplace (12). Additional task training may be helpful (13), but it is more important to communicate with, and receive feedback from his section foreman.

**Question C** - The correct answers are 17 and 18. When the foreman acknowledges that the mud hole was there for a week (17), he should have been asked how and when he address such hazards. The investigators need to continue the investigation until all contributing factors leading to the incident (18) have been identified. Investigators often make the mistake of ending an investigation once a single contributing cause has been determined. Very few accidents can be attributed to a single cause. All the contributing causes should be explored to determine appropriate preventive measures that can be recommended to management (14)(18). Being accident prone is a judgement and is not a consideration (15). "Be careful", does not demonstrate a proactive approach to safety (16) or show concern, and has very little value as a preventive measure. Even if documentation of task training indicates that John was trained, there is no evidence that the training was appropriate (19). Many variables affect training or performance, therefore this choice is inappropriate.

**Question D** - The correct answers are 21, 22, and 23. Observation coaching, monitoring, reminding and feedback are the responsible actions a foreman needs to incorporate into his management style. Just talking safety (21) isn't enough. John may require additional supervision and instruction (22) in correcting hazards in the workplace. It is important for supervisors to monitor (23) and provide feedback to their employees to ensure the health and safety of his/her employees. It is not enough to provide lip service, Bruce needs to demonstrate his safety attitude through proactive actions (20)(24).

**Question E** - Answers 25, 26, 27 and 29 are the correct choices. The poor housekeeping in the section (25) could be the result of Bruce's failure to assign specific job tasks. It is likely that housekeeping will not improve (26) and accidents will continue unless interventions are introduced to improve housekeeping (27). Bruce's shift may not be the only crew ignoring the housekeeping problem in the section. If poor housekeeping is evident across all three shifts (29), it points to an organizational problem. Just because management has shown attention to this accident (28), it is unlikely that this sporadic attention will improve housekeeping in the section. Supervisory skills and workers responsibility must be emphasized to bring improvement to the section.

**Question F** - The correct answers are 30, 31, 33, 34 and 35. Observations by supervisors that increase workers' acceptance and fix responsibility (30) are essential tools in accident prevention. They assist the supervisor in identifying problems with tools, equipment or work procedures. By providing feedback (34), training, and a review of his accident (31), John may begin to accept personal responsibility for his own safety. A medical examination (33) may reveal a physical or medical condition that contributed to the accident. Allowing John to be responsible for reporting or correcting

unsafe conditions (35) is a correct step in raising his safety awareness. Disciplining an employee (32) after an accident is counter productive. Monitoring and correcting work habits at the time they occur is more productive because it provides immediate feedback to undesirable actions.

**Question G** - Answers 36, 37, 38, 39, 40, 42 and 43 are correct. As a result of your investigation, you identify the following four contributing factors leading to the accident: 1) everyone, including management, tolerated the hazard for a long time (36)(39), 2) specific job assignments (40) and follow-up could improve housekeeping in the section (37), 3) Bruce failed to give John specific work instructions concerning moving the rock dust and correcting the hazard (38), and 4) John's lack of responsibility (43) in correcting the unsafe condition. It is problematic to attribute John's accident to his "poor safety attitude." His safe or unsafe behavior (41) is much more related to the specifics of his work assignment. The expectations and standards set by the foreman and other tangible factors add to his attitude.

**Question H** - The correct answers are 44, 45, 46, 47, 48, 50, 52 and 53. By training the foreman in the proper management procedures of instruction, monitoring employee behavior, hazard recognition and hazard control (44), his safety awareness can be heightened and communicated to the crew. It is the foreman's responsibility to ensure that any unsafe conditions he observes are corrected (45). If upper management sets the example and becomes actively involved (46)(52), safety commitment throughout the organization is re-emphasized. When a work procedure is revised (47), it acts as a catalyst to involve management and labor in coming to a consensus on the safe and productive ways to complete a task. By having the foreman prescribe specific assignments to crew members (48), he fixes responsibility. Then, through observing and encouraging good performance, and correcting problems that arise, housekeeping can improve. When all lost time accidents are investigated (50), contributing factors can be identified, trends defined, and appropriate recommendations made. Discussing this accident at a safety meeting (53) provides a real issue that everyone can relate to and affords an excellent opportunity for feedback.

