Escape From A Mine Fire

Problem Booklet

Instructions

Read the problem situation described on the next page. Next, answer each of the 14 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 the section foreman on the 3 Left longwall development panel.

You and seven miners are at work on the section today.

It is 10:00 a.m.

The seam height is 48 inches. Entries and crosscuts are cut 20 feet wide with pillars on 100' centers.

The face has advanced 2,500 feet from the mains.

It is 12,500 feet to the outside from the junction of this section with the mains. (it is 15,000 feet from the face of 3 Left to the portal.)

The designated primary escapeway is the #2 intake aircourse (14,000 cfm) and the secondary escapeway is the #1 return aircourse. (See Figure 1 on the next page.)

The crew travels to and from this section in the #2 entry in a rubber tired, battery operated mantrip. The mine bottom is rough and rutted.

Ten self-contained self-rescuers (SCSRs) are stored at the power center, the designated evacuation assembly point.

You and the rest of your crew had hands-on SCSR training 3 months ago.

Everyone is wearing a filter self-rescuer (FSR) on their belt.

Problem

You are the section foreman for the 3 Left development panel. You are checking on a mechanic who is working on a scoop in #2 entry at #19 crosscut. Suddenly you smell smoke. Turn the page and study Figure 1. Then turn to question A.

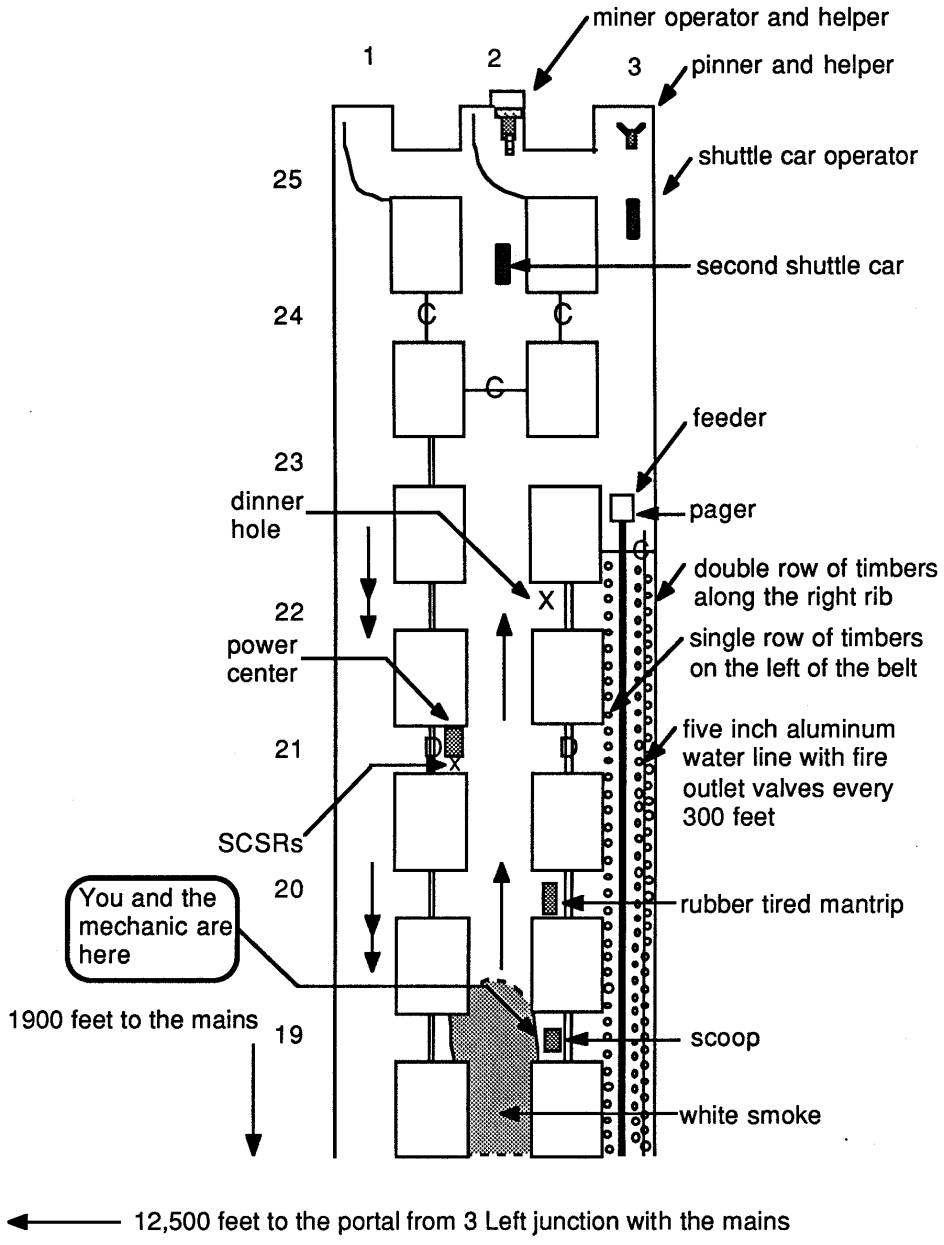

Figure 1: Section map for 3 Left (not to scale)

Question A

You look into the #2 entry and see light white smoke traveling toward the face. The entire entry is filled with smoke. What things should you do now? (Select as MANY as you think are correct.)

