

Delta Mine Cutthrough

Problem Booklet

Instructions

This exercise concerns cutting through from one section of a mine to another and the problems that can occur in ventilation. The exercise has several sections. Each section describes situations and events as the cutthrough progresses. A series of maps show how the mining advances and the ventilation arrangements change. In each section there are a few questions. The questions ask you to make judgments and decisions about mining and ventilation procedures as the cutthrough takes place. Just as in real life, the problem unfolds over the time span of several days. When you work the problem, do so a page at a time. Answer all the questions on a page before going on to the next section. The reason for this is that in real life situations one cannot jump ahead to see the future. But one can look back. So do look back to previous parts of the exercise once you have completed them, but don't jump ahead.

You will work the exercise with a small group of persons. Each of you will have your own problem booklet. As you work through the exercise, talk about each section and the questions. Try to come up with the best answers possible by working together.

Have one person in your group write your answers down on one copy of the answer sheet. Following the exercise the instructor will discuss your answers.

Now turn the page and begin the exercise.

Background

Large, gassy mine in 84 inch coal

1,000 hp electric motor operates a Jeffery Aerodyne fan exhausting 690,000 cfm

Total methane liberation at the fan ranges from 2.6 to 3.2 million cubic feet per day

Mining method - block system with generally staggered pillars from 80 to 100 feet on center with 20 foot entries

Mining technique - continuous mining machines with shuttle cars and conveyor belts working to develop a longwall section

Problem

Four crews working two shifts are driving 1 Left and 2 Left 4,800 feet southwest from the Cranesnest mains to develop a retreating longwall section as shown in Figure 1. First Left has four entries with a single air split. Second Left has three entries with a single air split. The ventilation systems for both sections are separate from one another, but both begin and end in the Cranesnest Mains. Three longwall setup entries are being driven from 1 Left section to 2 Left section to form the retreating longwall face. These are ventilated from 1 Left section. The 1 Left section day shift is about to cut through from the longwall setup #3 entry to 2 Left #1 entry, as shown in Figure 1. Assume you are the mine foreman. It is your job to determine what ventilation procedures are necessary to proceed safely.

Study the map on page 3. Then turn to page 4 and begin.

Longwall setup entries

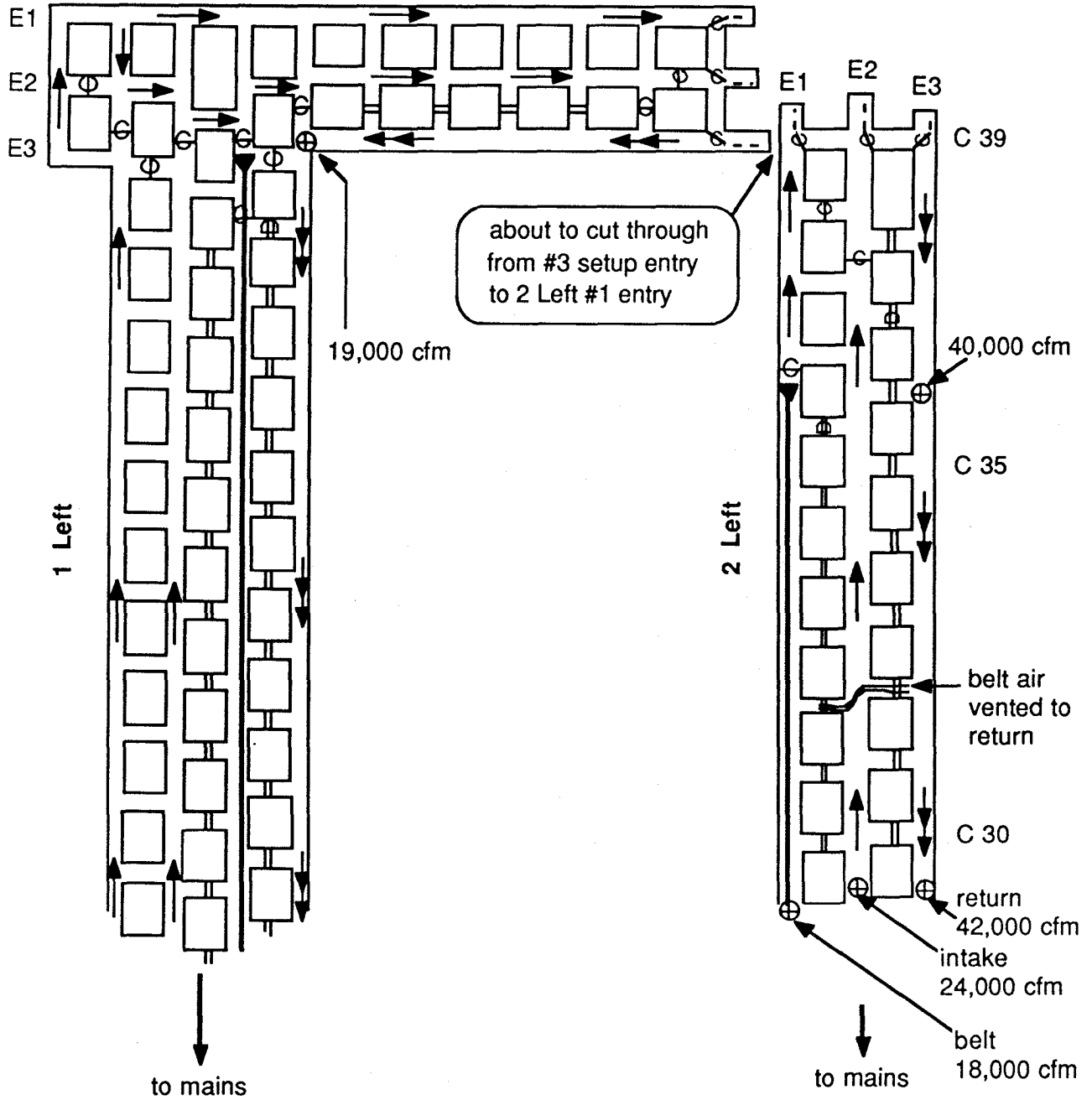


Figure 1: Mine ventilation before cutthrough from setup #3 entry to 2 left section

Section A

The 1 Left section crew is about to cut through from the longwall setup entry #3 to 2 Left section #1 entry, as shown in Figure 1.

Questions

1. When cutting through, what should the 1 Left section crew do to maintain proper ventilation? Why?
2. What are some errors that the section crews could make in this situation?
3. When the cutthrough is completed, what changes, if any, may be expected in the ventilation?
4. What procedures would you recommend in this situation to make sure the work proceeds safely?

Turn to Section B when you have answered these questions.

Section B

The cutthrough from longwall setup entry #3 to 2 Left section #1 entry is completed as shown in Figure 2 on the next page. The 1 Left section roof bolter is now bolting the top in the cutthrough. The 2 Left section foreman tells the brattice man to take down the curtain at point A and to hang curtains at points B and C.