## **References**

Accident Prevention Manual for Industrial Operations. 8<sup>th</sup> Edition, National Safety Council, Frank E McElroy, PE, CSP. 80-81376, 1980.

Occupational Accident Research, Proceedings of the International Seminar of Occupational Research, Saltsjobaden, Sweden. 3-5 September 1983. Urban Kjellen, Elsevier Science Publications B.V., 1984

“Research Study to Determine the Applicability of New Methodologies in Mine Accident Investigation,” Contract JO308008, Bureau of Mines.

### Scoring Key for Investigation of a Slip/Fall Accident

The correct answers are marked with an asterisk<sup>1</sup>.

<u>Question</u>	<u>Answer Number</u>						
A	1*	2*	3*	4	5*	6	7*
	8	9					
B	10*	11*	12*	13			
C	14	15	16	17*	18*	19	
D	20	21*	22*	23*	24		
E	25*	26*	27*	28	29*		
F	30*	31*	32	33*	34*	35*	
G	36*	37*	38*	39*	40*	41	
	42*	43*					
H	44*	45*	46*	47*	48*	49	50*
	51	52*	53*				

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<sup>1</sup>This page is printed in large type and may be duplicated as an overhead transparency.

## Investigation of a Slip/Fall Accident Exercise Field Test Data

Demographic data: n = 256

Average age	43.0
Average years experience:	19.3

Job categories: n = 203

Miner/laborer	19.2 %
Maintenance/technical	25.1
Supervisor/manager	52.2
Other	3.4

Specialized training reported:

Foreman	42.0 %
Safety committee	36.6
Accident investigation	55.1
Accident prevention	64.5
Loss control	16.7
Labor-management relations	53.1
Other training	6.1

Face validity of exercise:

Situation could happen	99.2 %
Helped remember something important	97.2
Learned something new	79.6
Exercise took too long	6.6
Liked working the exercise	94.7
Instructor's directions were clear	98.3
Written directions were clear	98.8
Diagrams easy to understand	98.7
Scoring easy to understand	84.0
Exercise easy to read	98.4

Trainee performance:

**Score by question:**

<u>Score</u>	<u>Max</u>	<u>Min</u>	<u>Mean</u>	<u>Std. Dev.</u>
A	12.5	5.56	10.50	1.444
B	12.5	3.13	9.29	2.150
C	12.5	0.0	9.39	2.536
D	12.5	2.50	10.14	2.391
E	12.5	0.0	10.07	2.434
F	12.5	4.17	9.73	1.794
G	12.5	4.69	10.41	1.702
H	12.5	3.75	11.15	1.503
Score	100.0	56.08	80.72	7.92

**Total score:**

<u>Score</u>	<u>percent</u>
<60%	2.0
60.0 - 69.9	9.1
70.0 - 79.9	31.0
80.0 - 89.9	49.6
90.0 - 100.0	8.3
	100.0

**Answer discrimination:**

40/53 positively discriminate	75.5
13/53 did not discriminate	24.5
0/53 negatively discriminate	0.0

**Overall score by job category:**

Miner/Laborer	79.3
Maintenance/Technical	82.1
Supervisor/Manager	79.9
Other	79.9

Questions discriminating at the .05 level: C, F, and G

**Overall score by specialized training:**

No specialized training reported	79.7
Reporting specialized training	81.1

Questions discriminating at the .05 level: C and D  
Z = .55

## **Appendix A: Problem Booklet**

Duplicate this copy of the problem booklet for use in your classes. **Booklets should be printed on only one side of the paper.** Each person in your class should have a problem booklet while they are working the exercise. The problem booklets are reusable. To save effort and money, ask the trainees to avoid marking in the booklets and collect all the booklets after the class.

