

# 2012 Northern Mine Rescue Contest

## JUDGE'S PACKET (Field Competition)



June 13, 2012  
Rochester, New York

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# **MINE INFORMATION SHEET**

## **Kabel Mining Company – Rochester No. 5 Mine**

### **Mining & Equipment:**

The single-level drift mine uses a conventional room and pillar method to extract high-grade ore. The broken ore is transported by load-haul-dumps (LHDs) to the outside. The entries are initially driven 8 feet high and 10 feet wide. Typical pillar dimensions are 20 feet by 20 feet. All underground mobile equipment (including the LHDs, face drill, roof bolting machine, and utility vehicles) is diesel-powered.

### **Gas:**

In accordance with Title 30 CFR 57.22003, the mine is classified as Category VI. That is, the presence of methane has not been established in this mine and there is no history of methane gas in any other mine in the area. Historical hygiene data from the mine, both MSHA and Company's samples, have indicated no presence of methane.

### **Water:**

The mine has recently experienced water problems in the northeastern corner of the active workings. Submersible pumps are used to remove accumulations from the mine; however, standing water is typical in this area.

### **Mine Openings:**

The mine has four drift openings. Drift 1 is designated as the primary escape way from the mine. Drift 4 is the main haulage way for the mine and is designated as the secondary escape way.

### **Ventilation:**

The 6-ft. diameter blowing Main Fan is located on the surface at the Intake Portal. The fan is not reversible. The fan produces approximately 100,000 cfm and operates in the stable portion of its performance curve. Electrical power to the Main Fan is available, but locked out and guarded. The fan will not be restarted until it is safe to do so.

Air enters the mine through the Intake Portal and exhausts from of the Return Portal. Air is directed to the faces using permanent (concrete block) and temporary (brattice cloth) ventilation controls. There are two auxiliary fans (20,000 cfm each) located underground near the active faces to enhance airflow distribution. The last known location for each fan and typical airflow direction is marked on the Team and Fresh Air Base Maps.

### **Electric Power:**

Electrical power has recently been installed for overhead lighting at the mine openings and in the foreman's office. The underground power circuit has been de-energized, locked out, and guarded.

## **MINE INFORMATION SHEET (continued)**

### **Kabel Mining Company – Rochester No. 5 Mine**

#### **Ground/Rib and Roof Control:**

The immediate roof or back is supported by 6-foot long roof bolts, installed on 4-foot centers. Wooden posts or wooden crib blocks are available for additional support in problem areas.

#### **Recovery:**

No recovery work (or second mining) has been performed.

#### **Mine Map:**

The mine map was updated 12 days ago by Evin Kabel, PE.

#### **Other Mines:**

There are several known mines, active and abandoned, in Rochester, NY. At this time, the Rochester No. 5 Mine is not connected to any of these mines.

#### **Explosives:**

Explosives are available and stored on the surface. They are used during the mining cycle and blasting is conducted at the end of the day shift while all persons are out of the mine. Only enough explosives for a day's use are transported underground via the blasters' truck.

#### **Materials:**

Most available equipment and materials to work the problem are located in the mine and are identified with placards. The materials are stored in several areas underground and can be readily located if needed. If there is something else deemed necessary by the team, upon request, it can be delivered in a reasonable amount of time. These include: timbers, crib blocks and additional brattice materials.

#### **Communications:**

A pager phone is available in the foreman's office. At this time, we do not know its status because there has been no contact with the missing miners.

## TEAM BRIEFING STATEMENT

The Kabel Mining Company's Rochester No. 5 Mine started production on January 2, 2012. It is a single-level underground mine opened by four drifts. The mine is ventilated using a blowing fan operating at the Intake Portal. Fresh air enters the mine through the Intake Portal and exits through the Return Portal. Two diesel-powered auxiliary fans are available to enhance airflow in the face areas.

High-grade ore is mined by the traditional room and pillar method. Typical entries are driven 8 feet high and 10 feet wide. Pillar dimensions are typically 20 feet by 20 feet (W x L). There is no second mining conducted at this time. Only diesel-powered equipment is used underground. The immediate roof, or back, is supported by six-foot rock bolts. The back is fairly competent, but problem areas are supported by wooden posts or stacked crib blocks.

