2014 National Metal and Nonmetal Mine Rescue Contest

JUDGES' PACKET
Day #2

August 6, 2014
Lexington, Kentucky

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Introduction

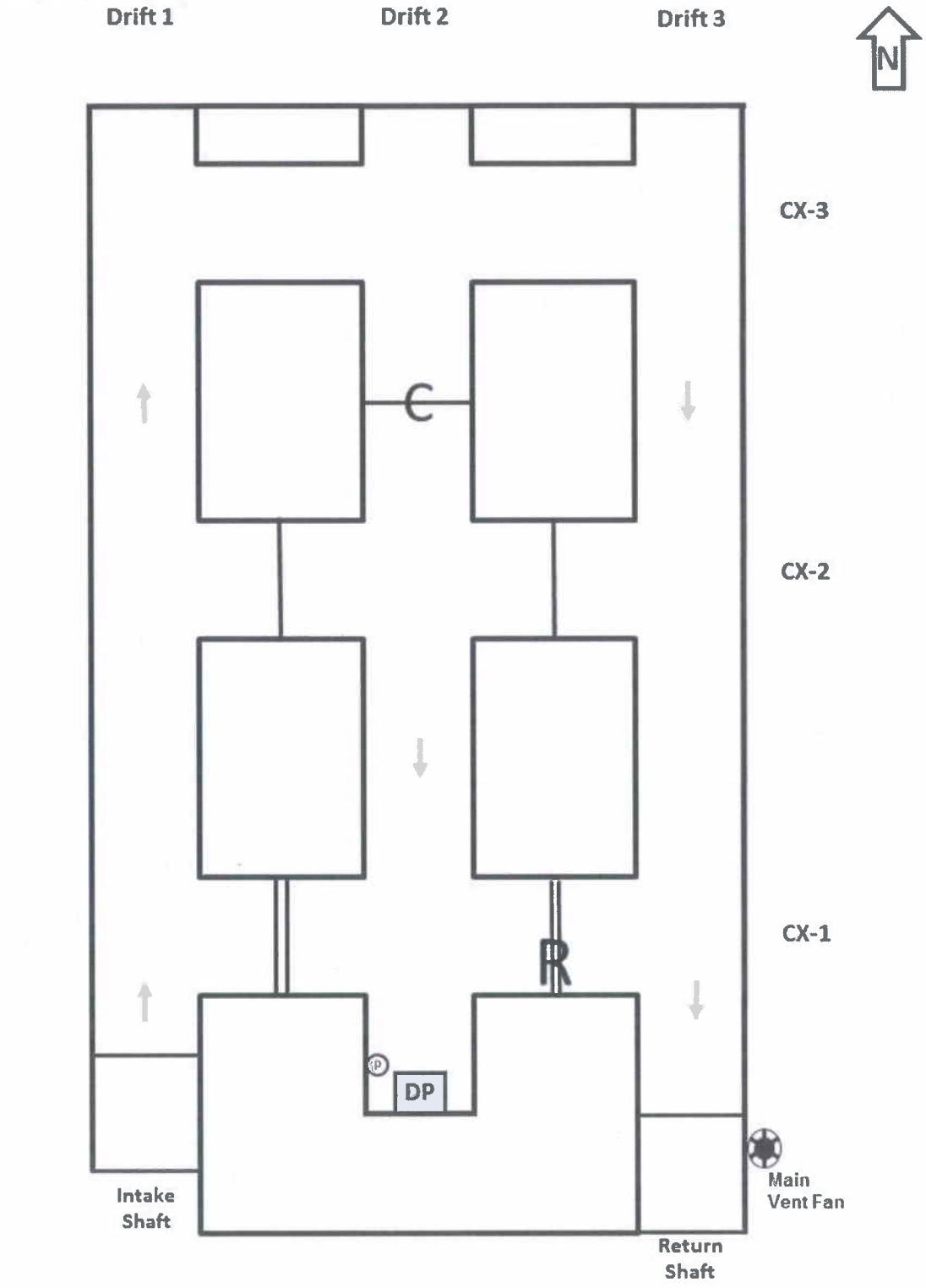
Congratulations! Each team has survived the Day 1 field problem and has returned today for more. Whether it is an opportunity to improve over yesterday's totals or to put your team further ahead of the others, we want to again commend each of you for your dedication to mine rescue and your willingness to participate in this important training function.

Remember, your team's final placement will be based on your combined cumulative discounts for both day's field problems plus your written test discounts. Those teams with the least amount of total discounts will vie for the trophies. No matter what the outcome, we think that today's problem will test your mine rescue skills and serve to reinforce your preparedness for an actual emergency.

Based on what we have seen so far, the miners and their families, the communities, and the companies you represent can rest assured that you will continue to serve them well. Even though there can only be a handful of contest winners, each team has earned the respect and heartfelt thanks for a job well done!

Now, let us continue with the briefing for this year's Day 2 mine rescue problem.

Day 2 - Team Map



Mine Information Sheet
Bluegrass Mining, Inc. – Blue Mare Mine

Mining & Equipment:
The single-level mine uses a conventional room and pillar method to extract ore. The broken ore is loaded using load-haul-dumps (LHDs) and then transported to the shaft dump pocket. The ore is hoisted to the surface via production skips in the Return Shaft. The entries are initially driven 8 feet high and 10 feet wide. Typical pillar dimensions are 15 feet by 20 feet (W x L). All underground mobile equipment (including the LHDs, face drills, roof bolting machines, and transport jeeps) is diesel-powered.