1. Go to the face and tell your crew to assemble at the power center.
2. Send the mechanic to call outside to report the smoke and have him wait by the pager for further instructions.
3. Tell the mechanic to travel out the intake and try to locate the source of the smoke.
4. Immediately run to the power center and don your SCSRs.
5. Watch the smoke for awhile to see if it subsides.
6. Immediately don your FSR and tell the mechanic to do the same.

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

Question B

While still in #19 crosscut, you and the mechanic put on your FSRs and then begin to move toward the face to warn the others and to call outside. As you approach the power center, you see the SCSRs. What should you do now? (Select as MANY as you think are correct.)

7. Stop at the power center and you and the mechanic each don an SCSR.

8. Tell the mechanic to grab a couple of SCSRs, and you grab a couple, and continue on to warn the others and to call outside.

9. Wait at the power center until the other miners assemble.

10. Stop and check the condition of each SCSR, and then lay them out to make it easier for the other miners to get the units on.

11. De-energize the power center.

12. Wearing your FSRs, go directly to the face area, to warn the others and to call outside.

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

Question C

You and the crew assemble at the power center by the SCSRs. The shuttle car operator and mechanic return. They report that they received a call from the surface. They were told there is a fire outby your position and the crew is to evacuate the section immediately. The mechanic says he checked the air in the belt entry and that it is clear. Not all the miners are wearing FSRs. The smoke is rapidly getting thicker. Visibility is now only 8 feet. What things should you do now? (Select as MANY as you think are correct.)

13. Make a head count.

14. Send the mechanic to the return (the secondary escapeway) to check for smoke.

15. Hang a check curtain across the #2 entry at #19 crosscut.

16. Tell each miner to don his FSR, grab an SCSR, and move into the belt entry.

17. Take the crew up to the pager, and prepare to barricade.

18. Tell everyone to get into the mantrip and travel out the intake air course.

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

Question D

You and the entire crew move into the belt entry at crosscut #21. The air in the entry looks clean. Everyone is wearing their FSR. What should you do now? (Select as MANY as you think are correct.)

19. Remove your FSRs so you can breathe easier and travel faster, and then start out the belt entry.

20. Leave your FSRs on, carry your SCSRs, and travel outby.

21. Keep your FSRs on, but remove the nose clip so it is easier to breathe as you move out.

22. Before you leave, send one miner to the pager to ask for information about the location of the fire, and to report you are walking out the belt entry.

23. Take the escape map with you as you prepare to leave the section.

24. Take the two extra SCSRs with you.

25. Send the miners to get their lunch buckets and water to take with them.

26. Look for something that you can use for a lifeline.

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

Question E

You and your crew travel five crosscuts outby and begin to encounter heavy smoke. Visibility is 4 feet. Traveling is difficult because the walkway between the belt and the timbers is only 3 feet wide, and the entry height only 48 inches. What should you do now? (Select as MANY as you think are correct.)

27. Tell everyone to don their SCSRs.

28. Continue on while wearing the FSRs to save the SCSRs for later.

29. At the next mandoor, move into the #2 entry (the primary escapeway), and check the air. If it is clear, go on out in the #2 entry.

30. Move into the secondary escapeway (#1 entry) and go on out.

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

Question F

You tell everyone to put on their SCSRs. You are arranged in a line, close together in the belt entry. Visibility is poor. What should you do now? (Select as MANY as you think are correct.)

31. Tell your crew to stay close together and to help each other.

32. Ask if anyone needs help.

33. Tell your crew to keep their FSRs with them as they go out.

34. Make note of and remember the time.

35. Go down the line, ask each miner if he is okay and check to see if his SCSR is properly donned.

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

Question G

Everyone gets their SCSRs on correctly. You tell each person to take hold of the lifeline and to move out with you leading the way. The group is moving very slowly. After you go what you estimate is about four crosscuts, the line stops. Someone yells. “I can’t keep up! I gotta rest!” You note it is now 10:25 a.m. What would you do now? (Choose only ONE unless you are told to "Try again!")

36. Ignore the request and tell the group to continue on.

37. Find out who it is. Then give that miner an unopened SCSR

38. Find out who is in trouble.

39. Find out who is in trouble and tell that person to let go of the lifeline while you and the others move out.

Question H

Tommy, the miner having trouble, is overweight (260 lbs.) and out of shape. As you and the others continue to move out holding the lifeline, Tommy can't keep up. He has to stop every crosscut or so and rest for a minute or two. The smoke !s getting heavier. What would you do now? (Choose only ONE unless you are told to "Try again!")