This morning at 6:00 a.m., eight employees went underground to start their shift. At 7:00 a.m., dark black smoke was observed exiting the Return Portal. The Mine Manager tried to alert the crew, but could not reach anyone on the mine phone. He activated the stench warning system and proceeded toward the Intake Portal. He was met by three employees who had made their way out from the mine and reported that there was heavy black smoke in the face areas. They used their filter self-rescuers to escape from the mine. The employees did not know the source of the fire and did not know why the rest of the crew had not evacuated the mine. The mine manager returned to his office and notified MSHA and the local authorities of the fire at the mine.

Currently, you are located at the surface fresh air base. The main ventilation fan has not been restarted. All power to the underground has been locked out and guarded. Gas monitoring at the Return Portal indicates: heavy smoke with oxygen (O<sub>2</sub>) - 14.0% and carbon monoxide (CO) – 3,250 ppm.

We are still not able to establish contact with anyone underground. Guards have been posted at the mine drift openings. There is a fully equipped mine rescue team ready to be your team's backup.

If your team is willing to help, we would like you to give us a damage report; extinguish or seal any fires; account for the five (5) missing miners; bring any live miners to the surface; and explore and map all accessible areas of the mine. All materials needed to work this problem are located in the mine and are identified with placards.

When you reach the mine rescue course, the Mine Manager will introduce you to the judges. Once the Team Captain has started the timer, the Mine Manager will again give you the briefing information, the mine information, two copies of the mine map, and the Team and Fresh Air Base Attendant's Instructions. The Mine Manager will **not** answer any questions concerning the team briefing statement. The Manager will only respond to questions allowed by the rules while you are working the problem.

**GOOD LUCK!**

## **TEAM INSTRUCTIONS**

- \* Give us a damage report
- \* Extinguish or seal any fires
- \* Account for the five (5) missing miners
- \* Bring any live miners to the surface
- \* Explore and map all accessible areas of the mine

## **FRESH AIR BASE INSTRUCTIONS**

- \* The fresh air base attendant and alternate will be assigned a location where they can study the team briefing information, mine information, and map.
- \* Only one attendant or alternate will be allowed to assist at the fresh air base. This person can assist the team and answer any questions the team may ask. However, this person cannot physically assist the team beyond the fresh air base unless that person becomes an active team member in the event that someone drops out.
- \* The fresh air base attendant and mine rescue team alternate are not allowed to speak to anyone during the working of the problem except their team members and the mine manager.

## **PROBLEM ORIENTATION**

Introduce yourself to the team as the “Mine Manager.” Then, introduce the #1, and #2 Judges to the team.

Read the following instructions to the team:

**I have no new information to report to you. I cannot answer any questions concerning the team briefing statement. I can, however, define any term that the team did not understand. During the working of the problem, I will answer any question that you may have; however, by problem design, my response may be limited in scope.**

**The fresh air base attendant or mine rescue team alternate will be required to locate at a designated area where he/she can study the map and team briefing information. He/she can assist the team and answer any questions that the team may ask. Only one attendant or alternate will be allowed to assist at the fresh air base. He/she cannot physically go beyond the fresh air base to assist the team unless he/she becomes a team member when someone drops out.**

**The fresh air base attendant or mine rescue team alternate is not allowed to communicate with anyone except the team members, the mine manager, or the judging officials.**

**At the end of the problem, both the team map and the fresh air base attendant’s map will be collected and scored. All map editing must take place prior to stopping the clock.**

**Do you understand these instructions?**

When they verify understanding the instructions, have the Team Captain start the clock and hand the team the Team Briefing Information, the Mine Information Sheets, and the Mine Maps. Remember to add:

**“Good Luck!”**

## **PROBLEM SOLUTION**

### **DISCLAIMER:**

**There are many ways to successfully solve this problem. The following outlines one possible way for use during MSHA field judges' training.**

Each team will receive a briefing prior to arriving at the fresh air base. At the conclusion of the briefing they will receive the following: the team briefing statement, mine information sheet, mine maps, and instructions for rescue teams and fresh air base attendants.

Upon arrival to the fresh air base the team will meet the Mine Manager and will be introduced to the judges. The Mine Manager will read the Problem Orientation and update the team with any information obtained since their briefing. Questions will be answered only as required by the rules or to explain the meaning of a term.

When the team verifies that they understand the instructions, the captain immediately starts the official clock. He writes the month, day, year, and the team position number on the sign-in board.