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

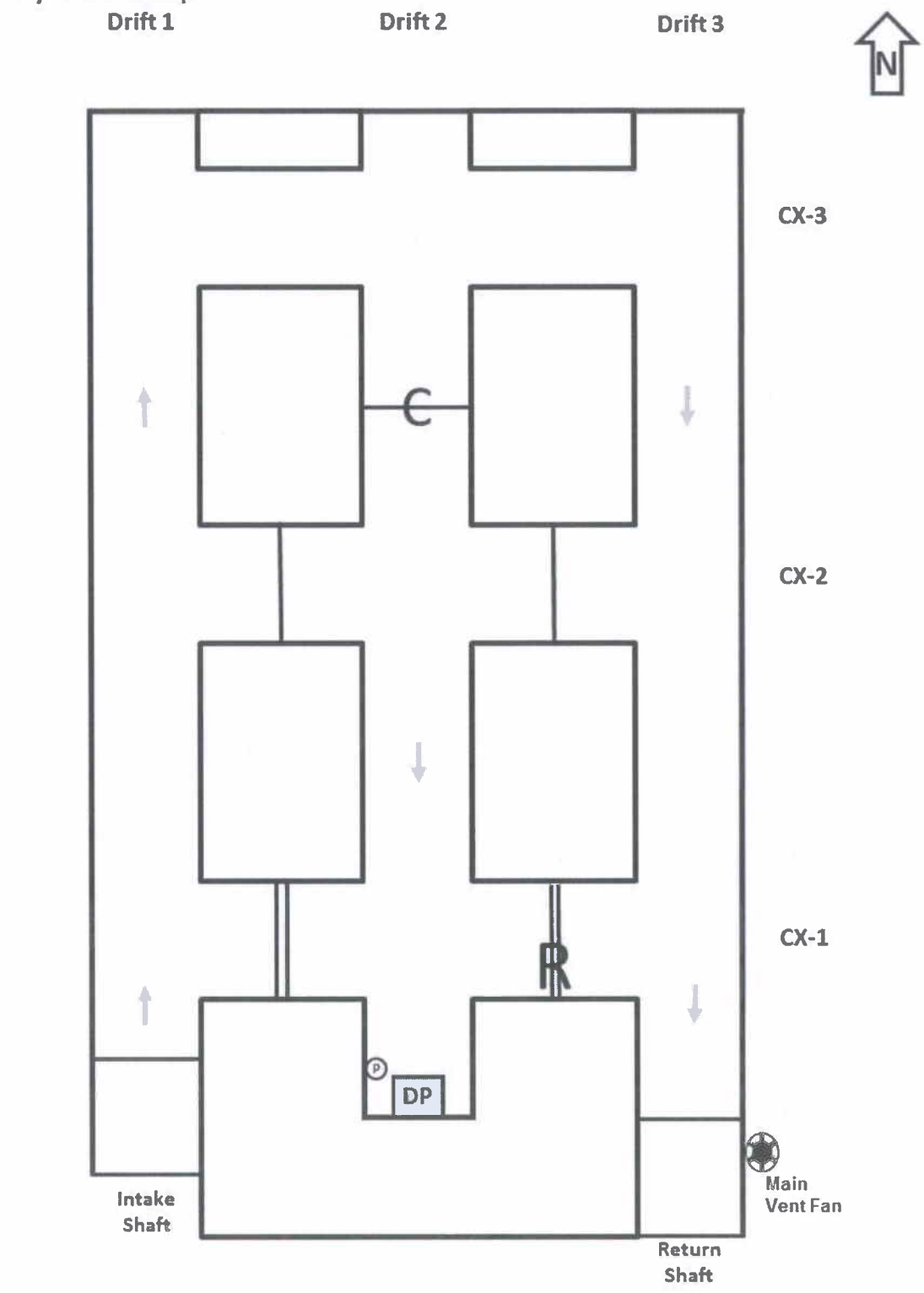
Gas and Oil:
In accordance with Title 30 CFR 57.22003, the mine is classified as Category VI. That is, the presence of methane has not been established in this mine, and there is no history of methane gas in any other mine in the area. Historical hygiene data from the mine, both MSHA and Company's samples,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

Water, Pumps & Sumps:
The ore body dips toward the South; therefore, standing water is typical in the drifts near CX-1. Diversion ditches have been installed in Drift 1 and Drift 3 to direct water into the shaft sumps. Although a nuisance, the water has never caused any significant production problems. Each shaft is equipped with a 10-foot deep sump. A large pumping station has been installed on the surface to keep the water levels to a minimum.

Mine Openings:
The mine is opened by two 16-foot diameter shafts approximately 1,100 feet deep. The Intake Shaft is equipped with a hoist used to transport people and to convey supplies. The shaft also serves as the primary escapeway from the mine. The Return Shaft which is equipped with production skips, as well as an escape compartment which can be used to hoist six persons to the surface.

Ventilation:
The 6-foot diameter Main Vent Fan is located on the surface near the Return Shaft and is <u>not</u> reversible. The fan exhausts approximately 100,000 cfm and operates in the stable portion of its performance curve. The electrical power to the fan is on, and the fan is operating. The air enters the mine through the Intake Shaft and exhausts from of the Return Shaft. Air is directed to the faces using permanent (concrete block) and temporary (brattice cloth) ventilation controls. The normal airflow direction is shown on the mine maps.

Day 2 - Team Map



Mine Information Sheet (continued)
Bluegrass Mining, Inc. – Blue Mare Mine

Ground/Rib and Roof Control:
The immediate roof, or back, is supported by eight-foot rock bolts. The back is fairly competent, but problem areas are supported by wooden posts or stacked crib blocks.

Explosives:
Explosives are available and stored on the surface. They are used during the mining cycle, and blasting is conducted at the end of each shift while all persons are out of the mine. Only enough explosives for a day's use are stored in day boxes on the blaster's jeep.

