2013 Northern Mine Rescue Contest

JUDGE'S PACKET
(Field Competition)

July 17, 2013
Rochester, New York

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MINE INFORMATION SHEET
Tankabel Mining Co., Inc. – Rochester No. 6 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 from the faces by load-haul-dumps (LHDs) to a feeder breaker and then to the outside via a conveyor belt haulage system. 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 face drill, roof bolting machine, LHD's, 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 three drift openings. Drift 1 is designated as the primary escape way from the mine. A conveyor belt haulage system is installed in Drift 3 and exits the mine through a series of airlocks. Drift 4 is designated as the secondary escape way.

Ventilation:

The 5-ft. diameter blowing Main Fan is located on the surface at the Intake Portal. The fan is <u>not</u> 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 <u>not</u> 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 diesel-powered 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:

A power center is located in CX1. It delivers electricity to operate the conveyor belt system and overhead lighting in Drift 3 and at the mine openings. The underground power circuit has been de-energized, locked out, and guarded.

MINE INFORMATION SHEET (continued)
Tankabel Mining Co., Inc. – Rochester No. 6 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:

To date, the mine is in a development stage and no recovery work (retreat or second mining) has been performed.

Mine Map:

The mine map was updated 6 days ago by Joel Tankabel, PE.

Other Mines:

There are several known mines, active and abandoned, in Rochester, NY. At this time, the Rochester No. 6 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 shift while all persons are out of the mine. Only enough explosives for a day's use are transported underground.

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 near the power center in CX1. At this time, we do not know its status because there has been no contact with the missing miners.

TEAM BRIEFING STATEMENT

The Tankabel Mining Co., Inc.'s Rochester No. 6 Mine started production on August 14, 2012. It is a single-level underground mine opened by three drifts driven into the highwall of the company's abandoned surface quarry. 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. A conveyor belt haulage system is installed and exits the mine through a series of airlocks from Drift 3. Two diesel-powered auxiliary fans are available to enhance airflow in the face areas.

An eight person crew works one 8-hour shift per day, five days per week, to mine high-grade ore using 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. Currently, the mine is in a development stage and there is no second or retreat mining conducted. 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 6:30 a.m., eight employees went underground to start their shift. At about 7:30 a.m., a blast of air and dark black smoke exited the Return Portal. At that time, the main fan started to stall and shut down. The Mine Manager tried to alert the crew, but could not reach anyone on the mine pager phone. He activated the stench warning system and proceeded toward the mine portals. He was met by four employees who had made their way out from Return Portal. They reported that a large thud was felt in the face areas followed by heavy black smoke. 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, State, and the local authorities of a possible explosion and fire at the mine.

Currently, you are located at the surface fresh air base. The main ventilation fan is off, but ready for use. It will not be restarted until it is deemed safe to do so. All power to the underground has been locked out and guarded. Gas monitoring at the Return Portal indicates: light smoke with oxygen (O_2) - 16.0% and carbon monoxide (CO) – 900 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. Another team will be sent into the mine to replace you after **2 hours (120 minutes)**.

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 four (4) 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 four (4) 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, the role of the mine manager will be assumed by the No. 1 Judge. He will answer any question that you may have; however, by problem design, his 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 <u>except</u> 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. During 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. At the conclusion of the briefing session, these materials will be collected.

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. At that time, the team will again receive two copies of the briefing information and their Team and Fresh Air Base maps. 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 during the working of the problem will 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 requests them from the official in charge, the tools that they brought with them will be deemed non-sparking.

Each team will use a portable, hard-wire communication system during the working of the problem. Alternate lifeline signals must be presented to the No. 2 judge for use in the event of a system failure. The team coordinator and alternate may both use communication headsets when located at the fresh air base, but only one will be permitted to speak to the team.

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 3 checks reveal:

There is no placard at this location. The team will find the southernmost airlock door is open. If the team stretches inside, they will find that the northernmost airlock door is closed and no other information is available.

Return Portal checks reveal:

A placard at the portal shows light smoke with oxygen (O_2) - 16.0% and carbon monoxide (CO) – 900 ppm. The drift is open to the north.

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

Note: Team Stop Nos. 1 – 5 (see Solution Map – 1)

Team Stop No. 1

Near the fresh air base, the team will find five sets of brattice material. They may opt to carry it with them for future use. The 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). 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 about 5 feet from the western rib 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.
- At this point in the problem, the team has not found any posts or crib blocks to support the areas of loose unscalable roof. If the team asks the mine manager for additional roof supports, the mine manager (No. 1 Judge) 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."
- 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.