After receiving the information from the Mine Manager, the team may discuss the conditions presented by the problem and the map. The team is not required to check their equipment again. These equipment checks were conducted prior to reporting to the field and the team is fully equipped, physically fit, and ready to go. However, deficiencies with the team's equipment, identified by the judges during the working of the problem, should be discounted appropriately.

Since the mine is a Category VI and methane hasn't been encountered in the mine, the team does not need to use non-sparking tools to work the problem. However, if the team does not have non-sparking tools and requests them from the official in charge, the tools that they brought with them will be deemed non-sparking.

Although the team will be using a communications reel during the working of the problem, alternate lifeline signals must be presented to the No. 2 judge.

When ready, the team must examine all openings to the mine.

Note: Entrances to all mine openings shall be examined while under oxygen. In air clear of smoke, these checks may be made without a lifeline, provided the entire team does not go into the entrance. This examination should not cover more than twenty-five (25) feet.

### **Intake Portal checks reveal:**

A placard at the portal shows "Clear Air." The Main Mine Fan is off and the adjacent man door is closed.

**Drift 2 checks reveal:**

A placard at the drift shows “Clear Air.” The airlock door is closed.

Note: Near Drift 2, the team will find five sets of brattice material. They may opt to carry it with them for future use.

**Drift 3 checks reveal:**

A placard at the drift shows “Clear Air.” The equipment door is closed.

**Return Portal checks reveal:**

A placard at the portal shows “Heavy Smoke” with 14% Oxygen (O<sub>2</sub>) and 3,250 ppm Carbon Monoxide (CO) exiting the mine.

Note: the team must perform an apparatus and personnel check before entering smoke, since the team briefing statement had stated that there was heavy smoke exiting the Return Portal.

**Note: Team Stop Nos. 1 – 4 (see Solution Map – 1)****Team Stop No. 1**

Team must count off before entering the mine (first time they go underground). Team can travel northward in Drift 4 toward Crosscut 1 (designated as “CX 1” on the Team and Fresh Air Base Maps). As they approach the intersection, they will find the first missing miner (Miner #1) who is unresponsive. The miner is lying near a roof bolter which is parked in the intersection. The team captain must perform necessary roof or back checks over the miner. After a primary assessment, Judge #2 will hand the team member a placard which reads: **“The miner exhibits no vital signs. The miner is dead.”** The captain must D&I the location of the body.

In the intersection, the captain will verbally state that he is checking the back or roof and the team will conduct necessary gas checks. There is no indication that the smoke and gas concentrations have changed from those measured at the Return Portal. The captain will find an area of unscalable loose back extending from the southern and eastern ribs of the inby pillar. The captain must warn the other team members to stay clear of this hazard. They will also find that the drift to the north and the crosscut to the west are open.

Note: Due to the presence of smoke inby the Return Portal, the team must be connected to their lifeline.

Note: After advancing into the mine, not more than fifty (50) feet from the portal, the captain must give a signal for the team to stop. At this team stop, all team members and their apparatus must be checked. After the first 50 feet apparatus check, the team is required to conduct apparatus examinations not exceeding 20-minute intervals while working the problem. Additionally, apparatus removed in order to enter a confined area or apparatus that has sustained possible damage must be checked before continuing.

Note: No physical comparison of the fresh air base map and team map will be allowed after this initial entry into the mine. No changes can be made to either map while the team is at the fresh air base or out of the mine.

### **Team Stop No. 2**

The team will advance westward in CX 1 toward Drift 3. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find a placard indicating 14% O<sub>2</sub> and 3,250 ppm CO. To the west, the team will find that CX 1 is blocked by an airtight cave extending rib-to-rib. After making roof or back checks and taking gas tests, the captain must D&I this furthest point of advance (at the cave). The team can stretch southward in Drift 3 to tie-in. The captain must D&I the equipment door to indicate their furthest point of advance in this direction.

### **Team Stop No. 3**

The team can advance northward in Drift 3 toward CX 2. At the intersection, the captain will perform back checks and the team will conduct necessary gas checks. They will find that the smoke and gas concentrations have not changed from their previous location. They will also find that the drift is open to the north and the crosscut is open to the west and east. The team can stretch westward toward Drift 2. About 5 feet from the intersection, the team will find that the crosscut is blocked by an airtight cave extending rib-to-rib. After making roof or back checks and taking gas tests, the captain must D&I this furthest point of advance (at the cave).

Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them.

### **Team Stop No. 4**

The team can now advance eastward in CX 2 toward Drift 4. At the intersection, the captain will perform back checks and the team will conduct necessary gas checks. They will find that the smoke and gas concentrations have not changed from their previous location. They will also find that the drift is open to the north. At this point, they can stretch southward in Drift 4 to tie-in.

Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them.

## Note: Team Stop Nos. 5 – 7 (see Solution Map – 2)

### Team Stop No. 5

The team can now exit the mine and re-enter through the southernmost airlock door at Drift 2. **Since the area behind the door is an unknown, the team must first erect a temporary stopping in order to avoid making an unintentional air change.** When the stopping has been completed, then the team can open the airlock door and advance northward in the drift. The team will find that the northernmost airlock door is open.

### Team Stop No. 6

The team can now advance toward CX 1. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find 16% O<sub>2</sub>, 990 ppm CO, and light smoke. To the east, the team will find that CX 1 is blocked by an airtight cave extending rib-to-rib. After making roof or back checks and taking gas tests, the captain must D&I this furthest point of advance (at the cave). To the west, the team can stretch in the crosscut to the permanent stopping. It is intact. The captain must D&I the stopping as their furthest point of advance in this direction. They will also find the foreman's jeep parked along the southern rib.

Note: At this location, the team must perform an apparatus and personnel check before entering smoke. They must also be connected to their lifeline.

### Team Stop No. 7

They can now advance northward in Drift 2 toward CX 2. When they reach the foreman's office, they will find a placard indicating that the gas concentrations have not changed from their previous location. They will also find that the office door is closed. At that time, Judge #2 will hand the captain a placard indicating the following:

The team can converse with Miner #2. He is alone and feeling a bit light headed. The air inside the office is O.K., ground conditions are good, and there is a solid face behind him. The mine phone is broken, so he couldn't call out to the surface. He states he had misplaced his self-rescuer. When the mine filled up with smoke, he made it to the office and closed the door. He doesn't know what happened to the rest of his crew. No other information is available.

**The team cannot open the door, because of the dangerous gas concentrations in the vicinity.** The team will instruct Miner #2 to stay inside the office and wait. They will return and get him out as soon as possible.

The team can now advance northward and find that the intersection with CX 2 is blocked by an airtight cave extending rib-to-rib. After making roof or back checks and taking gas tests, the captain must D&I this furthest point of advance (at the cave).

## Note: Team Stop Nos. 8 – 10 (see Solution Map – 3)

### Team Stop No. 8

The team can now exit the mine by retreating southward through the airlock doors. **In order to prevent an unintentional ventilation change, they must close at least one of the airlock doors before opening the temporary stopping that they had erected.**

### Team Stop No. 9

Now the team can re-enter the mine through the man door in Drift 1. **Since the area behind the door is an unknown, the team must first erect a temporary regulator in order to avoid making an unintentional air change. The regulator's open area should be approximately the same as the area of the 6-ft. diameter fan.** When the regulator has been completed, then the team can open the man door and advance northward in the drift. At the intersection with CX 1, the captain will check the back and the team will conduct necessary gas checks. They will find 16% O<sub>2</sub>, 990 ppm CO, and light smoke. The team can stretch eastward in CX 1 to the permanent stopping to tie-in. The captain must D&I the stopping as the furthest point of advance in this direction.

Note: At this location, the team must perform an apparatus and personnel check before entering smoke. They must also be connected to their lifeline.

### Team Stop No. 10

The team can now advance northward in Drift 1 to CX 2. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find that the smoke and gas concentrations have not changed from their previous location. The team can stretch eastward in CX 2 to the airtight cave extending rib-to-rib. After making roof or back checks and taking gas tests, the captain must D&I this furthest point of advance (at the cave).

**Note: Team Stop No. 11 (see Solution Map – 4 (Ventilation Change))**

**Team Stop No. 11**

To rescue Miner #2 from the foreman's office, a ventilation change is necessary to clear the area in front of the office door. At this point, the team must confer with the mine manager through their fresh air base coordinator by using the communication line, or by returning to the surface. In either case, they must explain the necessary ventilation changes prior to implementing them. They outline the following changes to the mine manager:

- 1) Construct a temporary stopping in Drift 1 between CX 1 and CX 2;
- 2) open the permanent stopping in CX 1 between Drift 1 and Drift 2;
- 3) open the temporary regulator in Drift 1 that they had erected;
- 4) close the man door adjacent to the Main Fan in Drift 1;
- 5) open the airlock door(s) in Drift 2; and
- 6) turn on the blowing Main Fan in Drift 1.