Electric Power:
The electrical power to the shafts and the surface pumping station has been restored; however, all power to the underground has been de-energized, locked out, and guarded.

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.

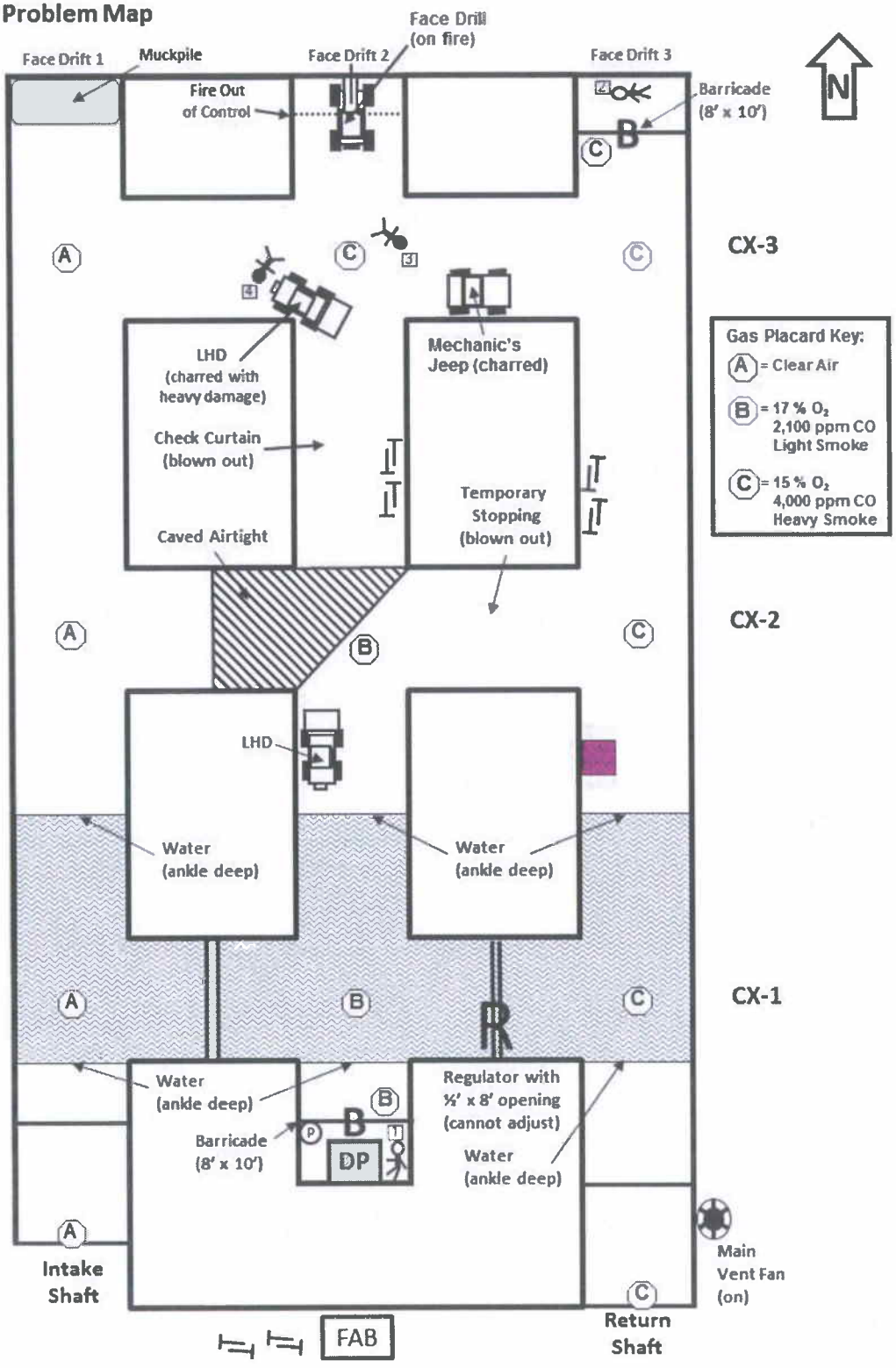
> **Note: The new brattice material available for use by the team is relatively lightweight and compact (10-foot strips of brattice cloth with a clip on each end). For the sake of realism, the team will only be allowed to carry two sets of material at any one given time.**

Communications:
A pager phone is available in the mine for contact with the surface. The current phone location is marked on the mine map. At this time, we do not know the status of the communication system, because there has been no contact with the missing miners.

Mine Map:
The mine map was updated on July 28, 2014, by the onsite Engineering Department.

Other Mines:
There are several known mines, active and abandoned, in Lexington, Kentucky. At this time, the Blue Mare Mine is not connected to any of these mines.

Day 2 - Problem Map



Team Briefing Statement

You are located at the surface of the Bluegrass Mining, Inc.'s Blue Mare Mine. The mine started production on June 7, 2013. It is a single-level underground mine opened by two shafts approximately 1,100 feet deep. Air enters the mine through the Intake Shaft which is equipped with a hoist used to transport people and to convey supplies. This shaft serves as the primary escapeway from the mine. Air exhausts from the Return Shaft which is equipped with production skips, as well as an escape compartment which can be used to hoist six persons to the surface. The mine is ventilated by the surface-mounted exhausting Main Vent Fan operating at the Return Shaft. The fan draws 100,000 cfm from the mine and cannot be reversed.

