Man in the Bin Exercise

Instructor's Copy

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Contents

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 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. Copies of this answer sheet must have the invisible ink answers that appear in Appendix C printed on them.[2] Answer sheets are consumable. One is needed for 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:	Invisible ink
Audience:	Coal preparation plant and other mining industry granulated product processing plant workers
Length:	Thirteen questions (40 minutes for administration plus 40 for discussion)
Skills:	Hazard recognition concerning bins, hoppers, and stockpiles Safe practices for working around the processing, transporting, and storage of granulated materials Strategies and procedures for rescuing a worker entrapped in a bin of free flowing, granulated material Procedures for rescuing an injured person from a high confined space (belt conveyor catwalk) Basic first aid for diagnosing and treating a victim with respiratory obstruction and probably multiple trauma
Location:	Surface coal (or other granulated product) preparation plant
Problem:	You are the weigh master at the scales at the truck unloading bins at a preparation plant. Jake, a truck driver, raises the bed of his truck to dump a load in a bin. But the load won't dump and the bed won't come down. The bin appears full. Jake climbs into the bin on top of the coal. Suddenly the bridge of coal collapses. The 20 tons of coal in the bed of the truck slide out and buries Jake in the bin. You must decide what to do to help him without risking your life or the lives of others.

[2] You can do this yourself if you have the proper equipment, or you may obtain copies of preprinted answer sheets from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

How to Use This Exercise

1. Look at the performance objectives. Decide if the exercise is relevant for your mine training class.

2. Work through the exercise with the developing 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:

   - Give each person an exercise booklet, an answer sheet, and a developing pen.

   - Demonstrate how to select and mark answers using the 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.

Performance Objectives

Objective number	Capability verb(s)	Description of required performance and conditions under which it is to occur
1 SW/CS[3]	Recognize Identify	Unsafe work practices around bins, hoppers, and stockpiles of free flowing granulated materials and the possible consequences of entrapment in such material
2 SW/CS	Recognize Anticipate	Dangers for persons attempting to rescue a worker entrapped in a bin or hopper of free flowing granular material
3 FA/CS	Select Evaluate	Safe and effective strategies for the rescue of victims entrapped in free flowing granular material to prevent additional injury and death to rescuers
4 FA/CS	Order Prioritize	First aid procedures in terms of assessing the accident scene to prepare safe access to the victim before administering first aid, providing first aid care to a victim in a confined and elevated space, and properly stabilizing and transporting the victim from the confined and elevated space to the surface
5 SW/CS	Understand Remember	Basic information and facts about the hazards of working above, around, or within large containers of unconsolidated granular materials
6 SW/CS	Comprehend	The lethal consequences of even an initial slight entrapment of only one's feet and legs in such material

[3] Skill and knowledge domain abbreviations:
SW safe work practices
CS confined spaces
FA first aid

Master Answer Sheet for Man in the Bin Exercise

Use this answer sheet to mark your selections. Rub the developing 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.

Question A (Choose only ONE unless you are told to "Try again!")

1. [Dangerous and illegal! You and Jake could be hurt or killed. Try again!]

2. [Dangerous and illegal! He should not get into the bed of the truck. Try again!]

3. [Something is wrong. The belt and the feeder are running, but the coal is not]
   [dumping. You need to do something else. Try again!]

4. [Correct! It is the foreman's job to keep the coal moving and to solve the]
   [problem safely. Do the next question.]

Question B (Choose only ONE unless you are told to "Try again!"

5. [This wastes time. The prep plant workers won't hear your call. Try again!]

6. [Correct! Big Jake is in serious trouble. You will need help to save him. Do]
   [the next question.]

7. [You are placing yourself in great danger and your actions won't help Jake.]
   [Try again!]

8. [You are placing yourself in great danger and this won't help Jake. If you are]
   [trapped no one will come to help either of you. Try again!]

9. [This is not the best thing to do. Jake is out of sight and completely covered]
   [with coal. Try again!]

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

10. [Jake is covered by about 20 tons of coal. The rescuers cannot dig him out fast enough to save his life and they are in danger in the bin.]

11. [If you shut the feeder down, Jake may die.]

12. [Correct! There is no sign of Jake from either place.]

13. [Correct! He could have come through the feeder and be somewhere along the belt to the prep plant.]

14. [This is dangerous! The coal could continue to fall from the open chute. The man on the rope could be buried. Anyway, the man on the rope could not move the coal fast enough to help Jake.]

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

15. [This would take too long and it might kill Jake.]

16. [This would set the coal in the bin on fire, probably kill Jake, and create a more serious problem.]

17. [This would take too long and it would place the mechanic in a very dangerous situation. The bin is still partially filled with coal.]

18. [Correct! If Big Jake is still in the bin, this is probably the only way to get him out in time to save his life.]

19. [Correct! If Big Jake comes out the chute, the feeder and the belt need to be stopped promptly.]

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

20. [Correct! There has already been one accident. The persons trying to help]
[Jake need to be protected from another accident.]

21. [This would take too long because the belt drive motor would have to be]
[rewired. Besides, Jake could fall from or be injured by the moving belt.]

22. [It would be difficult to stop the belt at just the right spot and Jake might be]
[hurt or killed.]

23. [You should be careful but you should also act rapidly. You should not]
[assume Big Jake is dead. Basic first aid has saved many lives.]

24. [More than two people are needed to help Jake. You should not wait for the]
[ambulance EMTs before trying to help him.]

25. [Correct! Mine properties are large and ambulance crews can waste time if]
[they are not directed to the accident area.]

Question F (Choose only ONE unless you are told to "Try again!")

26. [This won't help Jake. Try again!]

27. [You can't tell. All his exposed skin is black with coal dust. Try again!]

28. [You need to do something else first. Try again!]

29. [Correct! His mouth and nose are tightly plugged with fine coal and coal dust.]
[Do the next question.]

Question G (Choose only ONE unless you are told to "Try again!")

30. [This won't help and could hurt him. Try again!]

31. [This should be done only with a conscious victim. It won't help Jake and]
[could injure him. Try again!]

32. [This could hurt him. Try again!]

33. [Correct! Soon you get his mouth and nose cleared. Do the next question.]

Question H (Choose only ONE unless you are told to "Try again!")

34. [This could hurt him. He may have fractures and other injuries. Try again!]

35. [He should not be moved yet. Try again!]

36. [Correct! You find no bleeding or other obvious injuries. Jake is breathing]
[well. He opens his eyes, begins to mumble, and moves his arms. Do the]
[next question.]

37. [You should comfort Jake. He may have internal injuries, but you must]
[examine him for other injuries. Otherwise he may die. Try again!]

Question I (Choose only ONE unless you are told to "Try again!")

38. [There is no time to reason with Jake. Try again!]

39. [Correct! You must restrain him immediately or he may fall from the belt.]
[Do the next question.]

40. [There is no time for this now. Try again!]

41. [Dangerous! You are in an unsafe position. Jake could fall and take you]
[with him. Try again!]

Question J (Select as MANY as you think are correct.)

42. [Correct! The four of you are able to restrain him on the belt and he begins]
[to calm down a little as you talk to him.]

43. [He keeps sitting up and trying to get off the belt. You can't get him on the]
[stretcher and while you are trying he nearly gets away from you.]

44. [Correct! This will be much better than the folding aluminum stretcher for]
[restraining and transporting Big Jake.]

45. [Correct! Three of you manage to get the blanket around him and this helps]
[to restrain him. You continue to talk to him and calm him.]