When the fan is running, fresh air will travel northward in Drift 1; eastward in CX 1; and southward in Drift 2 through the open airlock and out of the mine. The smoke and gas concentrations along this route will quickly dissipate and the gas placards will revert to Clear Air. However, in order to sweep the area in front of the foreman's office, the team will need to:

- 7) Erect a wing curtain in Drift 2 to direct airflow northward in Drift 2 toward the office door.

**Note: If the team does not complete any of the changes (as described above) and turns the Main Fan on, certain areas will not clear.**

**Note: Team Stop Nos. 12 - 14 (see Solution Map – 5)**

**Team Stop No. 12**

The team can return to the foreman's office.

**Team Stop No. 13**

Once the air clears in front of the foreman's office, the team can open the office door. Inside they will find Miner #2. Team members can assess his condition and find that he is not injured and able to walk out with the team. The captain must D&I the miner's location. They will also find the inoperable mine phone.

At the face, the captain will perform roof or back checks and the team will conduct necessary gas checks. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction.

**Team Stop No. 14**

The team will escort Miner #2 to the outside. Once at the fresh air base, the team can arrange for any follow-up medical treatment.

Note: All areas that have been cleared of smoke or toxic or dangerous gases must be gas tested along the route that they travel.

**Note: Team Stop Nos. 15 - 20 (see Solution Map – 6)**

**Team Stop No. 15**

The team can now continue systematic exploration of the mine. They can now re-enter the Return Portal and advance northward in Drift 4 toward CX 3. As they approach the intersection, the team will find a placard indicating “water knee deep” extending rib-to-rib. They can proceed on and map the extent of the water. In the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find 14% O<sub>2</sub>, 3,250 ppm CO, and heavy smoke. The team can stretch northward in Drift 4 to the face. They will find a face drill parked along the eastern rib. At the face, the captain will perform roof or back checks and the team will conduct necessary gas checks. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction.

Note: At this location, the team must perform an apparatus and personnel check before entering smoke. They must also be connected to their lifeline.

**Team Stop No. 16**

The team can advance westward in CX 3 to Drift 3. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find that the smoke and gas concentrations have not changed from their previous location. They will also find that the drift to the north and the crosscut to the west are open.

**Team Stop No. 17**

The team can now advance northward in Drift 3 to the face area. They will find an auxiliary fan located along the western rib of the drift. They will also find that the extent of mining has progressed to CX 4 and the face is located 10 feet to the east of Drift 3. A blaster’s truck is parked in the middle of the new crosscut. At the face, the captain will perform back checks as the team conducts necessary gas checks. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction.

**Team Stop No. 18**

The team can now retreat to CX 3 and advance westward in the crosscut toward Drift 2. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find 14% O<sub>2</sub>, 3,250 ppm CO, and heavy smoke. To the south, they will find an 8’ by 10’ brattice cloth barricade. At that time, Judge #2 will hand the captain a placard indicating the following:

The team can converse with Miners #3 and #4. The air inside the barricade is good, ground conditions are also good, and there is solid face behind them. They state that an LHD caught fire and the smoke was too thick to see. So, they barricaded themselves and waited for rescue. No other information is available.

**The team cannot open the barricade, because of the dangerous gas**

**concentrations in the vicinity.** The team will instruct Miner #3 and Miner #4 to stay inside the barricade and wait. They will return and get them out as soon as possible.

The team can stretch northward in Drift 2 toward the face area. About 5 feet in by the crosscut, they will find an area of unscalable loose back extending rib-to-rib. At this point in the problem, the team has not found any posts or crib blocks to support the area.

**Note: If the team asks the mine manager for additional roof supports, the mine manager will inform them that: “All of the supplies that they have onsite are located in the mine. A shipment of posts and crib blocks is due to arrive tomorrow.”**

### **Team Stop No. 19**

The team can now advance westward in CX 3 toward Drift 1. At the intersection, the captain will assess back conditions as the team prepares to take gas checks. The team will encounter a placard indicating an “LHD on Fire.” The team can extinguish the fire using their two fire extinguishers. Once the fire has been extinguished, the placard can be flipped over to show the “Fire Out.” Before traveling on, the captain must D&I the location of the fire.

