Pipe Repair Problem

Problem Booklet

Instructions

Read the problem situation described on the next page. Study the diagram on page 4 until you understand the location of the workers and equipment in the problem. Next, answer each of the 11 questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and answers. Some questions ask you to select all of the answers that you think are correct. Other questions ask you to select only one answer unless you are told to "Try again!" Follow the directions for each question.

After you have selected a choice to a question, look up its number on the answer sheet. Select your answer(s) to each question by rubbing the developing pen between the brackets on the answer sheet. A hidden message will appear and tell you if you are right. When you have finished, you will learn how to score your performance.

Background

You are a prep plant tipple cleaner. You have been assigned to help two mechanics, Flash and Pete, replace a badly worn section of a 10 inch steel slurry pipe in the prep plant.

You are working third shift and it is 4:45 A.M.

A 3/8 inch plastic line is hung under the pipe section you are to replace. The line carries denatured alcohol to the froth cells.

The pipe is 12 feet above the expanded metal floor on the third level of the plant.

The pipe section is above the main walkway on this level.

Two large holes and several smaller holes are worn through the section of pipe near the left hanger. (See Figure 1.)

Five other workers are doing maintenance on levels below and above your position, and have been working on the vibrator on your level.

The pipe is empty now, but it has been leaking and the floor is wet and slippery where someone has spilled floc material. (See Figure 1.)

The prep plant shop and supply room are on the ground level and are well equipped.

A pager and a small first aid kit are located near the stairs on each level of this plant.

A new section of pipe and two collars are on the floor near the worn pipe.

Problem

The foreman tells Flash, Pete, and you to hurry up and get the pipe section replaced so the plant can start up at 7:00 A. M. This job was supposed to have been finished yesterday. Other work has prevented your working on the pipe until now. The foreman says the plant superintendent chewed him out for not having the pipe fixed earlier. Flash says he will cut out the worn section and weld the new section in place.