Question K (Choose only ONE unless you are told to "Try again!")

46. [When you do this, Jake's body bends in the middle, and his head falls back.]
[You may have added to his injuries. Try again!]

47. [Correct! This method of moving Jake will minimize extra movement and it]
[will help hospital emergency medical personnel remove him from the basket.]
[Do the next question.]

48. [When you try this, Jake is frightened. He begins to scream and struggle.]
[Try again!]

49. [This creates unnecessary movement, and Jake is frightened when you roll]
[him face down on the belt. He starts to scream and struggle. Try again!]

Question L (Choose only ONE unless you are told to "Try again!")

50. [They are less familiar with the prep plant than you are. Besides, you need to]
[get Jake down so the EMTs can promptly transport him to the hospital. Try]
[again!]

51. [This is dangerous. It is too slippery, and too narrow for two people to hold]
[both ends of the stretcher. You are unable to carry out this task without]
[risking falling and dropping Jake. Try again!]

52. [When you try this, the stretcher bumps and jerks. It also tends to slide]
[underneath the railing on the side of the catwalk away from the belt. It could]
[easily fall over the side. Try again!]

53. [Correct! This is the fastest and safest way to get Jake down. He must be]
[snugly tied in the stretcher. Someone on the ground must handle a tag line]
[to keep the basket from swinging. Do the next question.]

Question M (Select as MANY as you think are correct.)

54. [False! Over 500 pounds of force is required to pull a worker from granulated material in a bin when he or she is trapped only to the waist. Burial to the neck requires more than 1000 pounds of force.]

55. [False! They would have been in danger of being covered by the loose coal in the bin as more coal flowed out the bottom. They probably could not have dug Jake out in time to save his life.]

56. [Correct! Longer times without oxygen cause irreversible brain damage or death. Smaller persons immersed in cold water can sometimes survive for longer periods of time.]

57. [False! This is a common misconception. Persons trapped to the neck in granulated material for a few minutes usually die. With each breath out, the material packs tighter around the victim's chest. Soon the person is unable to inhale. This leads to suffocation.]

58. [False! It takes about 1,000 pounds of force to pull a victim from such a position. The person is usually at the bottom of a cone shaped well. Digging causes more material to slide down and cover the victim's head, and also exposes the rescuer to burial.]

59. [Correct! The freezing rain probably created a crust (or bridge) of coal over the top of the bin. The loose coal below the bridge went out the feeder onto the belt. Bridging of material in hoppers, bins, and stockpiles often occurs without rain or freezing temperatures.]

60. [Correct! Other ways should be used to clean out hung materials. Sending a worker into a full or partially full bin is a last resort. The life-line should be nearly vertical, remain taut, and be equipped with an automatic braking system that stops a workers fall within a foot or two. These arrangements prevent the worker from falling into the loose material.]

61. [Correct! A safety harness holds the worker's body in a vertical position even if he or she falls a short distance. This keeps the head and chest out of the material and facilitates pulling the worker free. With a safety belt even a short fall may cause a worker to double over and their head and chest may be covered. In this doubled over position a force of more than 2,000 pounds is needed to pull the victim free.]

62. [Correct! Otherwise materials from the sides of the bin may fall on the worker and cover all or part of the persons body. The falling material can kill or injure the worker, or the person can become entrapped.]

Finding your score

Number of "Correct" answers you colored in	=	(1)_____
40 minus number of incorrect answers you colored in	=	(2)_____
Add the values in blanks one and two to get your total score	=	(3)_____

Highest possible score = 62

Lowest possible score = 0

Instructor's Discussion Notes

Use the information presented here and on the master answer sheet, your own ideas and experience, and that of the persons in your class to discuss the exercise after it is completed. Group discussion can help strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the trainees. After they have worked the exercise, trainees 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 people 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 answers on the master answer sheet during the discussion, while the trainees look at their problem booklets. This allows you to lead the group through the exercise and to 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 - The correct answer is 4. You should warn Big Jake not to get into the truck and call the foreman to report the problem. Once material is hung in a bin, special procedures must be used to safely free the blockage. This may require equipment such as a crane, a suspended platform, safety harness, and long steel poles. Workers should never enter full or partially filled bins. Jake should not get into the bed of his truck because the load could slide out and dump him into the bin. For these reasons answers 1 and 2 are incorrect. Waiting for the coal to come out of the truck by itself (3) is not practical because the bridge of coal in the bin may last for a few more seconds, hours, or days.

Question B - The correct answer is 6, to run to the scale house and call for help from prep plant workers and to notify the local emergency medical service system. These actions in this order are the only actions that can help Big Jake now. Calling for help on Jake's CB radio (5) would be ineffective for two reasons. Although state police monitor this CB band, the range of the radio is generally less than 2 miles and even shorter in hilly country. It is unlikely that the police would hear the call, although other truckers in the area might. However, these other truckers are not at the scene and are not able to provide immediate help. Leaning into the bin and digging around to find Jake (7) would waste time and is dangerous and ineffective. The bin is large. Jake is buried. The rescuer could fall into the bin and suffer the same fate as Jake. Having the rescuer enter the bin, even with a rope tied to the truck and around his or her waist, (8) would probably result in the rescuers death. As the coal fed out of the bin the rescuer could be pulled down and buried. If the rescuer

were buried only to the mid thighs, it would be impossible for him or herself to pull free with the rope. The force required is too great. Shutting down the feeder for the bin (9) would stop Jake from going through the feeder, but would also probably ensure his death from suffocation. There is no other quick way to get Jake out of the bin except to let him run through the feeder with the coal. You might ask the members of your class to discuss what they would do in this situation if the feeder included a crusher or breaker. (Jake would almost certainly die either from suffocation or from being crushed. If his head or body were still visible from the top of the bin, the feeder could be stopped and some type of shoring material could perhaps be placed around his head or body. However, this rescue attempt could also pose a risk to the rescuers. The point to be made is that when a worker climbs into a bin or hopper of granular material, he or she is often doomed and beyond help. For this reason many companies have a policy of automatic dismissal for any employee seen on foot in the area of stockpiles, in feeders, or on materials in bin and hoppers.)

Question C - The correct answers are 12 and 13. An attempt to locate Jake should include inspecting the bin from the top and from the bottom at the chute and feeder. The feeder should be left running. Otherwise Jake could remain in the bin and suffocate. The bin may have been nearly empty under the bridge of coal that collapsed under Jake. At this point in the rescue attempt, Jake could already have traveled though the feeder and onto the belt to the prep plant. He could be covered with coal and be difficult to spot. Therefore, persons should be assigned to watch for him along the belt. If he were still in the bin, shutting the feeder down (10, 11, and 14) would all contribute to Jake's death by suffocation. Even after shutting down the feeder, sending rescuers into the bin to dig for Jake with shovels (10) is ineffective for rescuing Jake and dangerous for the rescuers. Tying a rope to a workers belt and sending him or her into the bin to dig for Jake (14) is also ineffective and very dangerous. Studies show that if the worker were buried only to the waist, the two helpers handling the rope could not exert the 500 pounds needed to pull him free. The worker also could be slumped over completely buried. In this position, studies show that over 2,000 pounds of force would be required to pull the victim free (Marshall, 1984a). A force this large could only be generated by a machine. The force itself would severely injure or dismember the victim if it did not first break the rope.