Afterward, they can continue exploration. They will also find a gas placard indicating that the smoke and gas concentrations have not changed from their previous location. The team can stretch southward in Drift 1 to tie-in.

### **Team Stop No. 20**

The team can now advance northward in Drift 1 toward the face area. They will find that the extent of mining has progressed to CX 4 and the face is located 30 feet to the east of Drift 1. They will find an auxiliary fan located along the northern rib of the new crosscut. They will also find an LHD parked in the middle of the crosscut and a muckpile extending 5 feet out by the face. Team members can traverse the muckpile to reach the face. Once there, the captain will perform back checks as the team conducts necessary gas checks. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction.

**The team will also find the gas testing box along the southern rib of CX 4. A team member must use the team’s multi-gas instrument to determine the gas concentrations in the unknown mixture. Judge No. 2 will assess the team’s measurements and, if warranted, apply appropriate discounts (see 2012 Rulebook - Judge 2 – UG Rule #4).**

**Note: Team Stop Nos. 21 - 23 (see Solution Map – 7 (Ventilation Change))**

**At this point, the team has explored all accessible areas of the mine that can be explored safely.** There are two areas that have not been explored in Drift 2 which extend to the north and to the south of CX 3. The team knows that Miner #3 and Miner #4 are alive and located behind a barricade in the southern area. They must assume that the last missing miner (Miner #5) is located in by the unscalable loose back to the north.

**Team Stops Nos. 21 – 23**

To safely access the barricade in Drift 2, a second ventilation change is required to move the smoke and the dangerous concentrations of CO and low O<sub>2</sub> from in front of the barricade. The team must ensure that any air movement created by this change does not compromise the safety of Miner #5 located in the area to the north of the barricade.

Once again, the team must confer with the mine manager at the fresh air base or they must have the fresh air base attendant confer with the mine manager and explain these necessary ventilation changes prior to implementing them. They outline the following changes to the mine manager:

1. Build a temporary stopping in Drift 2 to the north of CX 3 (**Team Stop No. 21**);
2. travel out of the mine and through the airlock in Drift 2 (**Team Stop No. 22**);
3. close one or both airlock doors in Drift 2; and
4. open the temporary stopping that they had erected in Drift 1 between CX 1 and CX 2 (**Team Stop No. 23**).

Once these are completed, fresh air will travel northward in Drift 1; eastward in CX 3; southward in Drift 3 and Drift 4 toward the Return Portal; and out of the mine. The smoke and gas concentrations along this route will quickly dissipate and the gas placards will revert to need to:

**Note: If the team does not complete any of the changes (as described above), certain areas will not clear.**

**Note: Team Stop Nos. 24 - 26 (see Solution Map – 8)**

**Team Stop No. 24**

The team can now return to the barricade in Drift 2.

**Team Stop No. 25**

Once the air clears in the vicinity, the team can open the barricade. Inside they will find Miner #3 and Miner #4. The captain must assess back conditions and the team must conduct necessary gas tests. The captain must also D&I the locations of both miners.

Afterward, the team can assess the miners' condition and find that both are not injured and able to walk out with the team. They will also find eight wooden posts. Before leaving the area, the captain must D&I the cave as their furthest point of advance in this direction.

**Team Stop No. 26**

The team will escort Miners #3 and #4 to the outside. Once at the fresh air base, the team can arrange for any follow-up medical treatment.

Note: All areas that have been cleared of smoke or toxic or dangerous gases along the route that they travel must be gas tested.

**Note: Team Stop Nos. 27 - 29 (see Solution Map – 9)**

**Team Stop No. 27**

The team will re-enter the mine and advance to the intersection of Drift 2 and CX 3. Once there, they can stretch southward and retrieve the eight wooden posts that they had found inside of the barricade.

**Team Stop No. 28**

The team can now advance northward in the drift and post their way through the area of unscalable loose back. The team will find Miner #5 lying near the face and unresponsive. The team captain must perform necessary back checks over the miner. After a primary assessment, Judge #2 will hand the team member a placard which reads: **“The miner exhibits no vital signs. The miner is dead.”** The captain must D&I the location of the body. Afterward, the captain will perform back checks at the face as the team conducts necessary gas checks. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction.