You may obtain a copy of the problem booklet from NIOSH, Pittsburgh Research Laboratory. The telephone number for this agency is listed in the footnote on page three of this document.

## **Investigation of a Slip/Fall Accident**

### **Problem Booklet**

NIOSH  
Pittsburgh Research Center  
Pittsburgh, PA

Behavioral Research Aspects of Safety  
and Health Group (BRASH)  
Institute for Mining and Minerals Research (IMMR)  
University of Kentucky, Lexington, Kentucky

## **Instructions**

Read the problem described on the next page. Then answer the 8 questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and your answers. The questions tell you to select as many answers as you think are correct.

After you have selected your choice to a question, look up the number for that choice on the answer sheet. Rub the special pen between the brackets for that choice. A hidden message will appear that tells you if the choice is correct and provides you with additional information. When you finish you will learn how to score your performance.

## Background

You have been the general mine foreman at White Rock Mine for 4 years and have worked at the mine for 12 years.

This mine has 3 working sections and a longwall and employs 187 miners who work on three production shifts.

Bruce Holt is a day shift section foreman. He has worked at this mine for 6 years, four years as a continuous miner operator, and two years as the section foreman for 4-G section.

The 4-G section is a five entry section. Housekeeping and maintenance of the section is split among the three shifts, with Bruce Holt's shift being responsible for the track entry.

John Smith has worked at this mine for 12 years. For the last 8 years he has been a scoop operator and section supply man.

Mike Powell, the safety supervisor, has 22 years experience in mining and 6 years in this job.

## Problem

The mine superintendent calls you into his office. He gives you the following accident report for John Smith, a scoop operator on the 4-G section:

Accident occurred on the day shift on 4-G section of the #1 Mine. Employee was carrying rock dust bags from the rock dust car to a battery powered scoop. A muddy area, approximately 9' x 3' with ankle deep mud, was along the walkway side of the rock dust car. It consisted of a water and rock dust mixture forming a slippery walkway. Employee's right foot stuck in the mud and his left foot slipped, causing him to fall over against the flat car. He struck his left wrist on the car, causing a severe bruise. He lost a day's work as a result of this accident.

The accident report includes the drawing shown in Figure 1 on the next page.

Several days after the accident, the mine superintendent assigns you and the safety supervisor to thoroughly investigate all the contributing factors to this accident. He is determined to find ways to prevent slipping and tripping accidents. Your job is to make specific recommendations to the superintendent. You want your recommendations to be both practical and effective.