Questions

5. Is the foreman's idea for ventilating the faces a good one? Why or why not?
6. What would you order to be done in this situation? Why?
7. Sketch how you would ventilate the faces on the map in Figure 2A. Mark the section of the map in the doffed line box. (Write only on the answer sheet.)

Turn to Section C when you have answered these questions.

Longwall setup entries

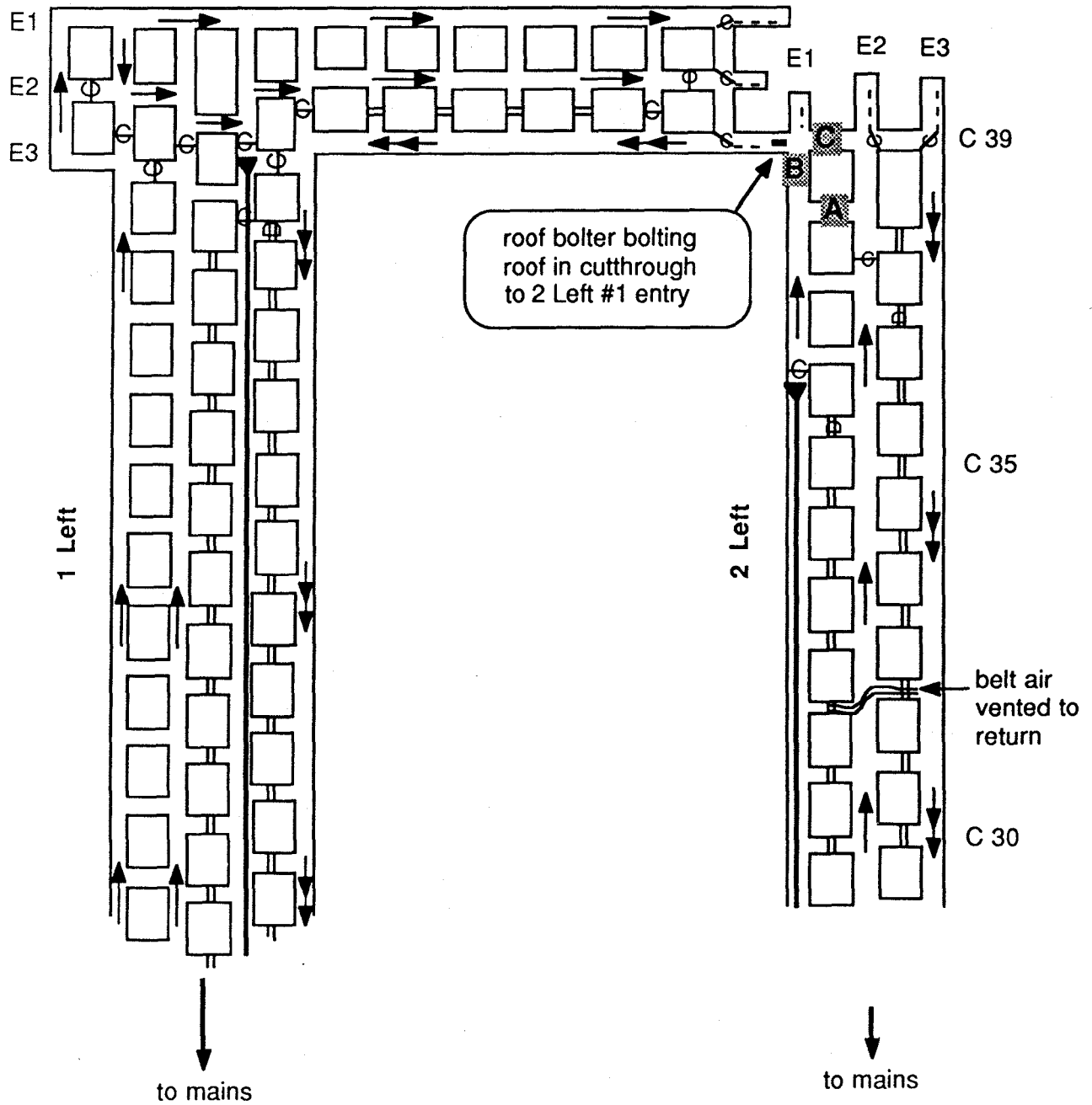


Figure 2: Mine ventilation immediately after cutthrough with curtains at B and C, but not A