Question D - The correct answers are 18 and 19. At this point the rescuers have to assume Jake is still in the bin. He has not been spotted on the belt. Both the feeder from the bin and the belt under the bin must be kept in operation to remove coal and Jake from the bin. One worker should be stationed at the bin chute and feeder to watch for Jake and another at the main control panel to shut down the feeder and the belts as soon as Jake is spotted. Digging from the top with a backhoe (15) would take too long and could dismember Jake. Cutting a hole into the bin with an acetylene torch (16) would take too long and start a fire that would kill Jake if he were in the bin and create risks to other miners who would now have to fight the fire. Disconnecting the feeder from the chute at the bottom of the bin (17) would take too long and the mechanic would be in danger of being struck by the falling coal and feeder.

Question E - The correct answers are 20 and 25. The prep plant belt drive should be locked out before the rescue is attempted, and a worker should be sent to the main gate to

flag the ambulance and direct it to the accident scene. Most prep plant belt drive motors are not reversible unless there is a reason for running the belt in alternate directions. Here there is no such reason. Reversing the belt (21) would require an electrician to rewire the motor. This would take too long, and if the belt were reversed, Jake could be caught or fall from the belt. Running Jake into the prep plant on the belt (22) would also be dangerous. He could be injured by the vibrator table or other equipment in the plant. Big Jake might be dead (23) and the rescuers should not hurry to the point that they risk harm to themselves. However, they should proceed rapidly with caution to rescue him and assume Jake is dead. Workers should immediately be sent up the catwalk to Jake's position, but they should begin first aid for Jake and not simply wait for the ambulance EMTs to arrive (24). Had they done so in this case, Jake would have died from an obstructed airway.

Question F - The correct answer is 29, to check his airway and see if he is breathing. Starting artificial respiration immediately before checking Jake's airway (28) would be ineffective and could harm him. Normally checking a victim's skin color (27) is one way to determine if he or she is receiving sufficient oxygen or is in shock. Bluish skin color indicated cyanosis (lack of oxygen in the blood and body tissues). A pale blanched white color indicates circulation problems, shock, and possible blood loss. However, when a person has been covered with finely granulated coal and coal dust, skin color is black and its underlying color cannot be determined easily. Checking Jake for broken bones and bleeding (28) is not an immediate priority and wastes time needed to check on and establish his airway.

Question G - The correct answer is 33. The coal and coal dust blocking Jake's airway needs to be removed immediately. This should be attempted with the rescuer's fingers, not with a pocket knife or a piece of wire (32) because of the potential for further injury to the victim. Rolling Jake onto his back and striking him between the shoulders (30) could further injury him if he has fractures and internal injuries, and this procedure would not clear his airway. Sitting Jake up and performing the Heimlich maneuver (31) has the same problems as rolling him over and striking his back. The Heimlich maneuver should be performed only on conscious persons.

Question H - The correct answer is 36, to leave Jake where he is on the belt, and to gently clean the coal from his body so he can be examined for injuries. During this period the first aiders should also monitor Jake's breathing. Jake should not be lifted from the belt to the catwalk (34), nor at this time put on a stretcher, even by using a proper three person lift with a fourth person keeping his head aligned with his body (35). Moving him before assessing his injuries and stabilizing him could harm him and should only occur if his present position endangered him or prevented access to him by his rescuers. It is wrong to simply stay with Jake, comfort him, and to clean the coal from his body and wait for the EMTs. If the first aiders delay conducting the hands-on survey, Jake's condition could become worse or he could die from an undiscovered injury that could be treated (for example, a bleeding wound). Not conducting the primary and secondary survey also wastes time by failing to prepare Jake for prompt transport to a hospital when the ambulance EMTs arrive.

Question I - The correct answer is 39, to immediately grab Jake by his collar and belt and pull him back down onto the belt. Although this is rough treatment that could aggravate his injuries, a 30 foot fall to the ground below is far worse and would result in more serious injury or death. There is no time to reason with Jake (38) and his confused behavior suggests that he would not be receptive to reasoning. Likewise, there is too little time to get a blanket and wrap it around Jake to restrain him (40). Reaching over the side of the belt and lifting his legs back up (41) is a gentler way to move him back to the belt, but it would be ineffective and potentially fatal. This position would allow Jake's upper body to fall onto the rescuer. Both Jake and his rescuer would likely fall and be killed or seriously injured. First aid treatment procedures and priorities must always be weighed against the overall risks the situation presents to the victim and the rescuers.

Question J - The correct answers are 42, 44, and 45. You should continue talking to Jake while physically restraining him, call for a stokes basket (stretcher), and snugly wrap Jake's entire body in a blanket to help restrain him. Because of his size, confusion, and the dangerous place in which this activity is occurring, more than one person is needed to restrain Jake. His confusion and attempts to get off the belt pose a grave risk both to himself and his rescuers. It would be difficult to move Jake onto the folding aluminum stretcher, and more difficult to secure him firmly to the stretcher. The stokes stretcher is a much better option since he can be more tightly secured within its basket, and because of the elevated place from which Jake must be removed. Even though Jake is irrational, the first aiders should continue to talk to him rationally and try to calm him as they restrain him.

Question K - The correct answer is 47. The best way to get Jake into the stokes basket is to carefully place a second blanket under him. Then each of the five persons present can use this second blanket as a sling to lift Jake as a unit and place him in the basket. This method not only prevents unnecessary movement, but helps keep Jake warm as the extra blanket is wrapped around him, and it also allows the EMT ambulance or hospital emergency medical staff to easily and gently lift Jake from the stokes basket to administer additional treatment. Simply lifting Jake into the stretcher by his feet and shoulders (46) would not properly support his body and could add to his injuries. Victims should be placed in the supine position in stokes baskets and on other stretchers. An injury victim's airway and vital signs can be monitored better when the person is on their back. Emergency medical personnel generally must have the victim on his or her back in order to carry out the examination and treatment procedures. Therefore, placing Jake face down in the stokes basket (48) is incorrect, and this procedure could frighten him when his face is placed on the blanket in the basket, or in the coal dust on the belt at the bottom of the basket. He could also be frightened by the height and movement of the basket when it is lowered from the belt to the ground. Logrolling Jake onto his stomach on the belt to put the basket over his back (49) would require placing his face into the coal and coal dust on the belt. Given his recent experience, this procedure would likely frighten and agitate him.

Question L – The correct answer is 53. Given the icy conditions and the elevated position, the best way to lower Jake to the ground is to use the hydraulic boom truck. Most prep plants have equipment like this available because of the large amount of fitting and maintenance that requires lifting materials to and from elevated places. A tag line secured

to the stokes stretcher and a tag man to guide the stretcher and prevent it from swinging would be critical. Waiting for the ambulance EMTs to remove Jake from this elevated position (50) is not reasonable because these persons are probably less familiar with the details of the plant and the equipment than are Jake's foreman and co-workers. Attempting to carry the stokes stretcher and Jake down the steep, narrow, and icy catwalk (51) is dangerous to Jake and the rescuers. Slips and falls would be likely and could result in serious injury or death. Tying a rope to the head end of the stokes basket and sliding Jake down the catwalk (52) would be difficult and dangerous because the basket would be hard to control. If this method must be used, a second rope should be tied to the foot end of the stretcher. Another person at a lower point on the catwalk should keep this second rope taut and guide the descent of the stretcher to prevent it from bumping or sliding off the catwalk.