40. Tell everyone, "No matter what, hang on to the lifeline and stay together." "We'll make it out!"

41. Let the group split up, so the faster persons can leave the section.

42. Tell the crew to take turns and to use a four man carry to bring Tommy out.

Question I

You and Pete decide to stay with Tommy to help him out. The other miners go on ahead and follow the belt out. You keep one unused SCSR with you.

Tommy continues to have trouble breathing and moving. As you travel you keep track of the distance by counting the fire outlet valves on the water line that runs along the bottom between the timbers on your left. You can just barely see the water line through the heavy smoke. It takes you twenty-five minutes to go what you estimate is about 10 more crosscuts.

During this time, Tommy falls down many times. When he falls, you and Pete often fall with him. You and Pete have been working hard to help pull Tommy along, and you are nearly exhausted. None of you is able to get enough oxygen from your SCSRs to continue in this way. Finally Tommy falls down and you can't get him up. He is confused. He says, "I can't go on." You look at your watch and see it is now 10:50 A. M. What should you do now? (Choose only ONE unless you are directed to "Try again!")

43. Put the unused SCSR on Tommy.

44. Tell Pete to take the unused SCSR and go for help, while you stay with Tommy.

45. You and Pete should take the unused SCSR with you, tell Tommy you are going for help, and then go on out.

46. You and Pete should drag Tommy.

Question J

You and Pete leave Tommy. After about 5 more crosscuts you get into the mains. You turn right in the track entry and head for the portal, still in heavy smoke. After 5 more crosscuts you come into fresh air. Both you and Pete are completely out of oxygen. Your SCSRS are empty. You look at your watch and note it is now 11:05 A. M.

You meet the miners fighting the fire. You tell them where Tommy is. There is no mine rescue equipment on the scene. A couple of miners don fresh SCSRs, and start to go back for Tommy. The general mine foreman arrives at this time. What should the foreman do now? (Select as MANY as you think are correct.)

47. Tell the two miners not to go after Tommy using SCSRs.

48. Keep all the miners present working to control the fire and to improve the ventilation to the inby sections, including Tommy's position.

49. Tell the two miners it is O. K. for them to go get Tommy using their SCSRs.

50. Call outside and request that mine rescue equipment be sent immediately.

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

Question K

The two miners tell the general mine foreman they know where Tommy is, they know where the fire is, that it is nearly under control, and they are sure they can find their way in and bring him out. Then, they go into the section to bring Tommy out.

In your own words, explain what you think about the two miners' attempt to rescue Tommy. (Write your answer on the blank lines on the answer sheet.)

Question L

Most exercises like this one tell how the problem ended. This exercise does not say what happened to Tommy and the two miners who tried to rescue him. Why do you think this exercise is designed this way? (Choose only ONE unless you are told to "Try again!")

52. If you were told that Tommy and the two miners who tried to rescue him survived, then you would know that it was O.K. for these miners to use their SCSRs to save Tommy.

53. If you were told that Tommy and the two miners who tried to rescue him died, then you would know that it was wrong for these miners to use their SCSRs to save Tommy.

54. In real-life situations like this, miners must decide what to do without knowing what the outcome will be. The decision to use SCSRs to try to rescue another miner, or not to do so, must be made on the merits of the situation and not the outcome.

55. The whole exercise is just a story that could never happen. It would be untruthful to say how it ended.

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

Question M

Look back at Question J. When the section foreman (you) and Pete got out of the section, you had been breathing with your SCSRs for 50 minutes. Yet, both of your units were empty. Both units were rated as having a one hour supply of oxygen. Think about the whole problem. Which of the following reasons explain why your SCSRs ran out of oxygen before an hour had passed? (Select as MANY as you think are correct.)

56. The SCSRs must have been defective or not fully charged.

57. The SCSRs were probably operating at too high a temperature.

58. When Tommy kept falling down and knocked you and Pete down, all three of you probably squashed your breathing bags and dumped a lot of oxygen.

59. The very hard work of lifting and dragging Tommy along resulted in you and Pete having to use more oxygen from your SCSRs than would be normal.

60. The SCSRs being used must have been the compressed oxygen type and not the chemical type.

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

Question N

During safety training, miners are taught to put their SCSRs on at the first sign of smoke. Yet, from talking with many miners who have escaped serious mine fires, it is known that they often delay putting on their SCSRs until they have been in smoke for about 10 or 15 minutes or even longer times. These miners said they wanted to save the SCSRs until they "really need them." The miners were worried they might run out of oxygen before they could get to the surface. These miners also did not don their FSRs while they were traveling in the smoke before they donned their SCSRs. Many of them forgot about the FSR and others thought they could move faster in smoke unprotected until they started to feel the effects of any CO that might be present. Then, they could don an SCSR.

During a mine fire, using an FSR and/or delaying the donning of an SCSR is dangerous and can be fatal. Think about this problem. List some things that could be done to help miners make better use of their breathing apparatus and safely escape from a mine fire. (Write your answer on the blank lines on the answer sheet.)

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

3. The best score is 59. The worst score is 0.

Discuss your answers to questions K and N with your classmates and instructor.

Determine what you think are the best answers to these two questions.