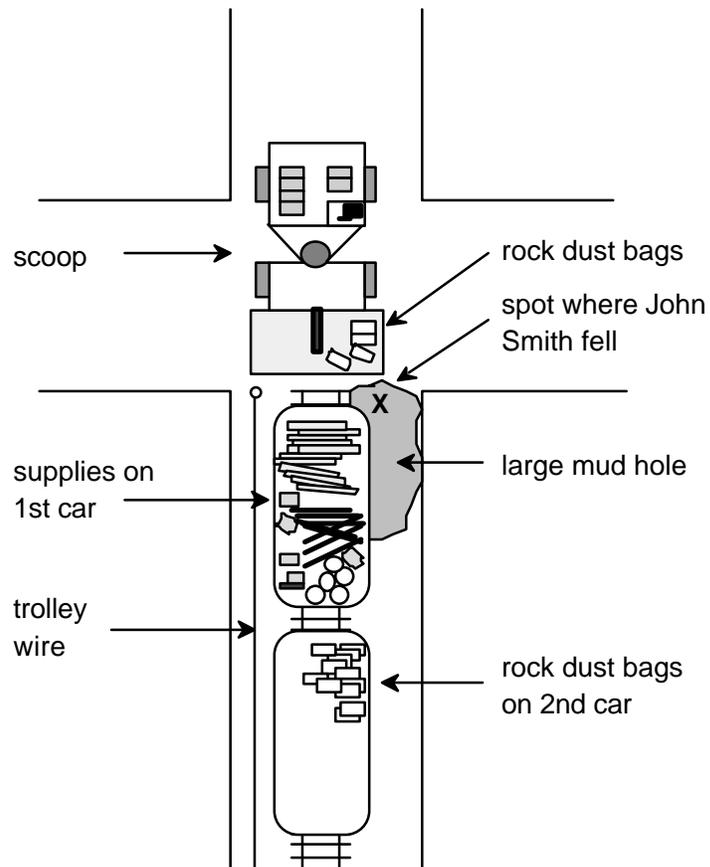


Figure 1: Sketch of the mud hole and accident scene

**Question A**

You meet with Mike Powell, the safety supervisor to plan the investigation. You both want to find all the contributing factors for this particular accident. Which of the following should you plan to do? (Select as MANY as you think are correct.)

1. Interview Bruce Holt, the foreman of the 4-G section where the accident occurred.
2. Interview John Smith, the injured scoop car operator.
3. Interview John Smith's co-workers on the section.
4. Interview the assistant mine superintendent.
5. Visit the 4-G section and examine the area where the accident took place.
6. Talk to the dispatcher about the accident.
7. Attempt to determine if John was wearing proper personal protective equipment.
8. Review John's personnel file in preparation for your investigation of the accident.
9. Attempt to determine if John is a conscientious worker, so you can ask the right questions when you conduct your investigation.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question B**

You and Mike decide to interview John, Bruce, & John's coworkers, determine if John was wearing the proper safety equipment, and visit the accident site. You start by talking with John Smith, the scoop operator. He says he was just trying to do his job, and that the boss wanted the dust in a hurry. He says if the boss would keep the section cleaned up, this accident wouldn't have happened. Then you ask John, "Why didn't you clean up the mud hole?" He says, "The boss didn't tell me to fix it. It's not my job!" Which of the following are correct? (Select as MANY as you think are correct.)

10. John feels he is not responsible for taking care of the mud hole unless he has specific orders to do so.
11. John should have informed his foreman about the hazard and suggested some actions to eliminate the condition or correct it.
12. It's John's responsibility to make the place safe for himself and his co-workers even though he was not specifically directed to do so.
13. John needs more training in hazard recognition.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question C**

Next you interview Bruce, the foreman about the accident. He says that he sent John, the section supplyman, to move rock dust from the supply car to the scoop. (See Figure 1). Bruce says that since this task is part of John's job, he gave him no specific instructions. Then he added, "Occasionally mud holes appear. This one was there for only a week. Since I know that John is somewhat accident prone, I told him to 'Be careful!' John is the only one who was injured."

What should you conclude based on the foreman's statements? (Select as MANY as you think are correct.)

14. The accident is John's fault, due to his not paying attention to slip and trip hazards.
15. John is accident prone.
16. Bruce, the foreman, is committed to safety, because he always reminds his crew to "Be careful".
17. Bruce, the foreman, was aware of the mud hole and the hazards it presented at the work site.
18. You need more information about the details of the accident.
19. Bruce, the foreman, did not provide John with adequate task training for this type of materials handling job.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question D**

You have decided you need more information. You look at John's training record, which shows that John has received his task training on scoop operation and materials handling. You, Mike, and Bruce visit the accident site on 4-G section. Bruce tells you he told John to move 20 bags of rock dust from the supply car to the scoop parked about 40 feet away on the other side of the mud hole. Then, Bruce says he always tells his employees to work safely and take care of unsafe work hazards. He says he is extremely interested in preventing accidents and constantly advises his employees about changes in the conditions on the section.

Which of the following statements are true? (Select as MANY as you think are correct.)