Longwall setup entries

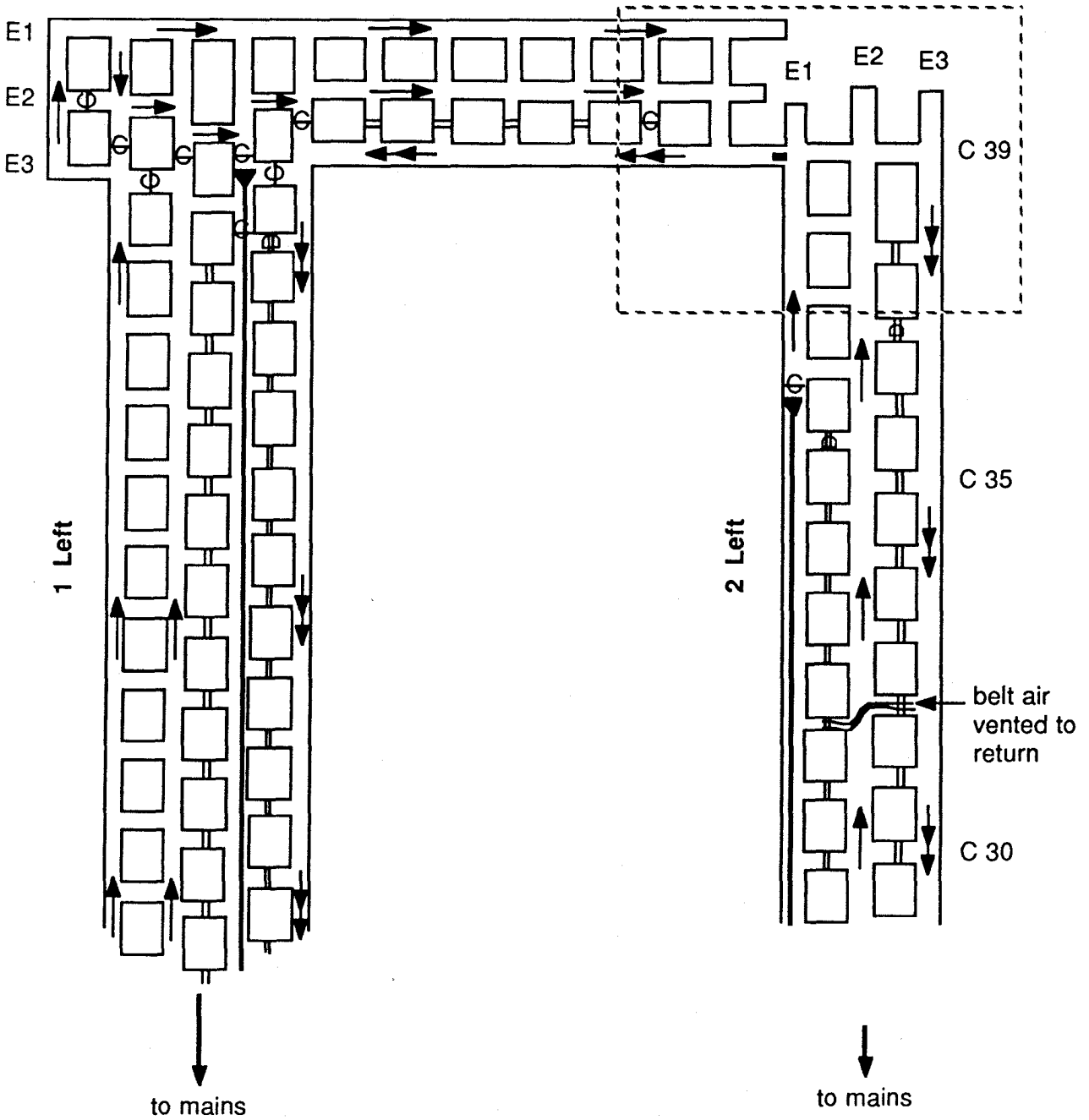


Figure 2A: Sketch your ventilation arrangement for this situation

Section C

The top in the cutthrough has now been bolted. One curtain is placed diagonally across crosscut #39 at 2 Left entry #1 as shown in Figure 3. The curtains shown at positions B and C in Figure 2 are removed. The shift ends. The preshift examiner for the second shift makes air quantity readings at the same locations where earlier readings were made, as shown in Figure 1. Assume the curtain at crosscut #39 is tight and there is minimal leakage.

Questions

8. Is the present ventilation arrangement adequate? Why or why not?
9. In the boxes on the map in Figure 3, write in the approximate air quantity readings the preshift examiner should find. (Write only on the answer sheet.)
10. Look back at Figure 2. Suppose two curtains were placed, one at position B and one at position C. Also suppose that the diagonal curtain at the intersection of crosscut #39 and entry #1 in Figure 3 was taken down. Would the air quantity values you just wrote in the boxes on Figure 3 be different now? Explain.