Question M - The correct answers are 56, 59, 60, 61, and 62. The reasons that these actions are correct and that the other responses are incorrect are given in the latent image messages for each answer. This set of statements was carefully selected to provide information about common misconceptions that workers have about the properties of granular materials in bins, hoppers, and stockpiles and the dangers of entrapment. The information is based on the findings from many accident investigations and studies that are reported in the references for these discussion notes. (The studies by Marshall (1984a, 1984b) used a life size mannequin to determine the forces required for pulling a victim free from entrapment in a bin of finely crushed limestone. The MSHA Think Quicksand program provides an excellent summary of the research and accident investigations as well as a set of practical guidelines.) As you discuss this last question, it might be worthwhile to discuss other ideas that miners in your class have about the properties of materials in bins and hoppers, and behavior of workers around these. It could also be informative to make a model bin or hopper, to fill it with sand or small pebbles, to have the material flow from the bin, and to place a child's doll at the bottom of the well in the flowing granular material. This activity can demonstrate how attempts to remove the victim cause more material to bury them more deeply, and can also demonstrate the large force required to extract the simulated victim from the material.

References

Marshall, M. D. (1984a). The safe handling of material in bins. Mining research contract H03180008 report. Pittsburgh, PA: U. S. Bureau of Mines.

Marshall, M. D. (1984b). Development of safer methods to clean down storage bins. Mining research contract H03180008 report. Pittsburgh, PA: U. S. Bureau of Mines.

Mine Safety and Health Administration. (1988, December). Fatalgram. (Two surface mine workers were suffocated in a crushed rock storage bin when they climbed into the bin and stood atop bridged material in an attempt to free a blockage.) Arlington, VA: Metal and Nonmetal Mine Safety and Health.

Mine Safety and Health Administration. (1988, August). Think quicksand: Accidents around bins, hoppers, and stockpiles slide and accident abstract program. Beckley, WV: National Mine Health and Safety Academy. (The program reviews and analyzes 44 fatal entrapment accidents that occurred around bins and hoppers from 1980 - 1986.)

NIOSH Alert. (December 1987). Preventing entrapment and suffocation caused by the unstable surfaces of stored grain and other materials. Cincinnati, OH: National Institute for Occupational Safety and Health.

Zegeer, D. A. (1987). Discussion of dangers involved when transporting and storing unconsolidated materials. Mining Engineer, 39 (1), 23-25.

Scoring Key for the Man in the Bin Exercise

The correct answers are marked with an asterisk.[4]

Question	Answer Number					
A	1	2	3	4		
B	5	6*	7	8	9	
C	10	11	12*	13*	14	
D	15	16	17	18*	19*	
E	20*	21	22	23	24	25*
F	26	27	28	29*		
G	30	31	32	33*		
H	34	35	36*	37		
I	38	39*	40	41		
J	42*	43	44*	45*		
K	46	47*	48	49		
L	50	51	52	53*		
M	54	55	56*	57	58	
	59*	60*	61*	62*		

[4] This page may be duplicated and used as an overhead transparency.

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.

You may obtain a copy of the problem booklet from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

Man in the Bin Exercise

Problem Booklet

Behavioral Research Aspects of Safety and Health Group (BRASH)
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Instructions

Read the problem described on the next page. Then answer the 13 questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and your answers. Each question is followed by a number of choices. Some choices are good things to do. Some are wrong. The object is to select wise choices and avoid wrong ones. Some questions tell you to select only one correct answer unless you are told to "Try again!" Other questions tell you to select all the answers you think are correct. Follow the directions for each question.

After you have selected a choice to a question, look up the number of that choice on the answer sheet. Rub the developing 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 are the weigh master at the scale house at the truck unloading bins at a prep plant that receives coal from several mines in the region.

You have just come on duty. It is 7:05 A. M.

lt has been raining and the temperature has dropped to 20 degrees F.

The scale house is located near bin #1. (See Figure 1.)

You see the evening shift left bin #1 full all night while the plant was shut down.

The plant has just started and the conveyor belt under the feeders is running.

The feeders under the bins are the oscillating type.

The feeders are located about 18 inches below the chute on each bin.

The feeder under bin #1 is running.

Each bin has its own feeder power switch located under the bin on the right hand bin support post. (See Figure 1.)

The main power panel and circuit breakers for all the feeders and the belt under the feeders are located on the lower belt level under bin #5. (See Figure 1.)

The belt under the feeders dumps onto the main belt to the prep plant.

No belts have reverse switches.

A hydraulic boom truck capable of lifting 2,000 lbs., 40 feet in the air is located at the plant. A backhoe is also nearby.

First aid supplies, a folding aluminum stretcher, and a stokes stretcher are located at the main prep plant supply room about 600 feet away.

No EMTs are on the property, but you and the other workers are trained in basic first aid.

A friend of yours, Big Jake (240 lbs.) is dumping the first load of coal for the day shift into bin #1.

Jake's truck is equipped with a CB radio. You know he carries a 40 foot length of half inch hemp rope on the floor in his truck cab.

TURN THE PAGE AND READ THE PROBLEM STATEMENT.

Problem

You are standing by the stairs to the lower level. Big Jake has come over to talk with you for a minute while his load dumps. After 5 minutes he notices his load has not emptied. Jake heads back to the truck cussing. His load is hung up because the bin is still full even though the feeder and belt have been running. Study Figure 1 and then turn to Question A.