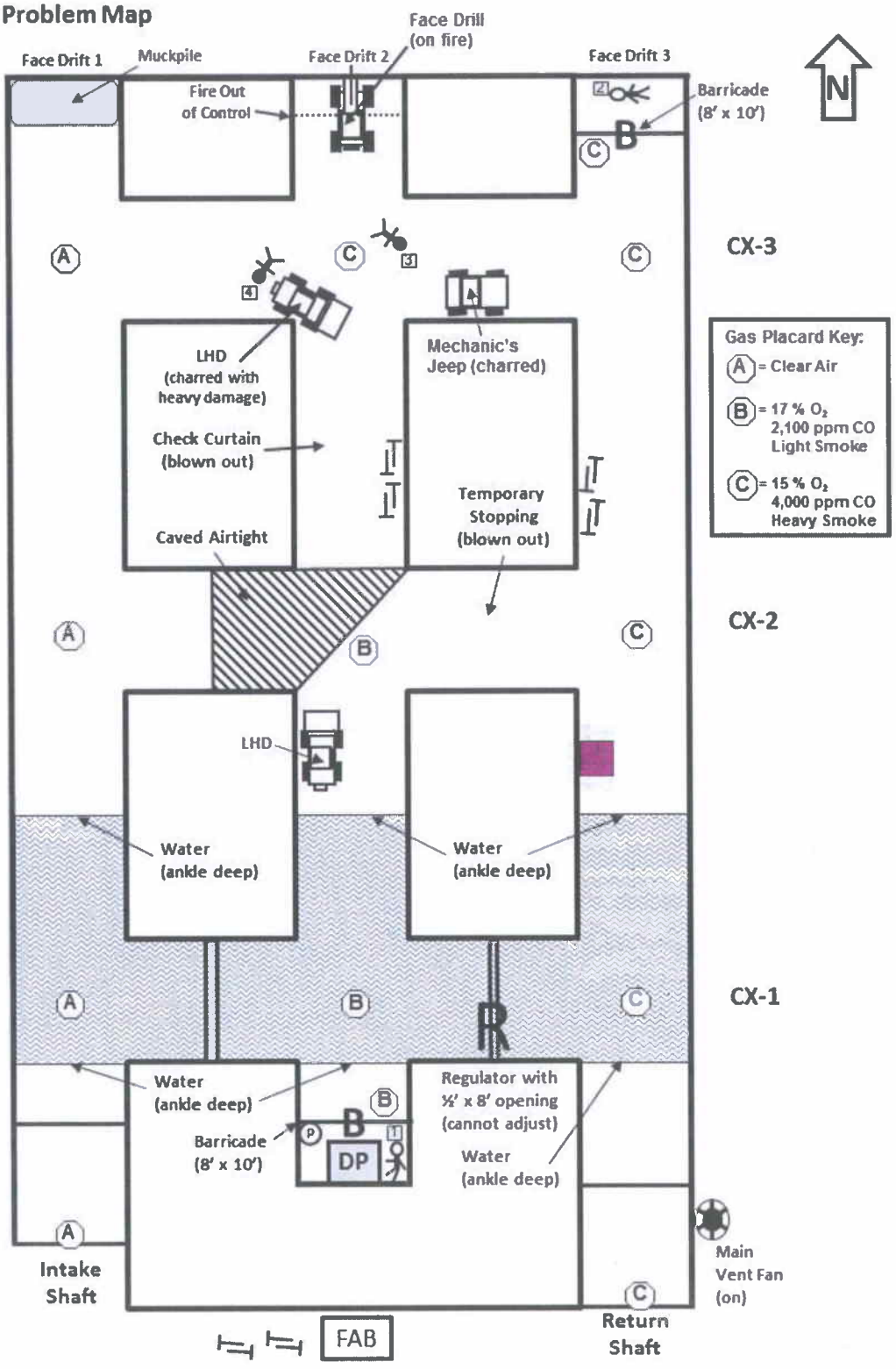
Ore is mined by the traditional room and pillar method. The entries are initially driven 8 feet high and 10 feet wide. Pillars dimensions are typically 15 feet by 20 feet (W x L). The immediate roof, or back, is supported by eight-foot rock bolts. The back is fairly competent, but problem areas are supported by wooden posts or stacked crib blocks. The ore body dips toward the South, and standing water is typical in the drifts near CX-1. Although a nuisance, the water has never caused any significant production problems.

This morning at 5:30 a.m., the shift foreman and a five-person crew went underground to start their shift. At about 6:15 a.m., one crew member called out from the shaft dump pocket and informed the hoist engineer that there was a piece of equipment burning in the face areas, and dark black smoke was filling the mine. He was unsure of the locations of the shift foreman and the rest of his crew. The engineer called the superintendent who immediately gave the order to activate the stench warning system to evacuate the mine. Five minutes later, the same crew member called out again and said that an explosion had rocked the mine, and he thought that the intersection behind him had collapsed. At that time, communication with the underground was lost.

Approximately 10 minutes ago, two crew members signaled the hoist engineer and exited the mine via the escape hoist in the Return Shaft. The miners stated that the crew had donned their W-65 filter self-rescuers because the face drill was on fire in one of the drifts. When they smelled the stench warning, the two miners decided to leave and head out. But, the others remained behind to fight the fire. As they approached the shaft station, an apparent air blast knocked them to the ground. One miner received a deep laceration on his forehead, and the other miner dislocated his left shoulder. Both were sent by ambulance to the local hospital for medical treatment.

All power to the underground has been de-energized, locked out, and guarded. Both hoists are operational, and the Main Vent Fan is operating. Continuous gas monitoring has been established at both shafts. The latest readings show "clear air" at the Intake Shaft and 15 % oxygen (O_2) and 4,000 ppm carbon monoxide (CO) with heavy smoke at the Return Shaft.

Day 2 - Problem Map



We are still not able to establish contact with anyone underground. We have called all of the government agencies for help. Guards have been posted at the shafts and at the main fan. There is a fully equipped mine rescue team located on the surface, and they are ready to serve as your team's backup.