Turn to Section D when you have answered these questions.

Longwall setup entries

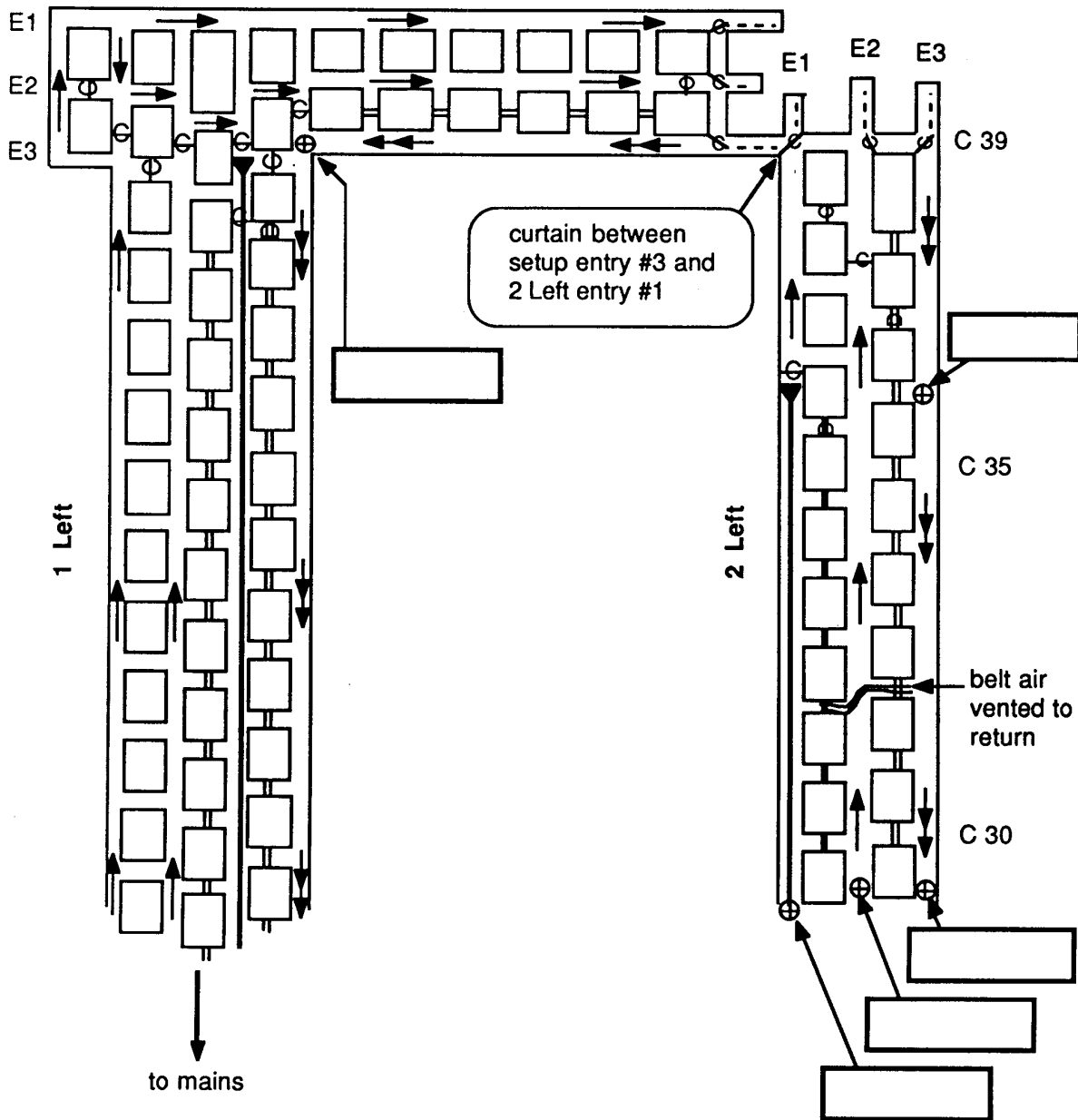


Figure 3: Curtain arrangement and ventilation after bolting cutthrough

Section D

It is now the next shift. The continuous mining machine helper energizes the miner which was left in crosscut #39 between #1 and #2 entries in 2 Left as shown in Figure 4. The methane monitor warning light comes on immediately and the miner won't start. The helper begins checking with a methane spotter. He finds the methane values at the locations shown in Figure 4.

Questions

11. What is the reason for these high methane values?
12. Mark **Xs** on the map in Figure 4 to show other places the miner helper should take methane readings. (Write only on the answer sheet.)
13. What changes would you make in the ventilation of the section? Mark your ventilation changes on the map in Figure 4A. Mark only the section within the dotted line box. (Write only on the answer sheet.)