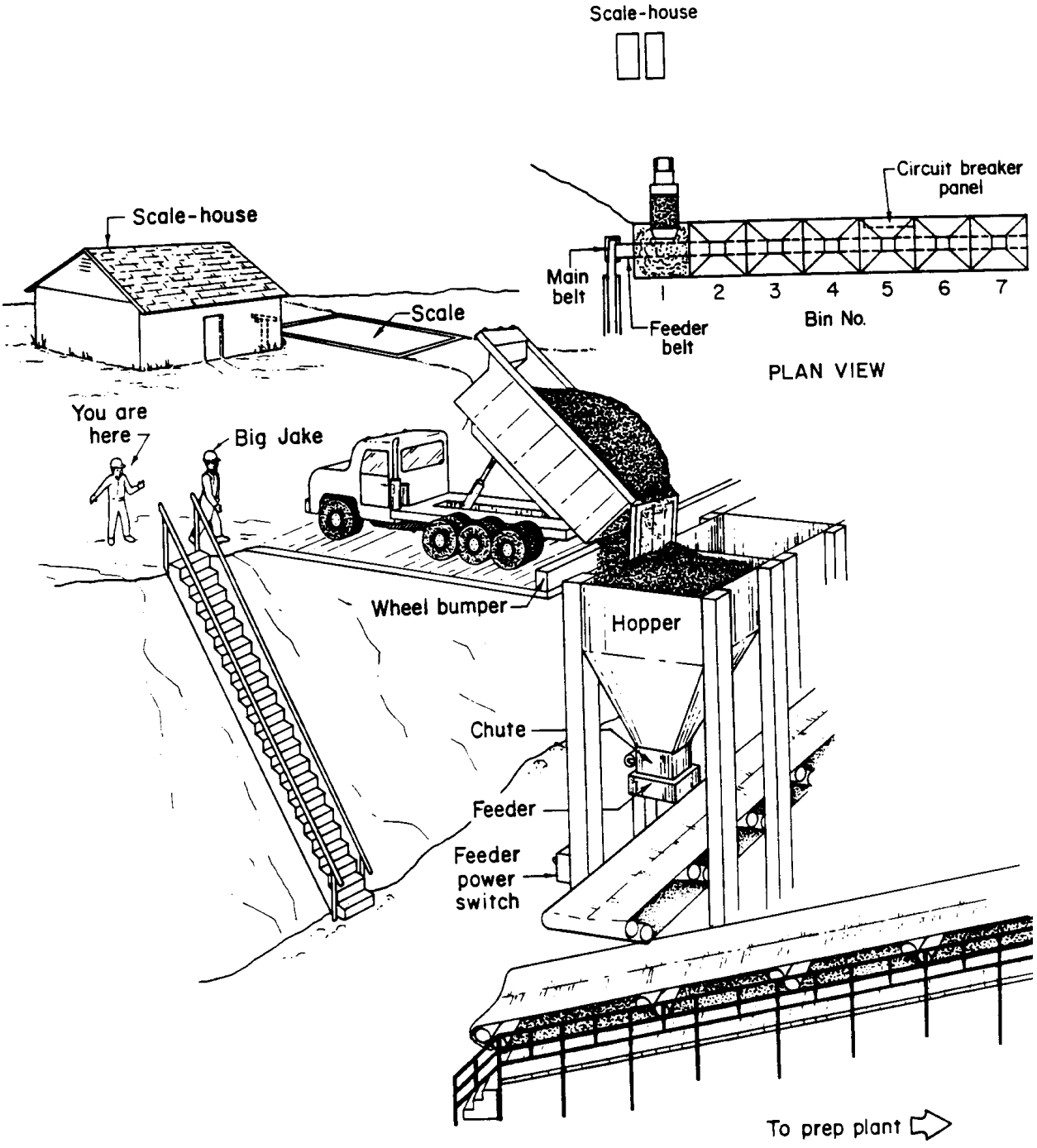

Figure 1: Big Jake's truck won't empty

Question A

Jake is in a hurry to empty his truck so he can go get another load. He says he is going to climb into the back of his truck to help push the load off with a shovel. What should you do? (Choose only ONE unless you are told to "Try again!")

1. Tell Jake this is a tough, two man job. Then offer to climb up and help him free the coal so he can lower the bed and dump the rest of his load at another bin.

2. Ask him to wait until you can get a ladder so he can safely climb into the bed of the truck.

3. Tell him to take it easy and to wait until the coal in his truck comes out by itself.

4. Tell him to not get into the bed of the truck, but to wait until you go to the scale house and call the plant foreman to report the problem.

Question B

As you start for the scale house, you see Big Jake climb up on the wheel bumper and step onto the coal in bin #1. He is holding the top of the truck tailgate with his left hand and stomping on the coal. Before you can say anything, you hear him scream as the coal drops into the bin and he disappears under more coal sliding out of his truck. (See Figures 2 and 3 on the next two pages.) Now what should you do? (Choose only ONE unless you are told to "Try again!"

5. Run as fast as you can to Jake's truck and call for help on his CB radio on channel 9.

6. Run as fast as you can to the scale house and use the phone to call the foreman in the prep plant to tell what happened and ask for help.

7. Run as fast as you can to the bin. Climb up, lean over, and dig around with your hands to try to find Jake to keep him from going through the feeder.

8. Run as fast as you can to Jake's truck, grab the rope that is in his cab, tie it around your waist, secure the other end to the truck tail gate, grab a shovel, and then get into the bin and dig for Jake.

9. Run down the steps as fast as you can to the power switch for the feeder for bin #1. Then knock the power so Jake doesn't go through the feeder.

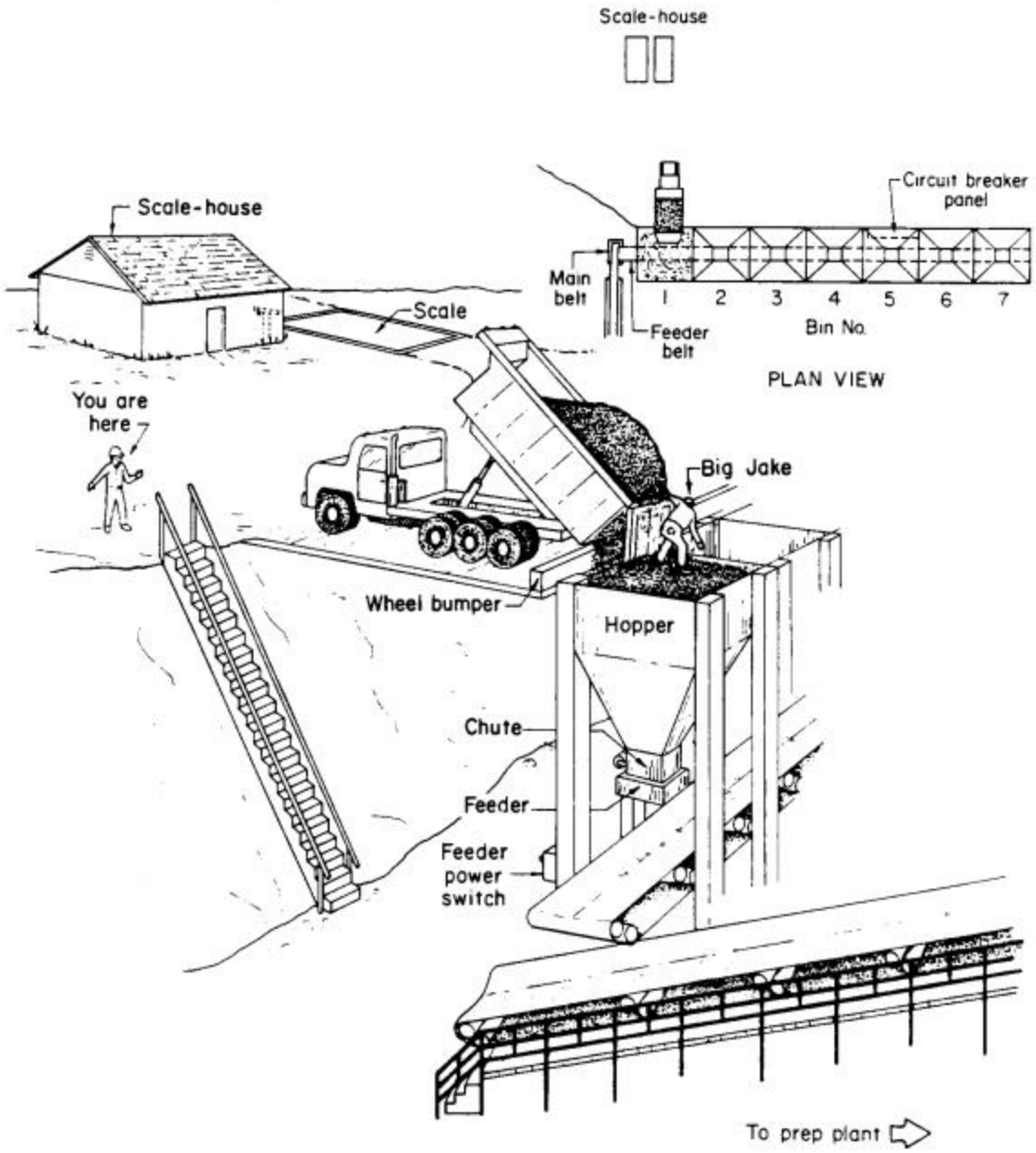

Figure 2: Big Jake climbs into the bin and stomps on the coal.