**Team Stop No. 29**

The team will return to the fresh air base. Afterward, the captain can state that the team has completed their mission. That is, they have explored all accessible areas of the mine, extinguished the fire, re-ventilated, located the five missing miners, and brought three of them out alive.

**\*\*\* THE END \*\*\***

## PLACARD KEY:

- |     |                                                                |     |                                                                |
|-----|----------------------------------------------------------------|-----|----------------------------------------------------------------|
| 1.  | Fresh Air Base                                                 | 20. | Roof Bolter                                                    |
| 2.  | Intake Portal                                                  | 21. | Miner #1                                                       |
| 3.  | Clear Air (Placard A)                                          | 22. | Loose Back (unscalable)                                        |
| 4.  | Main Fan (off)                                                 | 23. | Return Portal                                                  |
| 5.  | Man Door (closed)                                              | 24. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |
| 6.  | 16 % O <sub>2</sub><br>990 ppm CO<br>Light Smoke (Placard B)   | 25. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |
| 7.  | Permanent Stopping                                             | 26. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |
| 8.  | Permanent Stopping                                             | 27. | Caved Tight                                                    |
| 9.  | Foreman's Jeep                                                 | 28. | Caved Tight                                                    |
| 10. | 16 % O <sub>2</sub><br>990 ppm CO<br>Light Smoke (Placard B)   | 29. | 16 % O <sub>2</sub><br>990 ppm CO<br>Light Smoke (Placard B)   |
| 11. | Caved Tight                                                    | 30. | Mine Phone (inoperable)                                        |
| 12. | Airlock Door (open)                                            | 31. | Miner #2                                                       |
| 13. | Airlock Door (closed)                                          | 32. | Face                                                           |
| 14. | Brattice Material (5 sets)                                     | 33. | Caved Tight                                                    |
| 15. | Equipment Door (closed)                                        | 34. | 16 % O <sub>2</sub><br>990 ppm CO<br>Light Smoke (Placard B)   |
| 16. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |     |                                                                |
| 17. | Caved Tight                                                    |     |                                                                |
| 18. | Loose Back (unscalable)                                        |     |                                                                |
| 19. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |     |                                                                |

**PLACARD KEY (continued):**

- |     |                                                                |     |                                                                |
|-----|----------------------------------------------------------------|-----|----------------------------------------------------------------|
| 35. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) | 53. | Auxiliary Fan (off)                                            |
| 36. | LHD (On Fire)                                                  | 54. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |
| 37. | Auxiliary Fan (off)                                            | 55. | Blasters' Truck                                                |
| 38. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) | 56. | Face                                                           |
| 39. | LHD (load-haul-dump)                                           | 57. | Water Knee Deep                                                |
| 40. | Muckpile                                                       | 58. | Water Knee Deep                                                |
| 41. | Face                                                           | 59. | Water Knee Deep                                                |
| 42. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) | 60. | Face Drill                                                     |
| 43. | Barricade (8' x 10' brattice cloth)                            | 61. | Face                                                           |
| 44. | Miner #3                                                       | 62. | Clear Air (Placard A)                                          |
| 45. | Miner #4                                                       | 63. | Clear Air (Placard A)                                          |
| 46. | Wooden Posts (8)                                               |     |                                                                |
| 47. | Face                                                           |     |                                                                |
| 48. | Loose Back (unscalable)                                        |     |                                                                |
| 49. | Loose Back (unscalable)                                        |     |                                                                |
| 50. | Miner #5                                                       |     |                                                                |
| 51. | Face                                                           |     |                                                                |
| 52. | 14 % O <sub>2</sub><br>3,250 ppm CO<br>Heavy Smoke (Placard C) |     |                                                                |

**Note:**  
Eleven smoke placards are double-sided (Nos. 6, 10, 16, 19, 24, 25, 26, 29, 34, 35, and 42). The backside will indicate "Clear Air" when the mine areas have been successfully re-ventilated! A twelfth placard is also double-sided (No. 29). The backside will indicate "Clear Air" when the team uses a wing curtain to sweep gases away from the Foreman's Shop.

Placard No. 36 "LHD (On Fire)" is also double-sided. When the team successfully extinguishes the fire, the backside will indicate "LHD (Fire is Out)".