Turn to Section E when you have answered these questions.

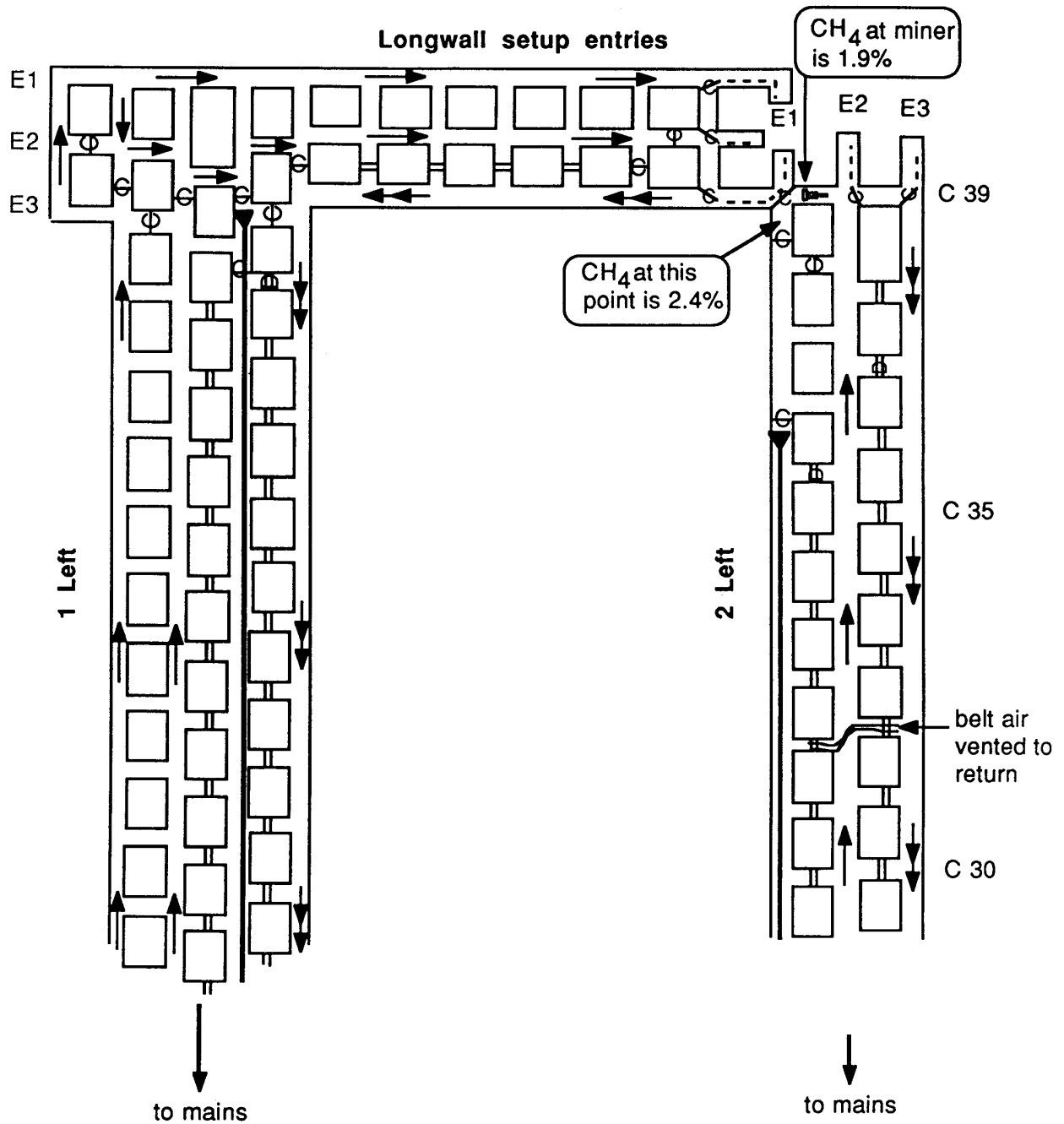


Figure 4: Methane in the face area of 2 Left section is noted

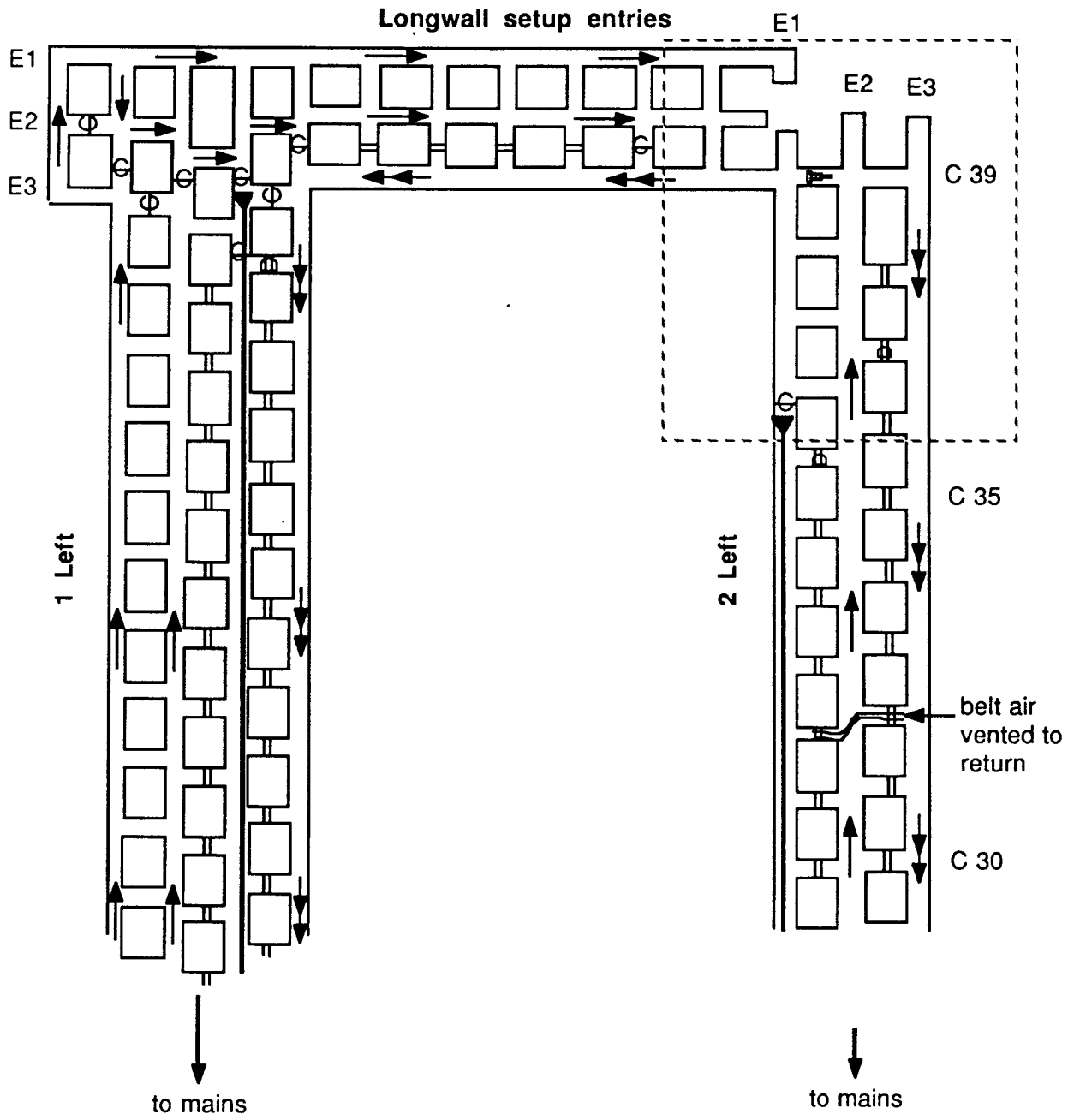


Figure 4A: Sketch a good ventilation arrangement within the dotted line box

Section E

It is now a few days later. The 1 Left section crew has advanced the longwall setup entries #1 and #2 into the heading for 2 Left, #1 entry. The second shift 2 Left crew is about to cut through to the longwall setup #2 entry at crosscut #40 as shown in Figure 5.

Questions

14. Is the section ventilation at the faces of 2 Left and the longwall setup entries all right? Explain.
15. Show the ventilation arrangements you would use, by marking them directly on the map in Figure 5A. Mark the part of the map within the dotted line box. (Write only on the answer sheet.)

Turn to Section F when you have answered these questions.