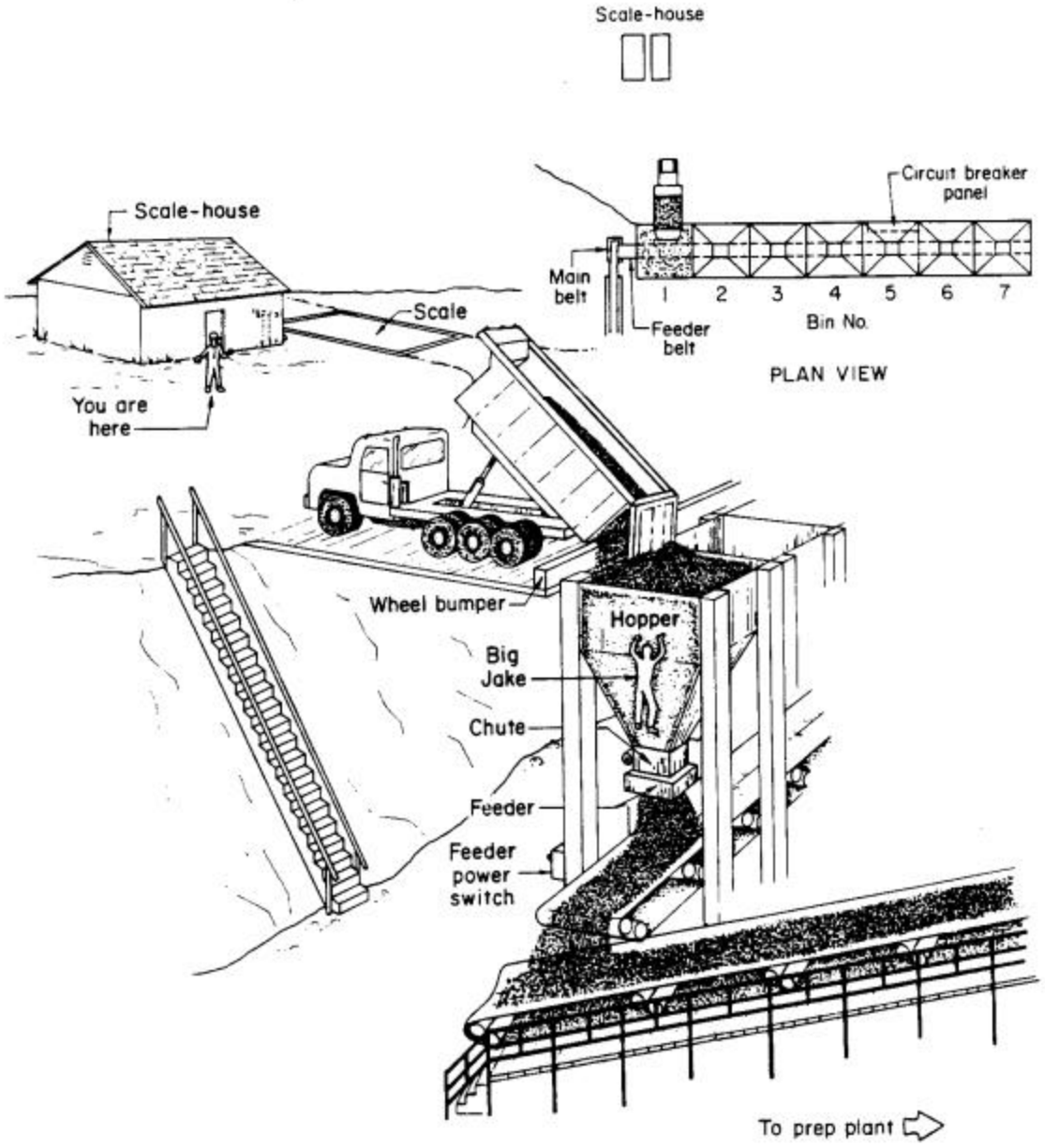

Figure 3: Big Jake falls into the bin and is covered by 20 tons of coal

Question C

You call the main prep plant and report what has happened. The foreman tells you to call the local emergency medical service ambulance. Just as you finish making this call, the foreman and two other workers pull up by Jake's truck in a company utility truck. You notice an acetylene cutting torch in the back of the utility truck. About 3 minutes have passed since Big Jake fell into the bin. Now what should you do to help Big Jake? (Select as MANY as you think are correct.)

10. Shut everything down. Then have three workers get into the bin and start digging for Jake using shovels, and working from the tip of the bin down.

11. Run to the power switch for the feeder for bin #1. Cut the power. Then look for Jake from the top of the bin and by looking up the feeder chute.

12. Leave the feeder and the belt running. Look for Jake by sending one person to the bottom of the feeder to look up the chute and another person to look into the bin from the top.

13. Notify all other prep plant employees to begin looking for Jake along the belt to the prep plant.

14. Shut down the belt under the bins and stop the feeder under bin #1. Then tie the half inch rope to one worker's belt. Have him get into the bin and dig for Jake while two other workers slowly let out the life-line.

When you have made your selection(s), do the next question.

Question D

You haven't been able to find Big Jake in the bin or the chute. The other workers who are checking along the belt to the prep plant belt haven't found him yet. Jake has been missing for about 4 or 5 minutes. You think he must still be in the bin. What should be done now to save Big Jake? (Select as MANY as you think are correct.)

15. Get the backhoe, move Jake's truck out of the way, and then start digging the coal out of the bin from the top down.

16. Get the cutting torch from the pickup and start cutting a hole in the side of the bin just above the feeder.

17. Call for a mechanic to disconnect the feeder from the bin.

18. Keep the vibrating feeder for bin #1 operating, and the conveyor belt under the bins running.

19. Place one worker at the chute, and another at the circuit breakers for the main control panel for the belt and feeders. Tell the worker at the chute to yell to the worker at the switch to shut down the power if Big Jake is spotted coming out the chute.

When you have made your selection(s), do the next question.

Question E

The worker by the feeder watches for Big Jake to come through the chute while a second worker waits by the main control panel to cut off the power to the feeder and the belt under the feeders. Then one of the workers watching the belt to the prep plant spots Big Jake about 100 feet from the prep plant. The worker yanks the emergency stop cord. The prep plant belt stops. Jake is 30 feet above the ground on the elevated belt about 80 feet from the prep plant. What should you and your helpers do now? (Select as MANY as you think are correct.)

20. Lock-out the prep plant belt drive power switch before getting out on the belt to examine Jake.

21. Immediately reverse the belt and bring Jake back to the ground.

22. Restart the belt. Let Jake come into the prep plant and onto the first vibrator table so he can be rescued from this position.

23. Be careful. Don't hurry. Big Jake is probably dead. You probably can't help him.

24. Send two people up the catwalk to stay with Big Jake, to watch him, and to wait until the ambulance EMTs arrive to take care of him.

25. Send one worker to the main gate to the prep plant so he can flag down the ambulance and direct it to the correct place on the property.

When you have made your selection(s), do the next question.

Question F

The belt drive for the prep plant belt is now locked out. You, the foreman, and two other workers have taken the first aid kit, and the folding aluminum stretcher, and a couple of blankets and climbed up the catwalk to Big Jake. The catwalk is covered with ice and freezing rain and is very slippery. Jake is lying on his back on the belt covered with coal. Only part of his face and head and his left boot are visible. The rest of his body is covered with coal. What should you do now? (Choose only ONE unless you are told to "Try again!")