If your team is willing to help, we would like you to account for all missing miners; bring any live miners to the surface; extinguish or seal any fires; and explore and map all accessible areas of the mine. **Another team will be sent into the mine to replace you after 75 minutes.**

All 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.

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 provide you with any changes to the briefing information that you have received. The Mine Manager will not answer any additional questions concerning the team briefing statement. However, if you do not understand a term, it will be defined. The Manager will only respond to questions allowed by the rules while you are working the problem.

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 fresh air base attendant can assist the team and communicate with them while they advance past the fresh air base using the wire communication system. He must maintain an accurate map indicating all initial information that the team relays to him. He may also assist the team by relaying information to the mine manager when required by the problem. He may also assist the team when they retreat to the fresh air base.

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, the mine manager, and the judging officials.

GOOD LUCK!

Team Instructions

- Explore and map all accessible areas of the mine;
- Extinguish or seal any fires;
- Account for the four missing miners;
- If necessary, re-ventilate the mine; and
- Bring any live miners to the surface.

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.
- 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, mine manager, and the judging officials.

Problem Orientation

Introduce yourself to the team as the "Mine Manager." Then, introduce Judges #1 and #2. The team has been briefed on the problem and the mine information, and been provided with the mine maps in isolation. Read the following instructions to the team:

At this time, I have <u>new</u> information for your team. The surface pumping station is down. We have no idea as to why this happened or how long it will take to restore pumping water from the shaft sumps. All available maintenance staff members are troubleshooting the problem, and we will keep you posted on their progress and the status of the pumping operation.

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 and mine rescue team alternate must remain at the surface fresh air base. Only the attendant can speak with the team via the communication system to discuss the rescue activities performed or proposed. If the team returns to the fresh air base, only the attendant or alternate will be allowed to assist them. However, neither the attendant nor the alternate can physically go beyond the fresh air base to assist the team unless he/she becomes a team member when someone drops out.

After the team has completed its 50 foot check, they will not be allowed to physically compare the team map with the fresh air base attendant's map or the team alternate's map. No side by side comparison will be allowed, and no changes (edits) can be made to any map while the team is at the surface fresh air base.

The fresh air base attendant or team alternate is not allowed to speak with anyone <u>except</u> the team members, the mine manager, or the judges.

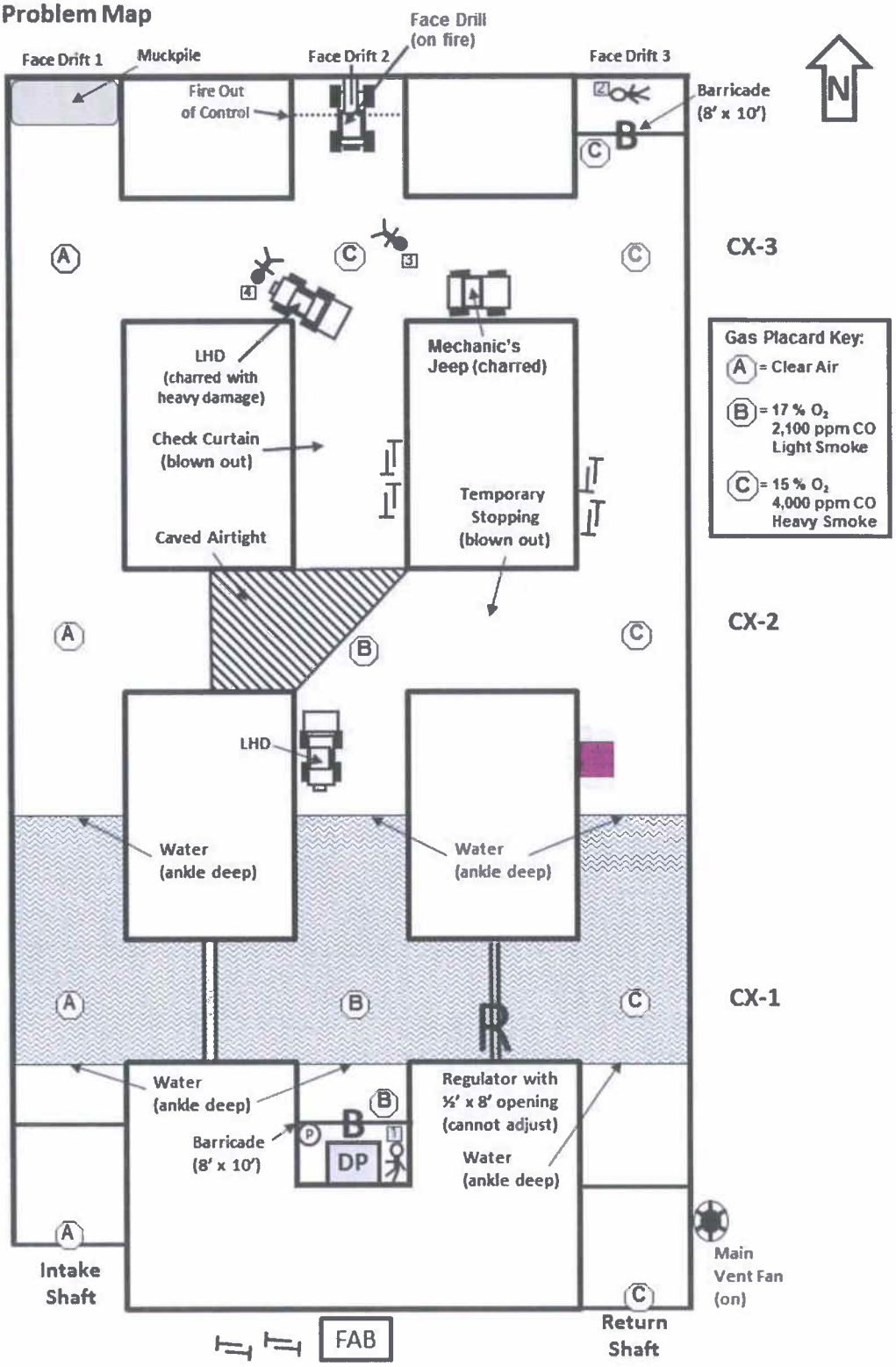
At the end of the problem, both the team map and the fresh air base attendant's map will be collected and scored. All map editing must take place prior to stopping the clock. The alternate's map will also be collected at this time, but it will not be scored.