- 20. The foreman's perceptions and actions are likely to encourage John and the other miners to identify and correct unsafe work conditions.
- 21. The foreman talks safety but ignores his responsibility of correcting the hazard.
- 22. The foreman had a responsibility to instruct John about how to correct the muddy condition and work safely.
- 23. A good foreman is expected to monitor his or her employees frequently.
- 24. The foreman has provided enough instruction and supervision so that John should have been able to perform the job safely.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question E**

As you examine the work site, you notice the dinner hole is dirty, there are roof bolts in the walkway of the track entry, there are papers and debris around the power center, and the equipment on the section is dirty and covered with coal and stone. You ask Bruce, "Do you assign specific miners to specific housekeeping duties?" Bruce says, "No, I tell them it's everybody's job!"

Given what you have seen and Bruce's response, what have you established at this point? (Select as MANY as you think are correct.)

- 25. Housekeeping on the section is generally poor.
- 26. Accidents involving housekeeping problems will continue to occur on this section.
- 27. On this section, housekeeping will probably continue to be a subject of discussion but not action.
- 28. Because of management's attention to this accident, housekeeping on this section will improve.
- 29. The housekeeping problem may not be limited to Bruce's shift.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question F**

You decide you need more information and review John's personnel file and his accident record. Here's what you find: John has worked as a scoop operator for 8 years, and has had 12 reportable accidents in the last 2 years. Most of these are slipping, tripping and injuries to the hand. Interviews with John, his supervisors, and co-workers indicate that he is a good worker.

What should you recommend for John, based not only on what you find in the personnel file, but also on your investigation of contributing factors? (Select as MANY as you think are correct.)

- 30. Observations of John by you and Bruce.
- 31. Special attention or training and review of his accidents.
- 32. Discipline John.
- 33. A medical examination.
- 34. To provide John feedback that part of his job is to assess safety hazards before performing tasks.
- 35. Remind John it is his responsibility to notify supervisors of hazards and to correct those hazards under his control.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

**Question G**

Based on your investigation which of the following are contributing factors to John's accident. (Select as MANY as you think are correct.)

- 36. The foremen and crews walked through the mud hole for a week.
- 37. Housekeeping was generally poor.
- 38. Bruce, the foreman, failed to give specific work instructions to John concerning the moving of the rock dust and correcting the hazard of the mud hole.
- 39. John's co-workers ignored the hazard.
- 40. No specific plan for housekeeping was in force on this section.
- 41. John's poor safety attitude.
- 42. Bruce, the foreman talked safety, but took little action.
- 43. John, the scoop operator, felt he had little personal responsibility for correcting the mud hole.

WHEN YOU HAVE MADE YOUR SELECTION(S), DO THE NEXT QUESTION.

## **Question H**

Based on your findings, which of the following recommendations would you make to the superintendent? (Select as MANY as you think are correct.)

44. Train the foreman to make safety a specific part of his work assignments and plans.
45. Remind the foreman of his responsibility to see that unsafe conditions are corrected before employees begin work.
46. Have the mine foreman tour section 4-G with Bruce to identify and describe how to correct unacceptable conditions.
47. John and Bruce should review the safe working procedures for this task.
48. Have the section foreman assign specific areas of responsibilities for housekeeping to each employee and follow up on assignments.
49. Discipline the foreman.
50. Plan and conduct an investigation for all lost time accidents.
51. Work the foreman weekends until he gets the message.
52. You, as the general mine foreman, and the safety supervisor should visit the section more frequently to assess housekeeping conditions and effectiveness of the section foreman.
53. This accident should be a subject of discussion at a future safety meeting.

END OF PROBLEM

## **Scoring your performance**

1. Count the total numbers of responses you colored in that were marked "Correct". Write this number in the first blank on the answer sheet.
2. Count the total number of "incorrect" responses you colored in. Subtract this number from 16. Write the difference in the second blank on the answer sheet.
3. Add the numbers on blanks one and two.
4. The best score is 53. The worst score is 0.