26. Immediately cover him with a blanket to keep him warm.

27. Check his skin color.

28. Check him for broken bones and bleeding.

29. Check his airway.

Question G

Big Jake's nose and mouth are plugged with fine coal and coal dust. He doesn't appear to be breathing. What should you do now? (Choose only ONE unless you are told to "Try again!")

30. Roll him onto his stomach and then strike him sharply between the shoulder blades four times with the heel of your hand.

31. Sit him up, get behind him, and then perform the Heimlich maneuver.

32. Carefully use your pocket knife or a piece of wire to dig the coal out of his mouth and nose.

33. Use your fingers to clean the coal from his mouth and nose.

Question H

As soon as you get the coal cleaned out of Big Jake's mouth and nose he starts breathing. Then he begins to regain consciousness. What should you do now? (Choose only ONE unless you are told to "Try again!")

34. Tell the other three people with you to help move him off the belt to the catwalk so you can better assess and treat his injuries.

35. Immediately have the other three people help you use a three person lift to put Jake on the stretcher while you keep his head and neck lined up with his body.

36. Leave him where he is, comfort him, gently clean the coal off his clothing, and check him for injuries.

37. Leave him where he is on his back. Comfort him but don't try to clean the coal off him, and don't touch him because he may have serious internal injuries.

Question I

While you are kneeling on the belt checking Jake for injuries, he suddenly sits up. He says, "I've gotta get back to my truck!" Then he swings his feet over the side of the belt opposite the catwalk. Then he starts to scoot his buttocks toward the edge of the belt so he can jump off. He is in danger of falling 30 feet to the ground. What should you do now? (Choose only ONE unless you are told to "Try again!")

38. Try to reason with Jake, and tell him to lie down on the belt.

39. Grab Jake by his collar and belt and pull him back and down on the belt.

40. Get a blanket from the first aid kit. Then wrap it around Jake to restrain him.

41. Lean over the far side of the conveyor belt, gently grab Jake's legs, and swing them back up onto the belt.

Question J

You and your three helpers pull Jake back on the belt, but he keeps trying to get up and jump off. He is confused and doesn't understand what has happened or where he is. He keeps repeating he has to get back to his truck. What should you do now? (Select as MANY as you think are correct.)

42. Talk to him and try to calm him down while the other three workers help you restrain him.

43. Get him on the folding aluminum stretcher and tie him in place with the cravats from the first aid kit, so you can carry him down the catwalk to the surface.

44. Yell down for the stokes stretcher to be sent up.

45. While continuing to restrain and talk to Big Jake, snugly wrap his arms, body and legs in one of the blankets.

When you have made your selection(s), do the next question.

Question K

Big Jake is still on the belt on his back wrapped tightly in a blanket. Another truck driver brings the stokes stretcher to you. How should you get Jake into the stokes stretcher? (Choose only ONE unless you are told to "Try again!")

46. Tell two of your helpers to lift Jake's feet, while you and the other helper lift his shoulders. Then lift Jake and place him in the stokes stretcher on his back.

47. Tell your three helpers to assist you in getting the second blanket under Jake. Then all four of you take hold of the blanket and use it as a sling to lift him smoothly and gently into the stokes stretcher on his back.

48. Place the stokes stretcher on top of Big Jake over his legs, abdomen, chest, and face. Then have your three helpers help you roll him and the basket as a unit so he is face down in the basket.

49. Have your three helpers log roll Jake onto his stomach on the belt. Then put the stokes stretcher over his back. Roll Jake and the basket over so he is in the basket on his back.

Question L

You and your two helpers tie Jake securely on his back wrapped in the two blankets. Now you must decide how to get him down. Jake weighs over 240 pounds. The catwalk along the belt is narrow, steep, and coated with freezing rain and ice. What should you do now? (Choose only ONE unless you are told to "Try again!")

50. Wait until the ambulance EMTs arrive. They will know how to get Jake down.

51. Have your three helpers assist you in lifting the stretcher and carrying Big Jake down the catwalk to the ground.

52. Tie a rope to the head end of the stretcher. Then move the stretcher to the catwalk. Then slowly slide Big Jake down the catwalk.

53. Send for the hydraulic boom truck. Have the operator move the truck near the belt, and attach a couple of pipe slings to the boom. Then have the operator raise the boom to Jake's position so you can attach the stokes stretcher to the slings. Then carefully lower Jake to the ground.

Question M

Think about this whole problem. Then read all the statements below this question. Select the statements that are true. (Select as MANY as you think are correct.)

54. If Jake had tied a rope to himself before he climbed into the bin, he could have been pulled out by you and the other workers.

55. If Jake had tied a rope to himself before he climbed into the bin, the other workers could have gotten into the bin, followed the life-line, and dug him out.

56. If Jake was to live, he had to get out of the bin within a period of about 4 to 6 minutes.

57. If Jake had been covered only to his chin, and his head had remained in the air at the top of the bin, he could have survived for a long time.

58. If Jake had been covered only to his armpits he could have been easily dug or pulled out.

59. When Jake climbed into the bin, he was probably standing over an empty space in the coal below him. Then he broke through the crust and fell deep into the bin.

60. Workers should never enter a bin of granulated material unless they are supported on a platform, or they are secured with a suitable lifeline that remains nearly vertical and taut.

61. Safety harnesses are much safer than safety belts for people working around bins and hoppers.

62. When a person is working in a bin from a platform, or while wearing a good safety harness with a properly secured lifeline, the worker should always keep his or her body above the highest level of material in the bin.

About this Exercise

This exercise is based on an actual case and many other similar cases. The truck driver survived with no serious or permanent injuries. He was very fortunate. In the period from 1980 to 1986, approximately 42 workers were killed in similar accidents in bins, hoppers, and stockpiles. Most of these persons were mining industry workers. Most died from suffocation.

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 40. Write the difference in the second blank on the answer sheet.

3. Add the numbers on the first and second blanks. This is your score.

The best possible score of 62 results from selecting all the correct answers and no wrong answers. The worst possible score of zero results from selecting all the wrong answers and no correct answers.

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 invisible ink. These answers are found in Appendix C. If you have the capability to print invisible ink, make copies of the blank answer sheets. Make a master of the answers that appear in Appendix C. Then print the invisible 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 answers in their proper places.

Most companies and trainers prefer to obtain copies of the preprinted answer sheets from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

The exercise is designed to be used in small groups. You will need one answer sheet for each group of 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

A developing pen is also needed by each person who marks an answer sheet.

Answer Sheet for Man in the Bin Exercise

Use this answer sheet to mark your selections. Rub the developing 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.

Question A (Choose only ONE unless you are told to "Try again!")

1. [ ]

2. [ ]

3. [ ]
   [ ]

4. [ ]
   [ ]

Question B (Choose only ONE unless you are told to "Try again!"

5. [ ]

6. [ ]
   [ ]

7. [ ]
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8. [ ]
   [ ]

9. [ ]
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Question C (Select as MANY as you think are correct.)

10. [ ]
    [ ]

11. [ ]

12. [ ]

13. [ ]
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14. [ ]
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Question D (Select as MANY as you think are correct.)

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17. [ ]
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18. [ ]
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19. [ ]
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Question E (Select as MANY as you think are correct.)

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21. [ ]
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22. [ ]
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23. [ ]
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24. [ ]
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25. [ ]
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Question F (Choose only ONE unless you are told to "Try again!")

26. [ ]

27. [ ]

28. [ ]

29. [ ]
    [ ]

Question G (Choose only ONE unless you are told to "Try again!")

30. [ ]

31. [ ]
    [ ]

32. [ ]

33. [ ]

Question H (Choose only ONE unless you are told to "Try again!")