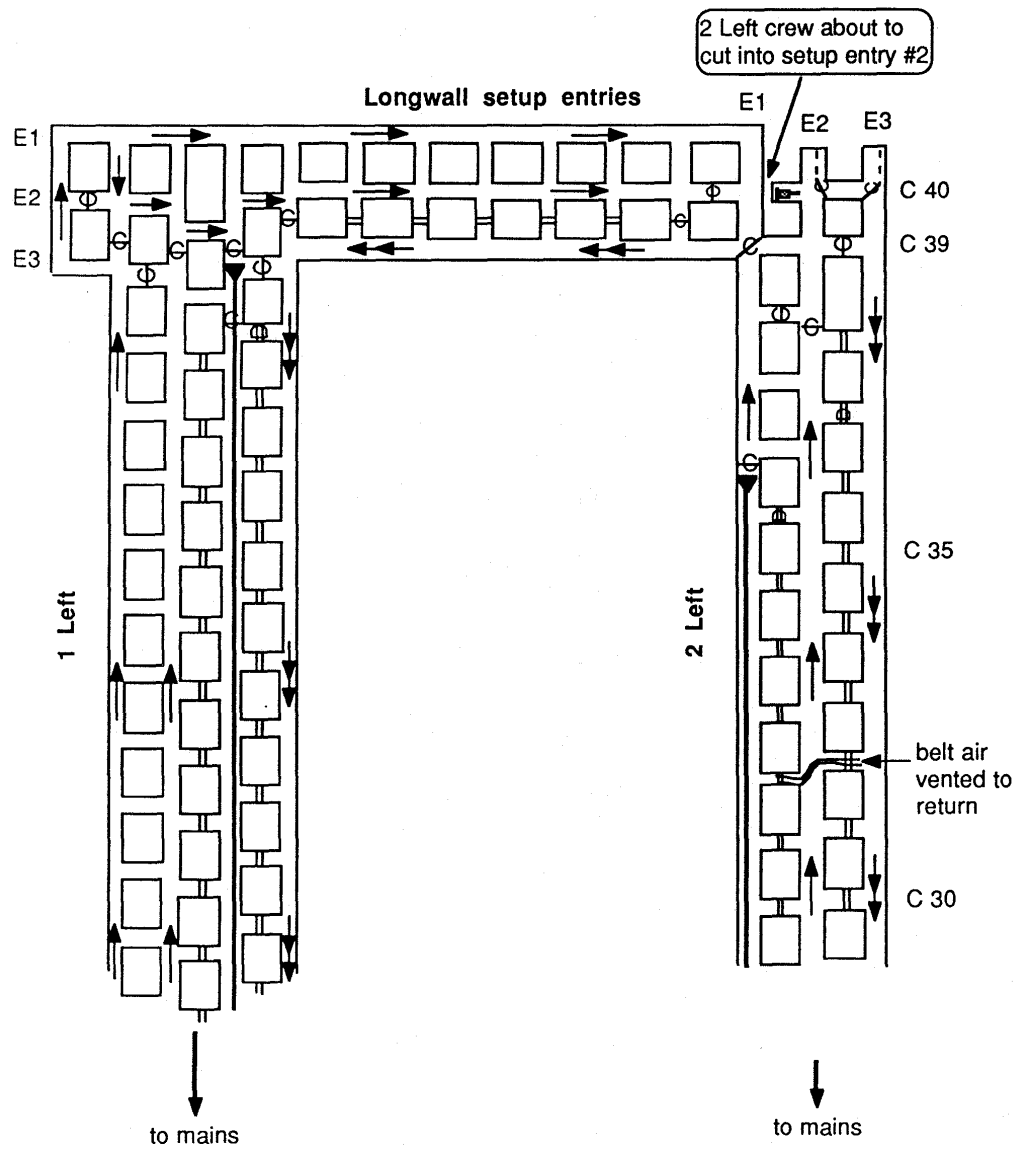


Figure 5: 2 Left crew gets ready to cut into #2 setup entry at crosscut 40

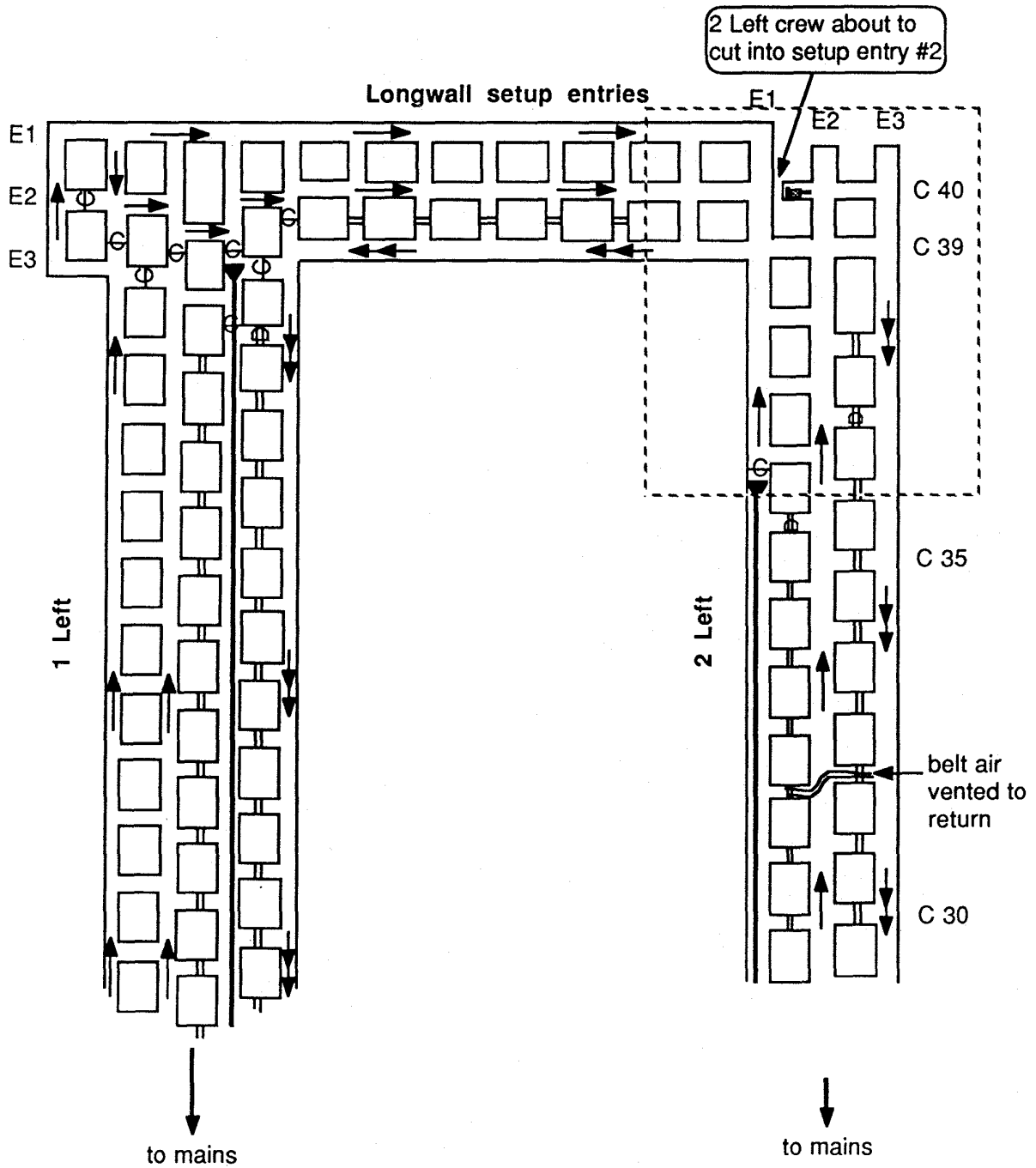


Figure 5A: Sketch a good ventilation arrangement (within the dotted line box)

Section F

The second shift 2 Left crew completes the cutthrough to longwall setup entry #2. The section crews leave crosscut #40 open as shown in Figure 6. Early the next morning the day shift preshift examiner takes the air quantity readings shown in Figure 6. He compares these readings to those he made a few days earlier. (The earlier readings are shown in Figure 1.) After comparing the two sets of readings the examiner assumes the ventilation is O. K.

Questions

16. Do you agree with him? Explain.
17. Suppose you are the day shift #2 Left section foreman. When you come on the section you find the connection between your section and the setup entries open as shown in Figure 6. What would you do? Why? Would you make any ventilation changes to the section right now? If so, mark the changes you would make directly on the map in Figure 6A. Mark within the dotted line box. (Write only on the answer sheet.)

Turn to Section G when you have answered these questions.