- 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, they will find that an impassable cave stretching from rib-to-rib. The captain will check the back and the team will conduct necessary gas checks. Afterward, the captain must D&I the cave as their furthest point of advance in this direction.

Team Stop No. 3

The team can advance northward in Drift 4 toward CX 2. As they travel, the captain must warn the team to stay clear of the loose unscalable roof which extends the entire length of the pillar. 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.

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 westward in CX 2 toward Drift 3. At the intersection, the captain will perform back checks and the team will conduct necessary gas checks. They will find heavy smoke with 16.0% O_2 and 3,000 ppm CO. They will also find that the drift is open to the north. At this point, they can stretch across the conveyor belt crossover to the permanent stopping between drift 3 and drift 2. They will find that the stopping is intact. The captain will check the back and the team will conduct necessary gas checks. Afterward, the captain must D&I the permanent stopping as their furthest point of advance in this direction.

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. 5

The team can now advance southward in Drift 3 toward CX2. As they approach the intersection, they will find that the conveyor belt is on fire and the fire is out of control. At this point, the team must cut the belt to keep the conveyor from burning northward. **The captain must check the roof or back and the team must take necessary gas checks. At this time, the team must use brattice material to seal the fire leaving a regulator in the seal. Once the seal has been erected, without undue delay, the team must find and seal all other approaches to the fire.**

Note:

- If the team has not taken brattice material with them, they will need to retrieve it from the Fresh Air Base.

- Sealing the fire does not relieve the team of the responsibility of systematic exploration.

Note: Team Stop Nos. 6 – 8 (see Solution Map – 2)

Team Stop No. 6

Now that the team knows that the impassable cave in CX1 is an approach to the fire, they must return to this location and build a fire seal. **Once they return to this location, the team must use brattice material to seal the fire leaving a regulator in the seal. Once the seal has been erected, without undue delay, the team must find and seal all other approaches to the fire.**

Team Stop No. 7

After exiting the mine through the Return Portal, the team can now re-enter through the open airlock door in Drift 3. Once through the door they can close it behind them.

Team Stop No. 8

Now, they can open the northernmost airlock door and advance northward in Drift 3. As they approach the intersection, they will find that the conveyor belt is on fire and the fire is out of control. **At this point, the team must cut the belt to keep the conveyor from burning southward through the airlock.** The captain must check the roof or back and the team must take necessary gas checks. Again, they will find heavy smoke with 16.0% O_2 and 3,000 ppm CO. Now, the team can retreat through the northernmost airlock door, closing it behind them. Then, they can open the southernmost airlock door and exit the mine.

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

Without undue delay, the team must find and seal all other approaches to the fire.

Note: Team Stop Nos. 9 – 10 (see Solution Map – 3)

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 5-ft. diameter fan.** When the regulator has been completed, then the team can open the man door and advance northward in the drift.

Team Stop No. 10

At the intersection with CX 1, the captain will check the back and the team will conduct necessary gas checks. They will find clear air. 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.

They can now advance northward in Drift 1 toward CX 2. About 10 feet inby the intersection, the team will find an airtight cave stretching from rib-to-rib and blocking their access to the north. The captain will check the back and the team will conduct necessary gas checks. Afterward, the captain must D&I the cave as their furthest point of advance in this direction.

At this point, the team must continue with systematic exploration and find any other approaches to the fire. They have two options:

1. Breach the permanent stopping in CX1 between Drift 1 and Drift 2 in order to access Drift 2; or
2. Breach the permanent stopping in CX2 between Drift 2 and Drift 3 in order to access Drift 2.

Since the team is already located in Drift 1, for this Problem Solution, the team chooses Option 1.

Note: Team Stop Nos. 11 - 18 (see Solution Map – 4)

Team Stop No. 11

Since the area behind the permanent stopping in CX1 is an unknown, the team must first erect a temporary stopping in order to avoid making an unintentional air change. Afterward, the team can open the permanent stopping and advance eastward in CX 1 toward Drift 2. At the intersection, the captain will perform back checks and the team will conduct necessary gas checks. They will find heavy smoke with 16.0% O_2 and 3,000 ppm CO. They will also find that the drift is open to the north. At this point, they can stretch eastward toward Drift 3. About 10 feet from Drift 2, the team will find the western extent of the impassable cave stretching rib-to-rib. They will also find a placard indicating visible flames (fire out of control). **At this time, the team must use brattice material to seal the fire leaving a regulator in the seal.** This is the final approach to the fire and, at this point, the fire has been totally isolated and airflow regulated on all four sides. The team can now continue systematic exploration of the mine.