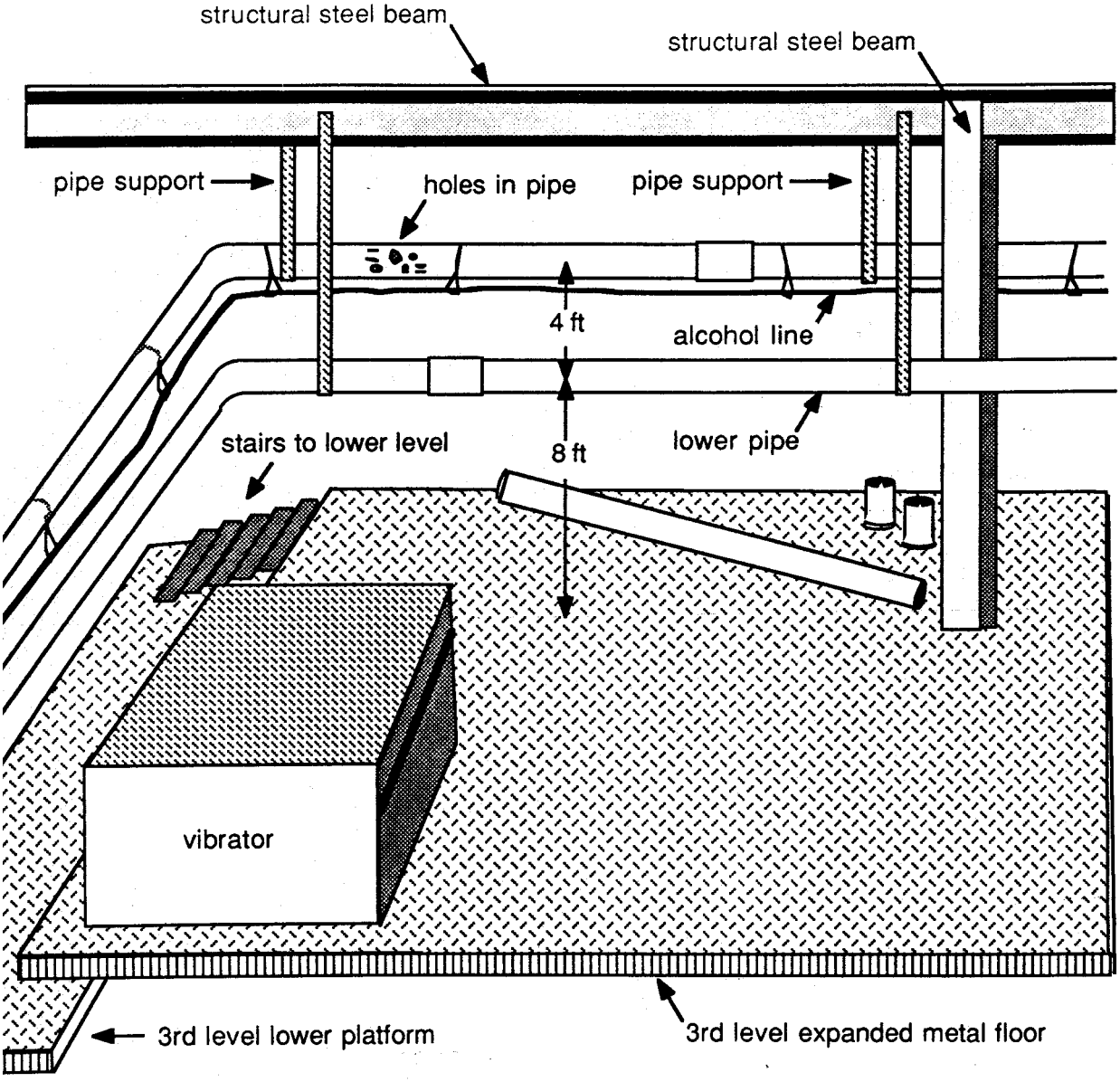

Figure 1: Position of pipe section to be repaired

Question A

What should the three of you do to get this job done safely and quickly? (Select as MANY as you think are correct.)

1. Get the tanks and torch and get Flash up there and start cutting the pipe.

2. Inspect the work area to determine what hazards are present and think about how you will deal with these.

3. Check to see that you have all the tools and equipment needed to complete the job properly.

4. Assign one person in your crew to watch out for the other maintenance workers so they can be warned if they get into a hazardous position.

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

Question B

The three of you check to see you have all the equipment that is needed to do the job properly and safely. In addition to your usual personal protective equipment, what other things will you need? (Select as MANY as you think are correct.)

5. Forty or 50 feet of colored plastic tape (or equal length of small rope).
6. Signs that say "Danger ", "Keep Out", or that warn of falling materials.
7. A portable radio.
8. Two pipe slings and a one ton come-along.
9. Cutting and welding goggles and gloves.
10. Acetylene and oxygen welding tanks, hoses, and torch.
11. Notebook and pencil to write down the time you started and finished this job.
12. Methane detector.
13. Padlock, key, and danger tag.
14. Fire extinguisher.
15. Ladder, several lengths of heavy twine, and a 20 to 30 foot section of small rope.
16. Safety belt.
17. Extension cord and trouble light.
18. First aid kit at the immediate work area.
19. Large piece of fire resistant brattice cloth, canvas, or similar material.
20. Empty 55 gallon drum with the top removed.

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

Question C

Flash, Pete, and you will be exposed to some potential hazards as the pipe section is cut, removed, and replaced. With which of these hazards should you be most concerned? (Select as MANY as you think are correct.)

21. Sprains and strains from lifting and pulling.
22. Water pressure in the 10 inch slurry pipe.
23. Bursting of the oxygen or acetylene tanks.
24. Falling or rapidly moving heavy materials and objects.
25. Fire at the hose connections on the torch.
26. Fire, explosion, burns and toxic fumes.
27. Trips and falls.
28. Being overcome by blackdamp and gases coming out of the pipe.
29. Eye and skin injuries.

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

Question D

The only available ladder on the third level is a 6 foot wooden step ladder. Flash sets this up under the lower pipe and prepares to climb up. (See Figure 2.) What should you do now? (Choose only ONE unless you are told to "Try again!")