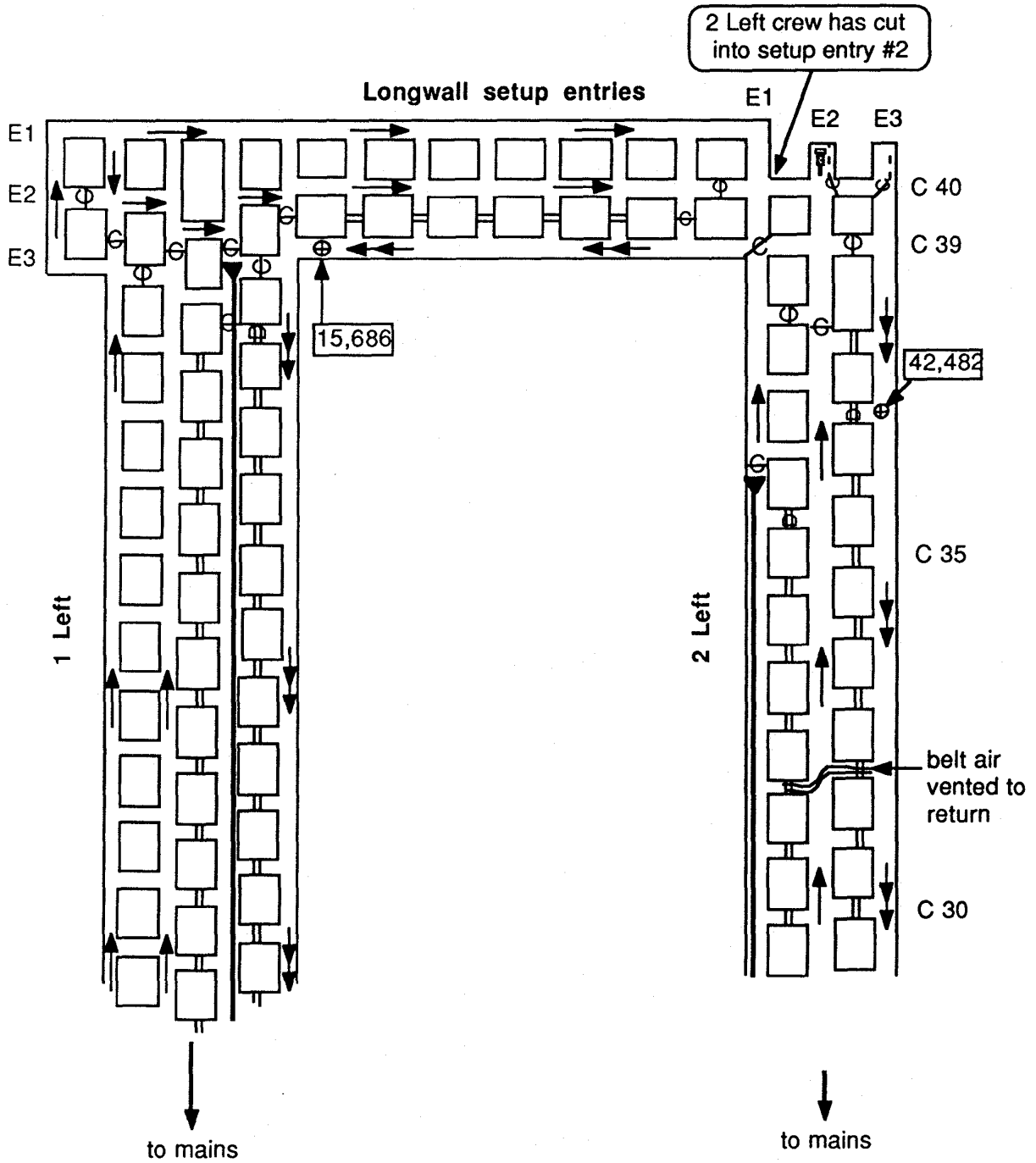


Figure 6: 2 Left crew completes cut into #2 setup entry at crosscut 40

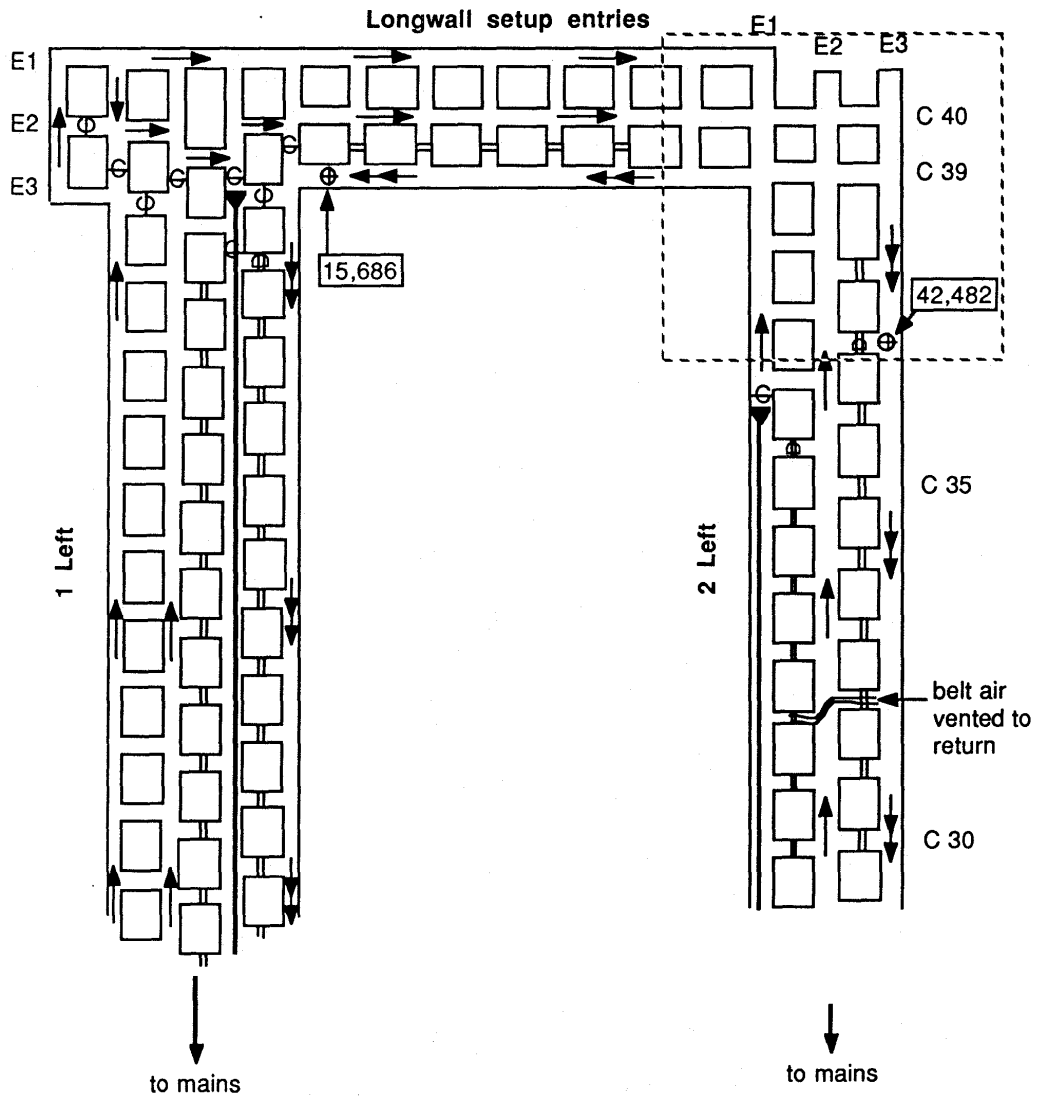


Figure 6A: Sketch your ventilation arrangement within the dotted line box

Section G

The day shift section foreman makes the ventilation arrangements shown in Figure 7. He then takes the air quantity readings at the locations shown in the boxes. When he talks to a mine mechanic, he learns that the connection between #2 Left and the longwall setup #2 entry has been open for nearly 9 hours.

Question

18. What should the day shift #2 Left foreman do now? Why?

Turn to Section H when you have answered the question.