34. [ ]

35. [ ]

36. [ ]
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37. [ ]
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Question I (Choose only ONE unless you are told to "Try again!")

38. [ ]

39. [ ]
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40. [ ]

41. [ ]
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Question J (Select as MANY as you think are correct.)

42. [ ]
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43. [ ]
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44. [ ]
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45. [ ]
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Question K (Choose only ONE unless you are told to "Try again!")

46. [ ]
    [ ]

47. [ ]
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48. [ ]
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49. [ ]
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Question L (Choose only ONE unless you are told to "Try again!")

50. [ ]
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Question M (Select as MANY as you think are correct.)

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62. [ ]
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Finding your score

Number of "Correct" answers you colored in	=	(1)_____
40 minus number of incorrect answers you colored in	=	(2)_____
Add the values in blanks one and two to get your total score	=	(3)_____

Highest possible score = 62

Lowest possible score = 0

Appendix C: Invisible ink Answers

These pages contain the 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 answers have been printed in the answer sheet blanks, the developing pen reveals the formerly invisible printed message.

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

Dangerous and illegal! You and Jake could be hurt or killed. Try again!

Dangerous and illegal! He should not get into the bed of the truck. Try again!

Something is wrong. The belt and the feeder are running, but the coal is not dumping. You need to do something else. Try again!

Correct! It is the foreman's job to keep the coal moving and to solve the problem safely. Do the next question.

This wastes time. The prep plant workers won't hear your call. Try again!

Correct! Big Jake is in serious trouble. You will need help to save him. Do the next question.

You are placing yourself in great danger and your actions won't help Jake. Try again!

You are placing yourself in great danger and this won't help Jake. If you are trapped no one will come to help either of you. Try again!

This is not the best thing to do. Jake is out of sight and completely covered with coal. Try again!

Jake is covered by about 20 tons of coal. The rescuers cannot dig him out fast enough to save his life and they are in danger in the bin.

If you shut the feeder down, Jake may die.

Correct! There is no sign of Jake from either place.

Correct! He could have come through the feeder and be somewhere along the belt to the prep plant.

This is dangerous! The coal could continue to fall from the open chute. The man on the rope could be buried. Anyway, the man on the rope could not move the coal fast enough to help Jake.

This would take too long and it might kill Jake.

This would set the coal in the bin on fire, probably kill Jake, and create a more serious problem.

. This would take too long and it would place the mechanic in a very dangerous situation. The bin is still partially filled with coal.

Correct! If Big Jake is still in the bin, this is probably the only way to get him out in time to save his life.

Correct! If Big Jake comes out the chute, the feeder and the belt need to be stopped promptly.

Correct! There has already been one accident. The persons trying to help Jake need to be protected from another accident.

This would take too long because the belt drive motor would have to be rewired. Besides, Jake could fall from or be injured by the moving belt.

It would be difficult to stop the belt at just the right spot and Jake might be hurt or killed.

You should be careful but you should also act rapidly. You should not assume Big Jake is dead. Basic first aid has saved many lives.

More than two people are needed to help Jake. You should not wait for the ambulance EMTs before trying to help him.

Correct! Mine properties are large and ambulance crews can waste time if they are not directed to the accident area.

This won't help Jake. Try again!

You can't tell. All his exposed skin is black with coal dust. Try again!

You need to do something else first. Try again!

Correct! His mouth and nose are tightly plugged with fine coal and coal dust. Do the next question.

This won't help and could hurt him. Try again!

This should be done only with a conscious victim. It won't help Jake and could injure him. Try again!

This could hurt him. Try again!

Correct! Soon you get his mouth and nose cleared. Do the next question.

This could hurt him. He may have fractures and other injuries. Try again!

He should not be moved yet. Try again!

Correct! You find no bleeding or other obvious injuries. Jake is breathing well. He opens his eyes, begins to mumble, and moves his arms. Do the next question.

You should comfort Jake. He may have internal injuries, but you must examine him for other injuries. Otherwise he may die. Try again!

There is no time to reason with Jake. Try again!

Correct! You must restrain him immediately or he may fall from the belt. Do the next question.

There is no time for this now. Try again!

Dangerous! You are in an unsafe position. Jake could fall and take you with him. Try again!

Correct! The four of you are able to restrain him on the belt and he begins to calm down a little as you talk to him.

He keeps sitting up and trying to get off the belt. You can't get him on the stretcher and while you are trying he nearly gets away from you.

Correct! This will be much better than the folding aluminum stretcher for restraining and transporting Big Jake.

Correct! Three of you manage to get the blanket around him and this helps to restrain him. You continue to talk to him and calm him.

When you do this, Jake's body bends in the middle, and his head falls back. You may have added to his injuries. Try again!

Correct! This method of moving Jake will minimize extra movement and it will help hospital emergency medical personnel remove him from the basket. Do the next question.

When you try this, Jake is frightened. He begins to scream and struggle. Try again!

This creates unnecessary movement, and Jake is frightened when you roll him face down on the belt. He starts to scream and struggle. Try again!

They are less familiar with the prep plant than you are. Besides, you need to get Jake down so the EMTs can promptly transport him to the hospital. Try again!

This is dangerous. It is too slippery, and too narrow for two people to hold both ends of the stretcher. You are unable to carry out this task without risking falling and dropping Jake. Try again!

When you try this, the stretcher bumps and jerks. It also tends to slide underneath the railing on the side of the catwalk away from the belt. It could easily fall over the side. Try again!

Correct! This is the fastest and safest way to get Jake down. He must be snugly tied in the stretcher. Someone on the ground must handle a tag line to keep the basket from swinging. Do the next question.

False! Over 500 pounds of force is required to pull a worker from granulated material in a bin when he or she is trapped only to the waist. Burial to the neck requires more than 1000 pounds of force.

False! They would have been in danger of being covered by the loose coal in the bin as more coal flowed out the bottom. They probably could not have dug Jake out in time to save his life.

Correct! Longer times without oxygen cause irreversible brain damage or death. Smaller persons immersed in cold water can sometimes survive for longer periods of time.

False! This is a common misconception. Persons trapped to the neck in granulated material for a few minutes usually die. With each breath out, the material packs tighter around the victim's chest. Soon the person is unable to inhale. This leads to suffocation.

False! It takes about 1,000 pounds of force to pull a victim from such a position. The person is usually at the bottom of a cone shaped well. Digging causes more material to slide down and cover the victim's head, and also exposes the rescuer to burial.

Correct! The freezing rain probably created a crust (or bridge) of coal over the top of the bin. The loose coal below the bridge went out the feeder onto the belt. Bridging of material in hoppers, bins, and stockpiles often occurs without rain or freezing temperatures.

Correct! Other ways should be used to clean out hung materials. Sending a worker into a full or partially full bin is a last resort. The life-line should be nearly vertical, remain taut, and be equipped with an automatic braking system that stops a workers fall within a foot or two. These arrangements prevent the worker from falling into the loose material.

Correct! A safety harness holds the worker's body in a vertical position even if he or she falls a short distance. This keeps the head and chest out of the material and facilitates pulling the worker free. With a safety belt even a short fall may cause a worker to double over and their head and chest may be covered. In this doubled over position a force of more than 2,000 pounds is needed to pull the victim free.

Correct! Otherwise materials from the sides of the bin may fall on the worker and cover all or part of the persons body. The falling material can kill or injure the worker, or the person can become entrapped.