30. Steady the ladder while he climbs up.

31. Ask him to wait a minute while you tie the top of the ladder to the nearest beam.

32. Tell him to be careful when he steps from the ladder to the lower pipe.

33. Ask Flash to wait while you go to the supply room and get a longer ladder.

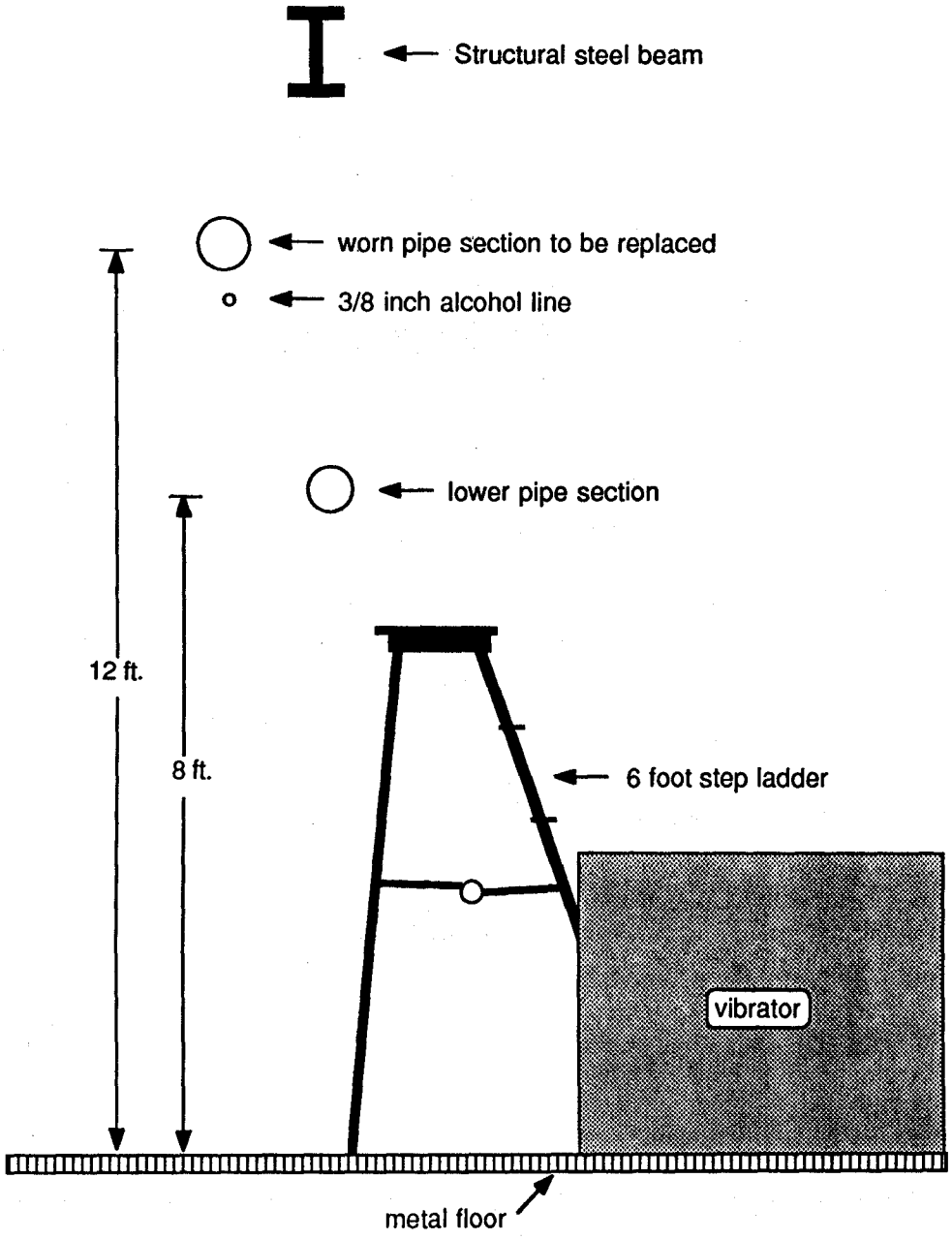

Figure 2: Position of step ladder and pipes as Flash prepares to climb up (side view)

Question E

Flash grumbles, "We won't get this job done if we keep fooling around!" But he agrees to wait until you get the ladder. In about 10 minutes you come back with a 24 foot aluminum extension ladder. The ladder is new and has rubber feet. What concerns should you have as you help Flash set up the ladder so he can work? (Select as MANY as you think are correct.)

34. Check to see that the floor is clean and not slippery where the ladder feet will sit.

35. Check to see that the fire resistant brattice cloth is in place to protect lower levels from stray sparks.

36. Set the ladder so the rung at shoulder height is one full arm length in front of you when you stand on the bottom rung with your shoulders square.