Do you understand these instructions?

When they verify understanding the instructions, have the Team Captain start the clock and hand the team their copies of the Team Briefing Information, the Mine Information Sheets, and the <u>three</u> mine maps.

Remember to add: **"Good Luck!"**

Day 2 - Problem Map



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. This includes an identical videotaped version for all teams. At this time, each team will be allowed to review the team briefing statement, mine information sheet, mine maps, and instructions for rescue teams and fresh air base attendants. However, copies of these documents and maps will be collected at the end of the briefing session.

Upon arrival at 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 (or sheet).

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.

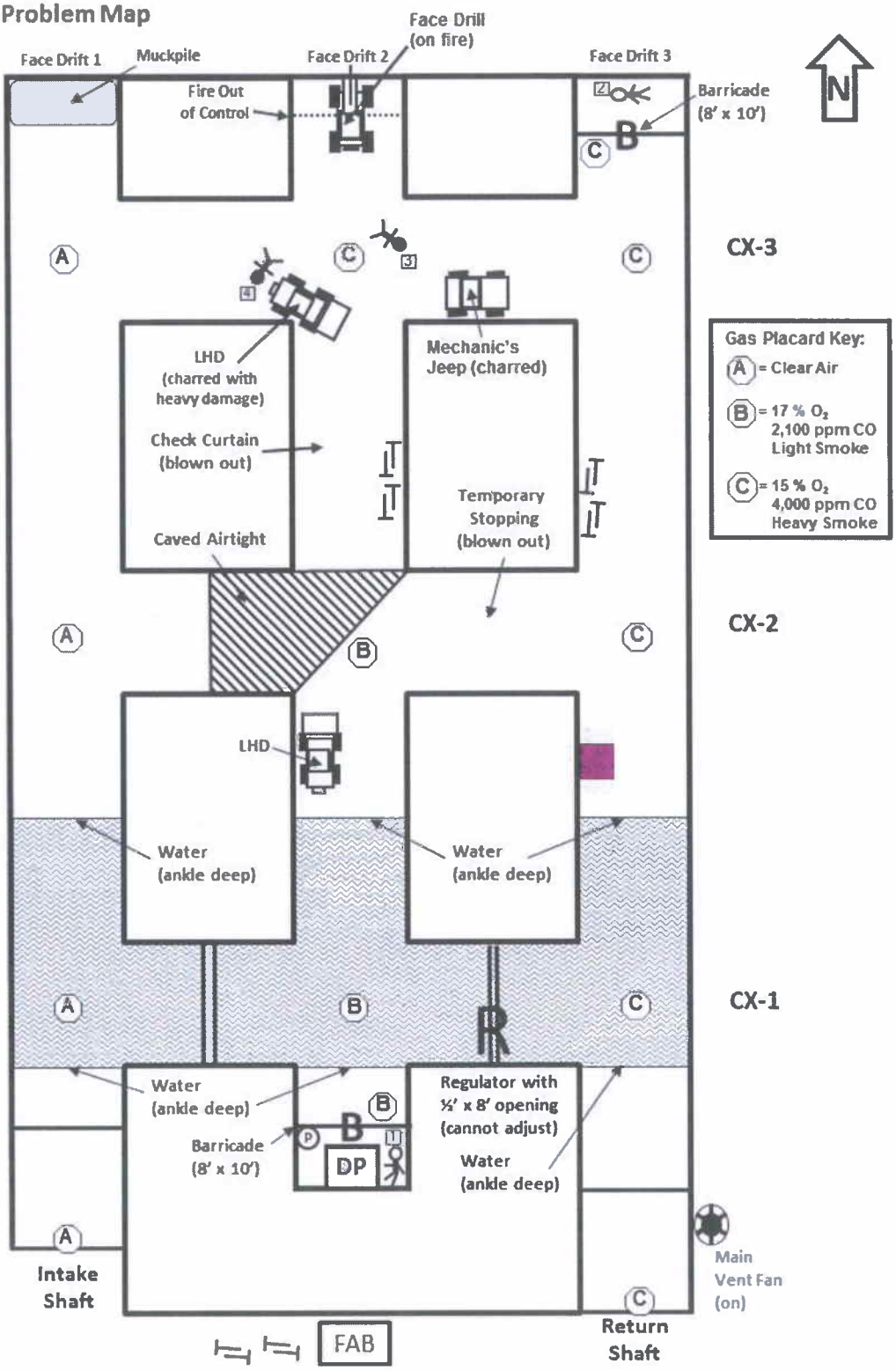
Since the mine is a Category VI, the team does not need to use non-sparking tools to work the problem. However, if the team does not have non-sparking tools and requests them from the official in charge, the tools that they brought with them will be deemed non-sparking.

The team will find that there are two sets of brattice material at the fresh air base to be used as needed during the working of the problem. The team may elect to take these along with them during exploration of the mine.

Note: The new brattice material available for use by the team is relatively lightweight and compact (10-foot strips of brattice cloth with clips on each end). Therefore, for the sake of realism, the team will only be allowed to carry two sets of material at any one given time. This information was provided to the team on the Mine Information Sheet.