## **Appendix B: Answer Sheet Blanks**

These are the answer sheet blanks. Copies of these blank answer sheets may be duplicated in the normal fashion. However, the answers that are found within the brackets must be printed on these blank answer sheets in latent image ink. These answers are found in Appendix C. If you have the capability to print latent image ink, make copies of the blank answer sheets. Then make a mimeograph master of the latent image answers that appear in Appendix C. Then print the invisible latent image ink on the blank answer sheets, being careful to make sure all pages print and that the appropriate answers line up with the appropriate blanks. The Master Answer Sheet shows all the latent image answers in their proper place.

Most companies and trainers prefer to purchase preprinted answer sheets. You may obtain copies of preprinted latent image answer sheets from NIOSH, Pittsburgh Research Laboratory. The telephone number for this agency is listed in the footnote on page three of this document.

The exercise may be administered in small groups or individually. Used individually, you will need one answer sheet for each person in your class. If you use the exercise in small groups, you will need one answer sheet for each 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

Special developing pens are also needed by each person who marks an answer sheet. These are "PENIB" and may be obtained from SICPA Customer Service, 8000 Research Way, Springfield, VA 22153, phone 1-888-742-7287.

## Answer Sheet for Investigation of a Slip/Fall Accident

Use this answer sheet to mark your selections. Rub the special pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need. The last part of the message will tell you what to do next.

**Question A** (Select as MANY as you think are correct.)

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**Question B** (Select as MANY as you think are correct.)

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- 13. [ ]  
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**Question C** (Select as MANY as you think are correct.)

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- 17. [ ]  
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- 18. [ ]  
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**Question D** (Select as MANY as you think are correct.)

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**Question E** (Select as MANY as you think are correct.)

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**Question F** (Select as MANY as you think are correct.)

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**Question G** (Select as MANY as you think are correct.)

- 36. [ ]
- 37. [ ]  
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- 38. [ ]  
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- 39. [ ]  
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- 43. [ ]  
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**Question H** (Select as MANY as you think are correct.)

- 44. [ ]  
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- 48. [ ]  
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- 51. [ ]  
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- 52. [ ]  
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- 53. [ ]  
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END OF PROBLEM

**Finding your score**

Number of "Correct" answers you colored in = (1) \_\_\_\_\_

16 minus number of incorrect answers you colored in = (2) \_\_\_\_\_

Add blanks one and two to get your total score = (3) \_\_\_\_\_

Highest possible score = 53

Lowest possible score = 0

### **Appendix C: Latent Image Answers**

These pages contain the latent image answers that must be printed in the blanks of the answer sheet in Appendix B. These answers are spaced and sequenced correctly so that they exactly match up with the appropriate blanks on the answer sheet blank.

Once the latent image ink answers have been printed in the answer sheet blanks, the special developing pen reveals the formerly invisible (latent image) printed message.

You may purchase preprinted answer sheets or you may prepare your own copies. To learn more about this option, and to determine how many answer sheets and special pens you will need, see the introductory section of the Instructor's Copy.

The foreman's knowledge and perceptions are important. Correct!

Correct! His knowledge and perceptions are important.

Correct! The co-workers may provide information that is useful for understanding the factors that contributed to this accident.

He was not involved in this accident.

Useful information can be obtained in this manner. Correct!

He has little knowledge and few facts about this situation.

John and the section EMT who treated his injury both say he was wearing a hard hat, hard toed boots, metatarsals, safety glasses and heavy gloves. Correct!

You need to investigate the accident first, not the person. Prejudging the person can prevent finding all contributing factors.

Asking the right questions should proceed independent of personalities. You need to investigate the accident first, not the person. Prejudging the person can prevent finding all contributing factors.

Correct! John may feel this way, but safety and hazard recognition and corrective action is John's, and everyone's, responsibility when performing a task.

John should know the job and the hazards better than anyone. He has the responsibility to take the initiative to correct problems and ask for help when needed. Correct!