Team Stop No. 12

The team can advance northward in Drift 2 toward CX2. As they travel, they will find the mechanic's truck parked along the western rib. Just south of the intersection, the team will find the first missing miner (Miner #1, ID – 1776) who is unresponsive. The miner is lying along the eastern rib. 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.

At the intersection, as the captain performs necessary back checks, he will find to the west in CX2 an area of unscalable loose back extending about 5 feet from the northern rib of the inby pillar. The captain must warn the other team members to stay clear of this hazard. Afterward, the team can 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 Drift 2 to the north is open. They can stretch eastward in CX2 to the permanent stopping and tie-in. At the stopping, the captain will check the back and the team will conduct necessary gas checks. Afterward, the captain must D&I the permanent stopping as their furthest point of advance in this direction.

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. 13

The team can now advance westward in CX2 toward Drift 1. As they travel, the captain must warn the other team members to stay clear of the loose roof hazard which extends the entire length of the northern pillar. They will also find two sets of brattice material lying along the southern rib. The team can take the brattice materials with them for future use. At the intersection, the captain will find to the north in Drift 1 another area of loose unscalable roof extending rib-to-rib and blocking access. Again, he must warn the other team members to avoid this hazard.

After the captain has assessed roof conditions in the intersection and the team has taken necessary gas tests, they will find light smoke, 16% O_2 and 900 ppm CO. To the south, the team will find the northern extent of the airtight cave. Before leaving the area, the captain must D&I the loose unscalable back and the air tight cave as their furthest point of advance in either direction.

Note: At this point in the problem, the team has not found any posts or crib blocks to support the areas of loose unscalable roof. If the team asks the mine manager for additional roof supports, the mine manager (No. 1 Judge) 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. 14

The team can now advance northward in Drift 2 toward CX3. The team can pass through the check curtain after the captain assesses roof conditions inby. At the intersection, the captain will check the back and the team will conduct necessary gas checks. They will find light smoke, 16% O_2 and 900 ppm CO. They will also find that the drift is open to the north and CX3 is open to the east and west.

Team Stop No. 15

The team can now advance westward in CX3 toward Drift 1. As they travel, they will find the gas testing box along the southern rib of CX3. **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).**

Afterward, 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. To the south, the team will find the northern extent of the area of loose unscalable roof extending rib-to-rib. Before leaving the area, the captain must D&I the area of loose unscalable roof as their furthest point of advance in this direction.

Note: Since CX3 was open to the east during their previous Team Stop No. 14, the team must continue systematic exploration and tie-in across the crosscut and behind before advancing northward toward any of the face areas.

Team Stop No. 16

The team will advance eastward in CX3 toward Drift 3. As they travel, they will find a load-haul-dump (LHD) with a loaded bucket parked along the northern rib. At the intersection, the captain will perform back checks and the team will conduct necessary gas checks. They will find heavy smoke with 14.0% O_2 and 3,000 ppm CO. They will also find that the drift is open to the north. To the east, they will find an area of water knee deep extending rib-to-rib. The team can stretch to the south in Drift 3 toward CX2 to tie-in. They will find the third missing miner (Miner #2, ID – 1492) who is unresponsive and lying along the eastern rib. 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. After checking the feeder breaker, the belt conveyor, and the passing through the check curtain to tie-in, they can retreat to CX3.

Team Stop No. 17

The team must now advance eastward in CX3 toward Drift 4. As they travel, they will be in water knee deep. They will find that the extent of the accumulated water ends at the intersection with Drift 4. Here, the captain will perform back checks and the team will conduct necessary gas checks. They will find light smoke with 16.0% O_2 and 900 ppm CO. The team can stretch southward to CX2 to tie-in. They will not encounter any hazards or find any machinery.

Team Stop No. 18

As the team advances northward in Drift 4 toward the face area, they will find a load-haul-dump (LHD) parked inby the intersection with CX3 and along the eastern rib. Closer toward the face, the team will find the fourth missing miner (Miner #3, ID – 1812) who is unresponsive. 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 is unconscious with no obvious injuries."** Since there are no injuries, the team must follow the prescribed treatment for prevention of shock (listed in Brady's 8th Edition on pages 325 – 330).

The miner must be prepared for transport and carried out to the fresh air base. Before leaving the area, the captain can traverse the muckpile and perform back checks and the team can conduct necessary gas tests. The captain must D&I the face as the team's furthest point of advance in this direction, as well as the location of the miner.