When ready, the team must examine the mine openings. Both shafts must 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.

Day 2 - Problem Map



Intake Shaft checks reveal:

A placard at the shaft shows "Clear Air." The conveyance will be at the top of the shaft, and the team will place combustible material on the cage and send it down, using the posted Nevada hoisting signal codes. The team must then signal the cage to return to the surface. When the material is checked, it will be intact and dry.

Note: Judge #1 will allow 10 seconds for the conveyance to travel in each direction.

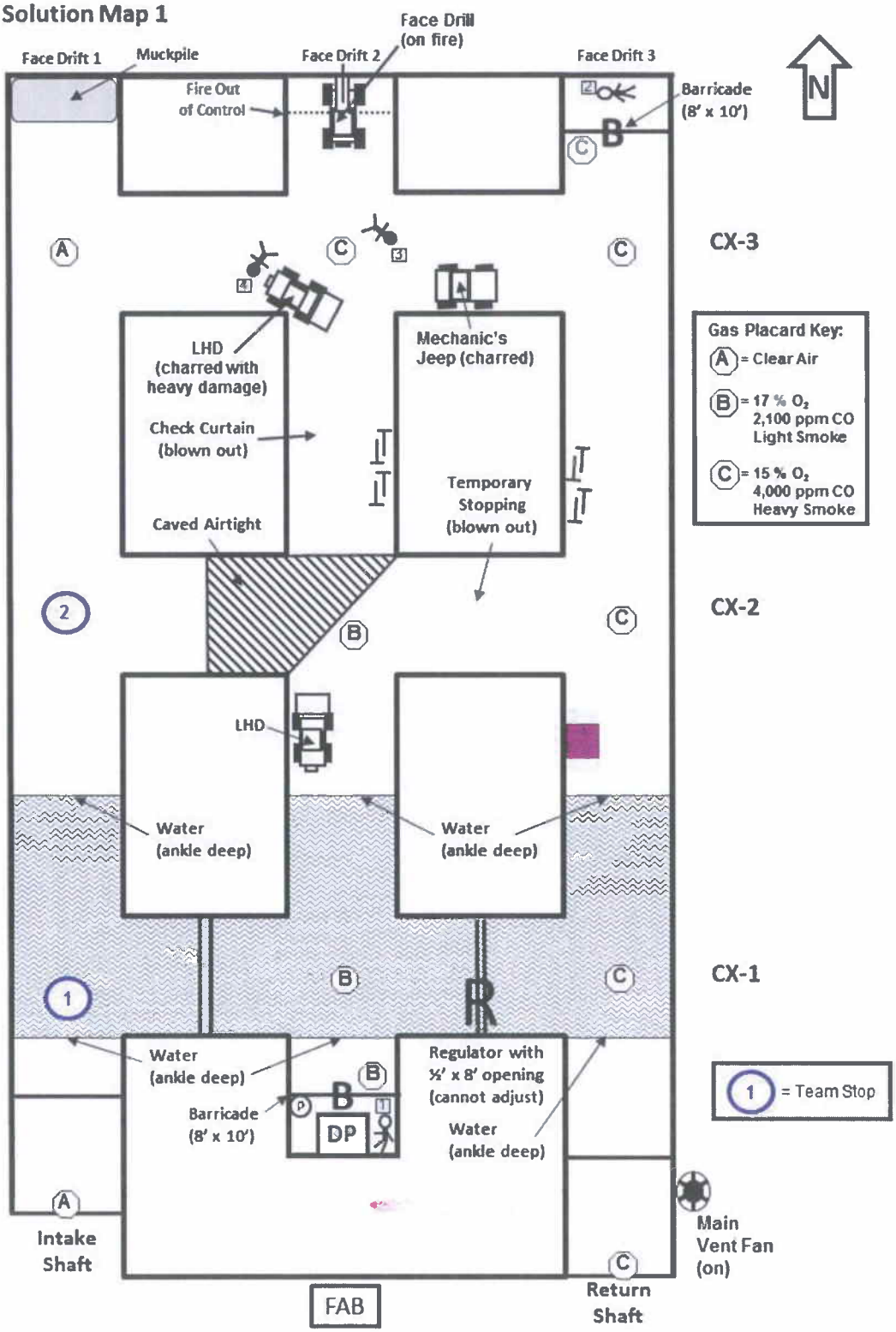
Return Shaft checks reveal:

A placard at the shaft shows 15 % oxygen (O_2) and 4,000 ppm carbon monoxide (CO) with heavy smoke. The conveyance will be at the top of the shaft, and the team will place combustible material on the cage and send it down, using the posted Nevada hoisting signal codes. The team must then signal the cage to return to the surface. When the material is checked, it will be intact and dry.

Note: Judge #1 will allow 10 seconds for the conveyance to travel in each direction.

Note: The same concentrations found on the placard at this shaft had been reported to the team during their briefing. Therefore, the team must perform an apparatus and personnel check before entering smoke at this location. They must also be attached to their lifeline.

Day 2 - Solution Map 1



Note: Team Stop Nos. 1 - 2 (see Solution Map 1)

Team Stop No. 1

The team must count off before entering the cage (first time they go underground). Team will descend to the Intake Shaft station. Before exiting the cage, the captain must check for loose roof in front of the cage. A gas check will show "clear air." The team can advance to the intersection with Crosscut 1 (designated as CX-1 on the team and fresh air base maps) and enter an area of ankle deep water. At the intersection, the captain performs roof or back checks, and the team will conduct necessary gas checks. The drift is open to the north. The team can stretch eastward to the permanent stopping. After again checking the roof or back and taking necessary gas tests, the captain must D&I the stopping as their furthest point of advance in this direction.