Correct! It is foolish to risk injury to himself simply because the boss failed to tell him to correct a hazard that he could have corrected himself.

John knew the hazards but did nothing to correct them. Some additional training may be helpful, but observing, coaching, frequent monitoring, reminders, and feedback from the foreman are also necessary.

You do not have enough information to determine all of the contributing factors of the accident. Jumping to this conclusion may stop you from looking for additional causes.

One should never make this useless judgement. When this judgement is made, people stop looking for contributing factors.

Saying "Be careful" does not demonstrate a serious concern for safety. Actions speak louder than words.

Correct! This should prompt you to ask Bruce how he normally deals with hazards like this.

At the present time you do not have enough information to make your report. Correct!

Training records must be examined before you make this judgment. However, having a piece of paper in the file does not guarantee an individual will perform as trained, or that adequate task training took place.

Bruce needs to demonstrate by actions, and assist and direct his miners in correcting problems, not only by making speeches.

Bruce's actions speak much louder than his words. Correct!

John may need more supervision than some miners, and he may have needed help in correcting the problem. Correct!

Correct! A good foreman monitors workers frequently, instructs, and follows up until he or she is confident the person will consistently perform the job in a safe manner.

Safe work habits require not only initial instruction, but also observing, coaching, frequent monitoring, reminders, and feedback.

Correct! Specific job assignments are needed so workers know what to do and who is to do it.

Data from this mine show that 15-20% of the total accidents involve housekeeping as a contributing factor. The rate on this section is likely to be higher than elsewhere if housekeeping is not improved. Correct!

Job assignments need to be specific and followed up if housekeeping is to improve and accident rates are to decline. Correct!

Perhaps, but this is unlikely because the foreman needs to learn some basic supervisory skills in order to become more effective.

Correct! Bruce is not the only foreman who is responsible for this section.

These observations may identify problems with tools, equipment, work procedures or John's failure to consider safety in performing tasks.

Correct!

This training can start John thinking about how he could have prevented those accidents and the type of thinking he must use in the future. This is a first step in getting John to accept personal responsibility for his own safety. Correct!

Disciplining an employee after an accident may be counter productive. Monitoring and correcting work habits at the time they occur is more productive.

Correct! This might reveal a physical or medical condition which could have been a contributing factor in the accident.

If John is successful in this, it is a first step in helping him assume responsibility and prevent accidents to himself and others. Correct!

Correct! This would contribute to reducing John's accident risk.

Everyone tolerated this risky situation for a long time. Correct!

Correct! Specific job assignments with good follow-up by the foreman could improve this situation.

The hazard should have been corrected earlier and the walkway maintained. Correct!

Correct! Any worker on this section on any shift could have easily fixed the mud hole and prevented the accident.

Correct! A good plan would include specific assignments.

Attitude is very difficult to measure. This is a judgment on your part and is not factual.

Although he told his workers to "Be careful!", housekeeping was poor, and the mud hole remained for a week. Correct!

This attitude was self-destructive and dangerous to John and his co-workers. Correct!

Correct! The foreman should not assume the employees will automatically think about the safety aspects of the job. He should instruct employees in recognizing and correcting hazards and monitor their performance.

Correct! Foremen must take action to eliminate unsafe situations.

This clearly teaches Bruce what to do so that his management and accident prevention skills can improve. Correct!

Correct! This is a good opportunity for them to make sure the procedures are current and up to date.

This is a first step in improving housekeeping. Follow-up means checking frequently, encouraging good performance, and correcting problems. Correct!

This should be used as a last resort to correct his work habits if other measures fail. Not correcting hazards is not acceptable.

Correct! A structured investigation for all lost time accidents is a good safety practice.

If you work him weekends, it would likely alienate him and could lead him to becoming a rebel. This will not teach him the skills he needs.

Correct! Good supervisors at all levels monitor performance and provide constructive feedback.

This is a good opportunity to present a real issue to everyone else in the mine. Correct!



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