Note: The unconscious miner must wear an apparatus as the team carries him to the fresh air base due to the dangerous concentrations of CO along the route. At the appropriate time, the team will be told by the No. 2 Judge to simulate donning the face piece on the patient. If the team does not choose to place an apparatus on the patient, they will be docked 50 points by Judge #1 for "improperly protecting the survivor."

Note: Team Stop No. 19 - 22 (see Solution Map – 5)

Team Stop No. 19

To bring Miner #3 to the fresh air base, first the team will need to retreat from the face area of Drift 3 to the intersection of CX1 and Drift 2.

Team Stop No. 20
The team can now pass through the permanent stopping that they had breached between Drift 1 and Drift 2 and, afterward, rebuild it. Then, the team can open the temporary stopping that they had previously erected and pass through to Drift 1.

Team Stop No. 21

The team can travel southward in Drift 1 and pass through the open man door adjacent to the main fan. They can close the door behind them.

Team Stop No. 22

Now, the team can open the temporary stopping / regulator that they had previously built and exit the Intake Portal. Once at the fresh air base on the surface, the team can arrange for any follow-up medical treatment.

At this point, the team has explored all accessible areas and located the four missing miners. In order to complete the problem, they must make a ventilation change to clear the concentrations of high CO and low O_2 from in front of the barricade in CX4. This will allow them to safely breach the barricade and bring Miner #4 to the surface.

Note: Team Stop No. 23 - 26 (see Solution Map – 6)

Team Stop No. 23

To continue systematic exploration, the can now re-enter the mine at the Return Portal and advance to the intersection of CX3 and Drift 2.

Team Stop No. 24

The team will advance northward in Drift 3 to the face area. At the face, the captain will perform back checks and the team will conduct necessary gas checks. They will find light smoke with 16.0% O_2 and 900 ppm CO. The captain must D&I the face as their furthest point of advance in this direction.

Team Stop No. 25

The team can now retreat to CX3 and advance westward in the crosscut toward Drift 2. At the intersection, they can proceed northward to the face area. As the team advances northward, they will find that Drift 2 has reached CX4. As they turn toward the east and approach the face area, they will find the auxiliary fan located along the northern rib. About 10 feet inby Drift 2, they will find a brattice cloth barricade (8-feet by 10-feet). Here, they will find a placard indicating that the gas concentrations have not changed from their previous location. At that time, Judge #2 will hand the captain a placard indicating the following:

> The team can converse with the second missing miner (Miner #4, ID – 1863). He is an LHD operator, he is alone and feeling a bit light headed. The air inside the barricade is O.K., ground conditions are good, and there is a muckpile behind him and a solid face. He states that he had misplaced his self-rescuer. When the mine filled up with smoke, he retreated to the face area and built the barricade. He doesn't know what happened to the rest of his crew. 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 #4 to stay inside the barricade and wait. They will return and get him out as soon as possible. The team can now retreat to CX3 and continue systematic exploration.

Team Stop No. 26

The team can now retreat to CX3 and advance westward in the crosscut toward Drift 1. At the intersection, they can proceed northward to the face area. Here they will find a roof bolting machine parked in the middle of the drift. At the face, the captain will check the roof and the team will conduct necessary gas tests. Before leaving the area, the captain must D&I the face as their furthest point of advance in this direction. Then, they can retreat to the intersection of Drift 2 and CX3.

Note: Team Stop No. 27 (see Solution Map – 7 (Ventilation Change – Step 1))

Team Stop No. 27

To rescue Miner #4 from the face area of CX4, a ventilation change is necessary to clear the area in front of the barricade. 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) Rebuild the temporary stopping / regulator at the mouth of the Intake Portal;
2) Open man door adjacent to the main fan;
3) Open the permanent stopping in CX 1 between Drift 1 and Drift 2;
4) Close the regulator in the fire seal in CX1 between Drift 2 and Drift 3; and
5) Open the check curtain in Drift 2 between CX2 and CX3.

Note: Team Stop No. 28 (see Solution Map – 8 (Ventilation Change – Step 2))

Team Stop No. 28

Now that the preparatory changes have been made inby the Intake Portal, the team can return to the Intake Portal and complete the following remaining tasks or the fresh air base attendant can be utilized to complete them:

1) Open the temporary stopping / regulator at the mouth of the Intake Portal;
2) Close the open man door adjacent to the main fan; and
3) Turn on the main fan.

Once these are completed, fresh air will travel northward in Drift 1; eastward in CX 1; northward in Drift 2; eastward in CX3; 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 double-sided gas placards will revert to “clear air.”