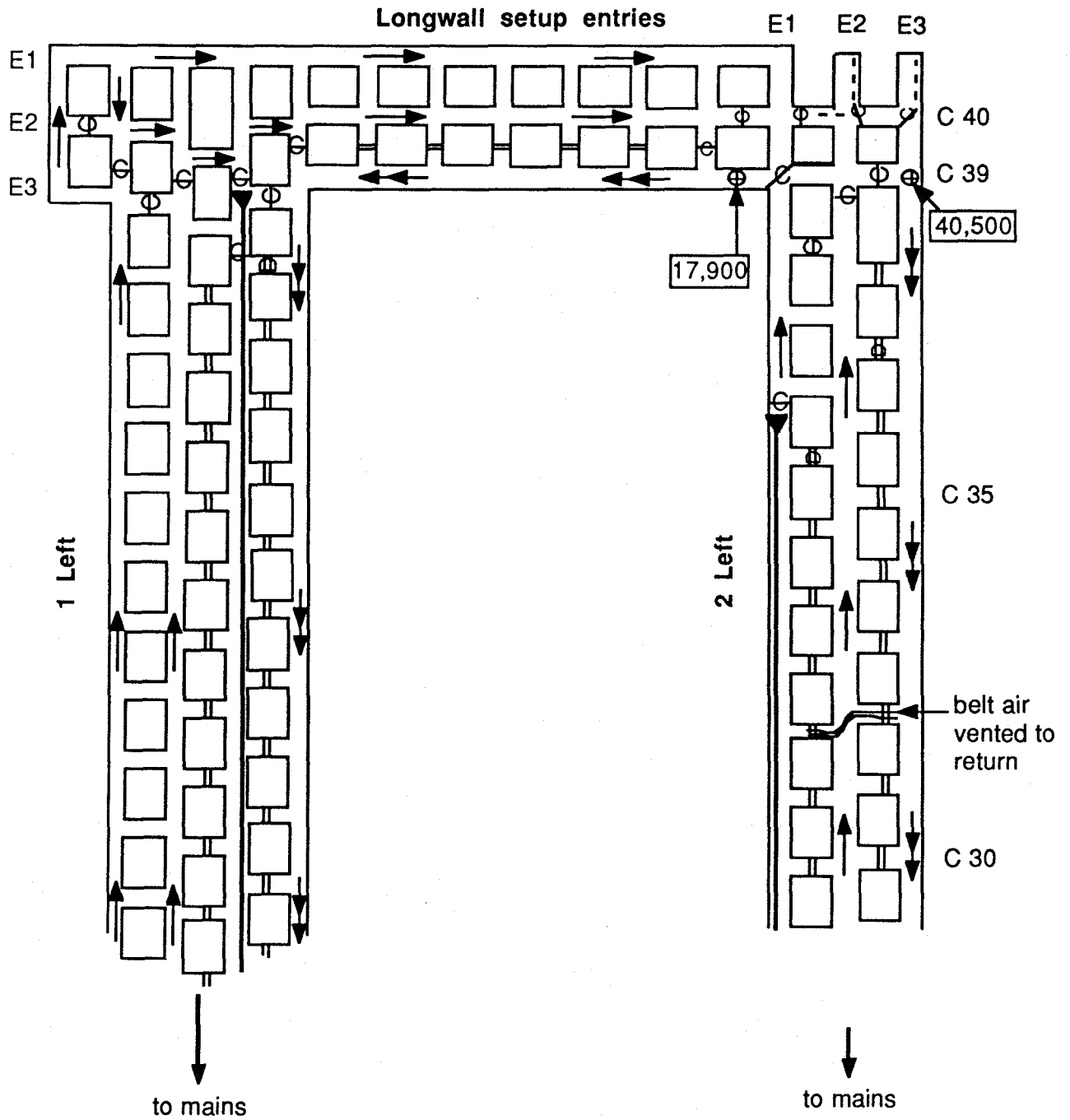


Figure 7: Day shift foreman's ventilation arrangement and air quantity readings

Section H

When the day shift 2 Left section foreman first came on the section he made methane checks at the faces of entries #1, #2, and #3. He found no appreciable methane. Then he found the cutthrough at crosscut #40 open and immediately ordered it curtained off as shown Figures 7 and 8. Then he learned that the cutthrough had been open for nearly 9 hours. After the curtain was up he again made air flow measurements shown at the locations indicated on Figure 8.

Questions

19. After he learned the cutthrough had been open for about 9 hours, should the foreman have taken additional methane readings? Why or why not?
20. If you think the foreman should have made additional methane checks, use an **M** to mark each location. Write your **M**s directly on the map in Figure 8. (Write only on the answer sheet.)
21. Look back at Figure 6. After the cutthrough at crosscut #40 was made by the second shift, the preshift examiner for the day shift took the air flow measurements at the locations shown in Figure 6. Should the examiner have made additional air flow measurements? Why or why not?
22. If you think the examiner should have made additional air flow measurements, mark the locations on the map in Figure 8 using **X**s. (Write only on the answer sheet.)

Turn to Section I when you have answered these questions

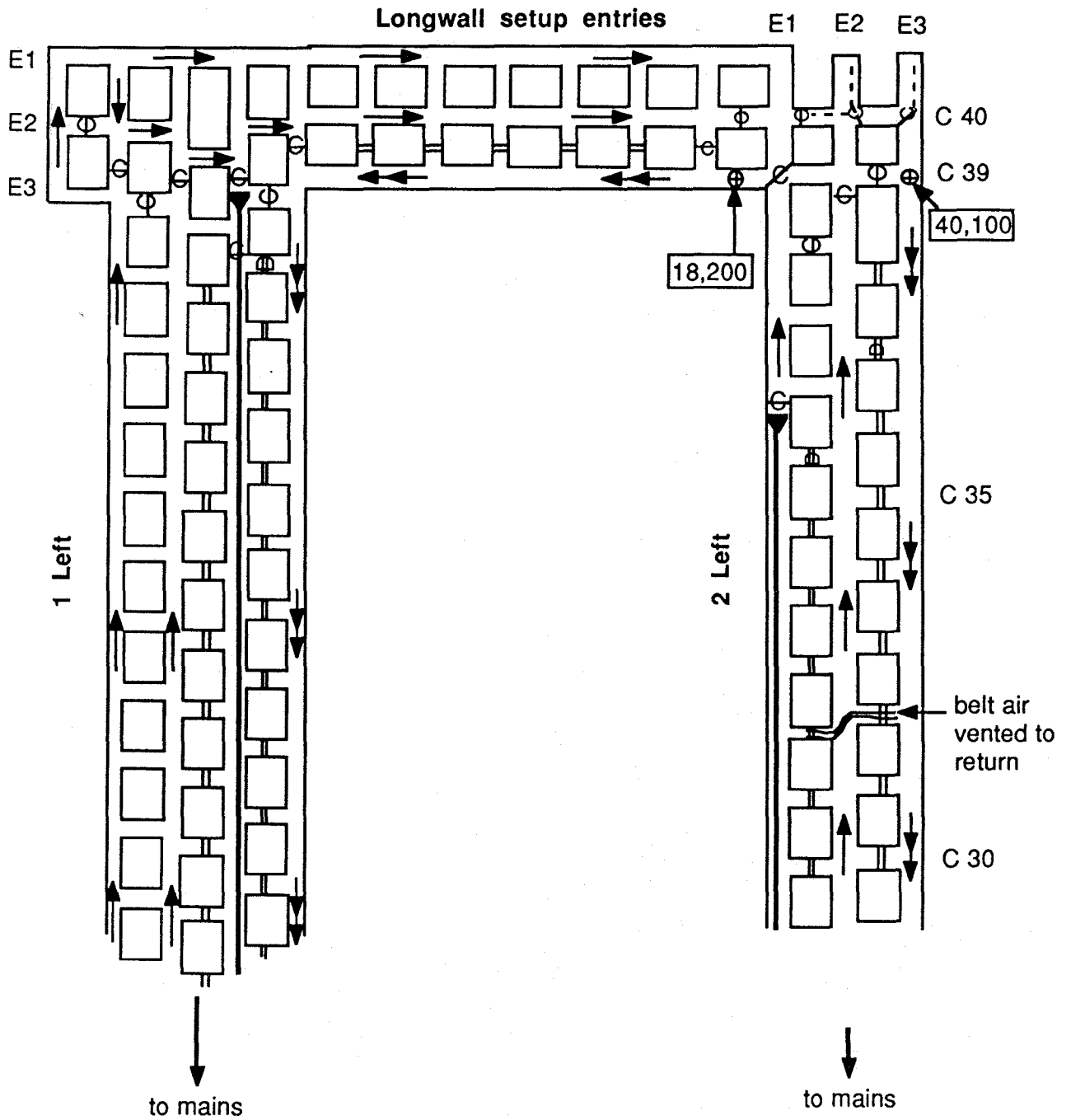


Figure 8: Mark locations of additional methane readings with **M**s and locations of additional air flow readings with **X**s

Section I

Think about the whole problem. Look at all the maps. Then answer the following questions.

Questions

23. What violations of federal and state laws are present in this problem?
24. Identify any poor mining practices you find in this problem.