37. Don't be too concerned about electrical hazards because the ladder has rubber feet and Flash is using gas welding equipment.

38. Joke with Flash by saying you heard he is afraid of heights and he shouldn't climb up and do this job.

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

Question F

You and Flash set the ladder securely and at the proper 75 degree angle. Using lengths of heavy twine, Pete ties both sides of the ladder securely to a beam near the top rung. Flash gathers his tools and gets ready to climb up and work. How should he get his tools to the work area where he will stand on the lower pipe? (Choose only ONE unless you are told to "Try again!")

39. Have Pete and you toss the tools up to him one at a time.

40. Have Pete climb half way up and pass the tools up from you to Flash.

41. Carefully sling the welding hoses over his shoulder, secure the torch to his belt, and carry his other tools as he climbs the ladder and steps out onto the lower pipe.

42. Take a 20 foot section of a half inch rope with him, coiled snugly over one shoulder so he can lower the rope and pull his tools up when he gets in position.

Question G

When Flash gets up the ladder, he hangs the trouble light and inspects the lower pipe. He finds it to be strong and in good shape. What is the first thing Flash should do when he gets ready to step onto the lower pipe? (Choose only ONE unless you are told to "Try again!")

43. Warn the other maintenance workers to stay clear.

44. Make a methane check.

45. Lower his rope and begin pulling up his tools.

46. Hook his safety belt to a safe and secure place.

Question H

Flash hooks his safety belt onto the overhead I beam about 3 feet above the top pipe. Pete has drained and disconnected the alcohol line. Flash lowers his rope. You tie his tools on and he pulls them up and secures them. He checks to see if the area below the pipe is clear. Now what should Flash do? (Choose only ONE unless you are told to "Try again!")

47. Move out on the lower pipe and make the first cut at the right end of the bad section of the upper slurry pipe.

48. Make a methane check.

49. Hook the come-along to the overhead I beam, put the pipe slings in place around the bad pipe section, attach the come-along to the sling, and snug it up.

50. Put his cutting goggles in position over his eyes.

Question I

Flash hooks up the pipe slings and come-along. He makes a methane check. Then he lights the torch and makes the first cut at the right end of the bad pipe section. As he completes the cut, he stands back behind the right hanger away from the cut end of the old pipe section. When he is nearly finished, he notices the bad pipe section begins to shift slightly to one side. He moves further back, completes the cut, and the pipe breaks loose and jumps out to the front side about 18 inches. His careful work has saved him from injury. Now what should Flash do? (Choose only ONE unless you are told to "Try again!")

51. Ratchet the come-along out and lower the cut end of the pipe toward the floor.

52. Leave the pipe slings and come-along in place, climb down and prepare to move the ladder to a new position to the left of the hanger at the other end of the bad pipe section.

53. Walk along the lower pipe to the left to inspect the other end of the bad pipe section and prepare to make the second cut.

54. Tell you or Pete to climb up on the other end of the lower pipe and look at the bad section in the top pipe near the left hanger.

Question J

You and Pete help Flash move the ladder to the other end of the bad section of pipe. Soon you get the ladder up and tied to the I beam. You are careful to keep the ladder a couple of feet to the left of the hanger that is holding the section of old pipe with the holes worn through it. Flash sees the metal in the pipe is twisted, rusted, and thin around the holes. What problem(s) may have been prevented by the care Flash has taken when removing the old pipe section? (Select as MANY as you think are correct.)

55. Rope burns to Flash's hands.

56. After the first cut, the weak section of pipe might have broken and the pipe section fallen and damaged equipment or hurt people.

57. If he had used an arc welder, Flash could have been electrocuted.

58. Flash could have been struck and knocked off the lower pipe.

59. Production could have been held up for another shift or longer.

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

Question K

Working carefully, you, Pete and Flash get the old pipe section down, and lift the new section into place with the pipe slings and come-along. Then Flash welds it up. You don't finish until 7:45 and the plant start-up must wait for you. Have you saved the company money, or have you cost the company money? (Select as MANY as you think are correct.)

60. You have cost the company 45 minutes worth of production.

61. You have saved the company from more down time later on by doing a good job.

62. You may have saved the company thousands of dollars that could have resulted from lost time accidents, injuries, and insurance compensation claims.

63. You have cost the company money by working overtime.

64. You helped the company maintain its reputation for safety and this translates into continued company profits.

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 30. 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 64 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.