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

The team can return to the barricade. At this point, the placard near the barricade will not change and the barricade cannot be opened. In order to flush the smoke and toxic gas concentrations from this area, the team must confer with the fresh air base and the official in charge for permission to restart the diesel-powered auxiliary fan to pull air toward the barricade. After the fan is started, the placard will revert to “clear air.”

Note: Team Stop Nos. 29 - 30 (see Solution Map – 9)

Team Stop No. 29

Now, the team can open the barricade. Inside they will find Miner #4. Team members can assess his condition and find that he is not injured and able to walk out with the team. Before leaving the area, the captain can traverse the muckpile and perform back checks and the team can conduct necessary gas tests. The captain must D&I the face as the team's furthest point of advance in this direction, as well as the location of the miner.

Team Stop No. 30

The team will escort Miner #4 to the outside. As they travel southward in Drift 1, the team will need to open the man door adjacent to the main fan in order to exit the Intake Portal. Afterward, they can close the door behind them. Once at the fresh air base, the team can arrange for any follow-up medical treatment.

Afterward, the captain can state that the team has completed their mission. That is, they have explored all accessible areas of the mine, sealed the fire, re-ventilated, located the four missing miners, and brought two of them out alive.

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

***** THE END *****

PLACARD KEY:

1. Fresh Air Base
2. Brattice Material (5 sets)
3. Intake Portal
4. Clear Air (Placard A)
5. Main Fan (off)
6. Man Door (closed)
7. Clear Air (Placard A)
8. Caved Airtight (rib-to-rib)
9. Permanent Stopping
10. Permanent Stopping
11. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
12. Mechanic's Truck
13. Miner #1 (ID – 1776)
14. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
15. Caved Impassable
16. Visible Flames (fire out of control)
17. Caved Impassable
18. Conveyor on Fire (out of control)
19. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
20. Man Door (closed)
21. Conveyor Belt
22. Man Door (open)
23. Belt Drive
24. Return Portal
25. 16 % O_2
    900 ppm CO
    Light Smoke (Placard B)
26. 16 % O_2
    900 ppm CO
    Light Smoke (Placard B)
27. Caved Impassable
28. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
29. Conveyor on Fire (out of control)
30. Caved Impassable
31. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
32. 16 % O_2
    900 ppm CO
    Light Smoke (Placard B)
33. 14 % O_2
    3,000 ppm CO
    Heavy Smoke (Placard C)
34. Conveyor Crossover
35. Conveyor Belt

PLACARD KEY (continued):

36. Check Curtain

37. Check Curtain

38. Feeder Breaker

39. Permanent Stopping

40. Permanent Stopping

41. 14 % O_2
3,000 ppm CO
Heavy Smoke (Placard C)

42. Check Curtain

43. Check Curtain

44. Loose Roof (unscalable)

45. Brattice Material (2 sets)

46. Loose Roof (unscalable)

47. Caved Airtight (rib-to-rib)

48. Loose Roof (unscalable)

49. Auxiliary Fan (off)

50. Loose Roof (unscalable)

51. 16 % O_2
900 ppm CO
Light Smoke (Placard B)

52. Roof Bolter

53. Face

54. Gas Box

55. 16 % O_2
900 ppm CO
Light Smoke (Placard B)

56. Auxiliary Fan (off)

57. Brattice Cloth Barricade
(8' by 10')

58. 16 % O_2
900 ppm CO
Light Smoke (Placard B)

59. Miner #4 (ID – 1863)

60. Muckpile

61. Face

62. Load-Haul-Dump (loaded bucket)

63. 14 % O_2
3,000 ppm CO
Heavy Smoke (Placard C)

64. Miner #2 (ID – 1492)

65. 16 % O_2
900 ppm CO
Light Smoke (Placard B)

66. Face Drill

67. Face

68. Water Knee Deep

69. 16 % O_2
900 ppm CO
Light Smoke (Placard B)

70. Water Knee Deep

71. Water Knee Deep

72. Load-Haul-Dump

PLACARD KEY (continued):

73. 16 % O_2
    900 ppm CO
    Light Smoke (Placard B)

74. Muckpile

75. Face

76. Miner #3 (ID – 1812)

Note:
Six smoke placards are double-sided (Nos. 11, 32, 41, 55, 63, and 69). The backside will indicate "Clear Air" when the mine areas have been successfully re-ventilated! A seventh placard is also double-sided (No. 58). The backside will indicate "Clear Air" when the team uses the auxiliary fan in CX4 to sweep gases away from the barricade.