Note: After advancing into the mine, not more than fifty (50) feet from the shaft, 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.

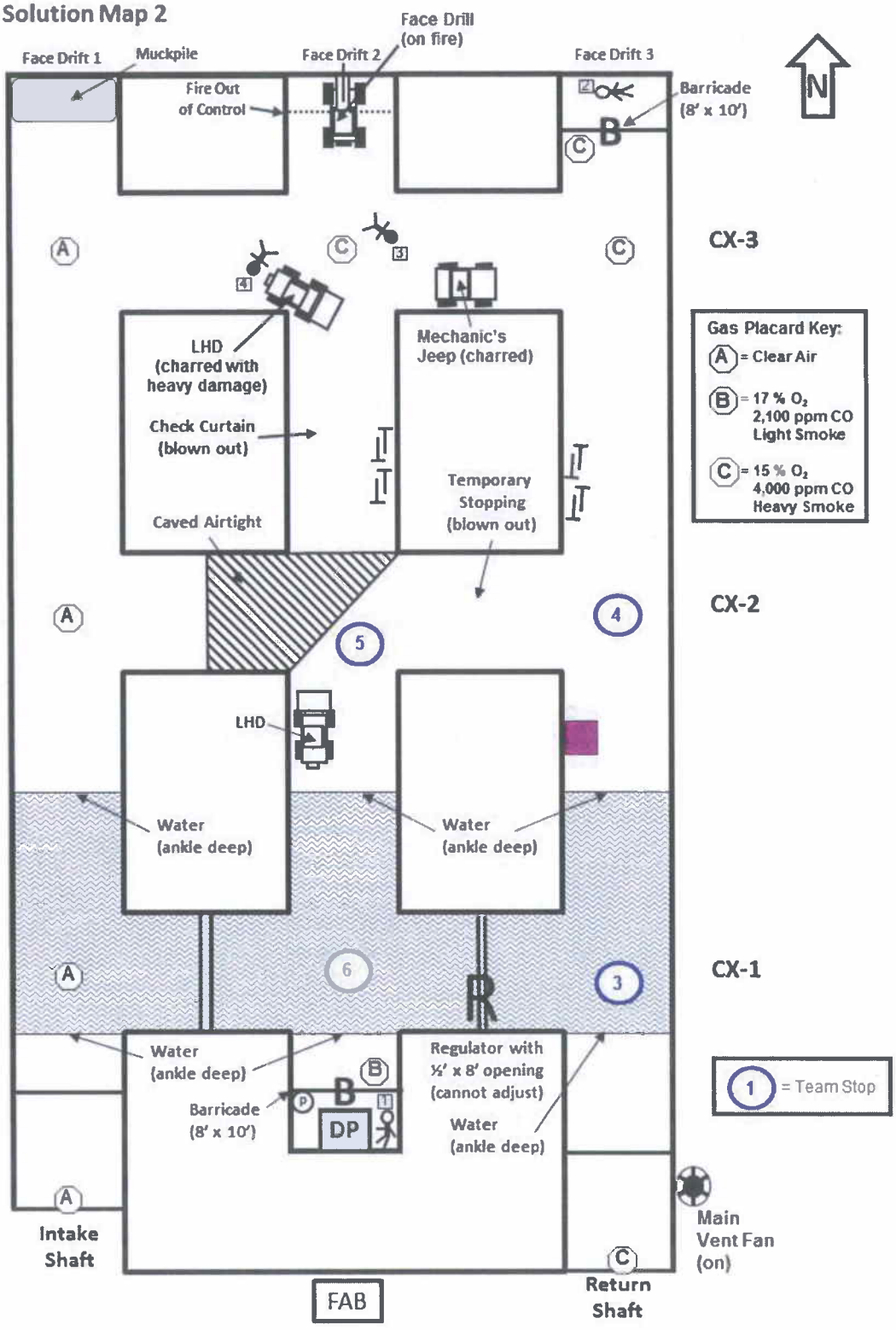
Note: No physical comparison of the fresh air base map and team map will be allowed after the initial entry into the mine. No changes can be made to either map while the team is at the surface fresh air base.

Team Stop No. 2

Now, the team can advance northward in the drift toward CX-2. As they travel about ten feet north of CX-1, they will exit the area of ankle deep water. At the intersection with CX-2, the captain performs roof or back checks, and the team will conduct necessary gas checks. The team will find that they are still in clear air, and the drift is open to the north. They can stretch to the east to find that the crosscut is blocked by an airtight cave extending rib-to-rib. After again checking the roof or back and taking necessary gas tests, the captain must D&I the cave as their furthest point of advance in this direction. The team can go no further in Drift 1, so they must exit the mine and re-enter at the Return Shaft.

Note: The team cannot advance beyond 3 feet past crosscut B-6 because they have not tied-in the entries behind them.

Day 2 - Solution Map 2



Note: Team Stop Nos. 3 - 6 (see Solution Map 2)

Team Stop No. 3
The team will descend to the Return Shaft station. Before exiting the cage, the captain must check for loose roof in front of the cage. A gas check will show 15 % O_2 and 4,000 ppm CO with heavy smoke. The team can advance to the intersection with CX-1 and enter an area of ankle deep water extending northward in Drift 3. At the intersection, the captain performs roof or back checks, and the team will conduct necessary gas checks. The drift is open to the north. The team can stretch westward to the permanent stopping. After again checking the roof or back and taking necessary gas tests, the captain must D&I the stopping as their furthest point of advance in this direction. They will also find that the regulator has a ½-foot by 8-foot opening which cannot be adjusted.

Note: The team must perform an apparatus and personnel check before entering smoke at the shaft. They must also be attached to their lifeline.

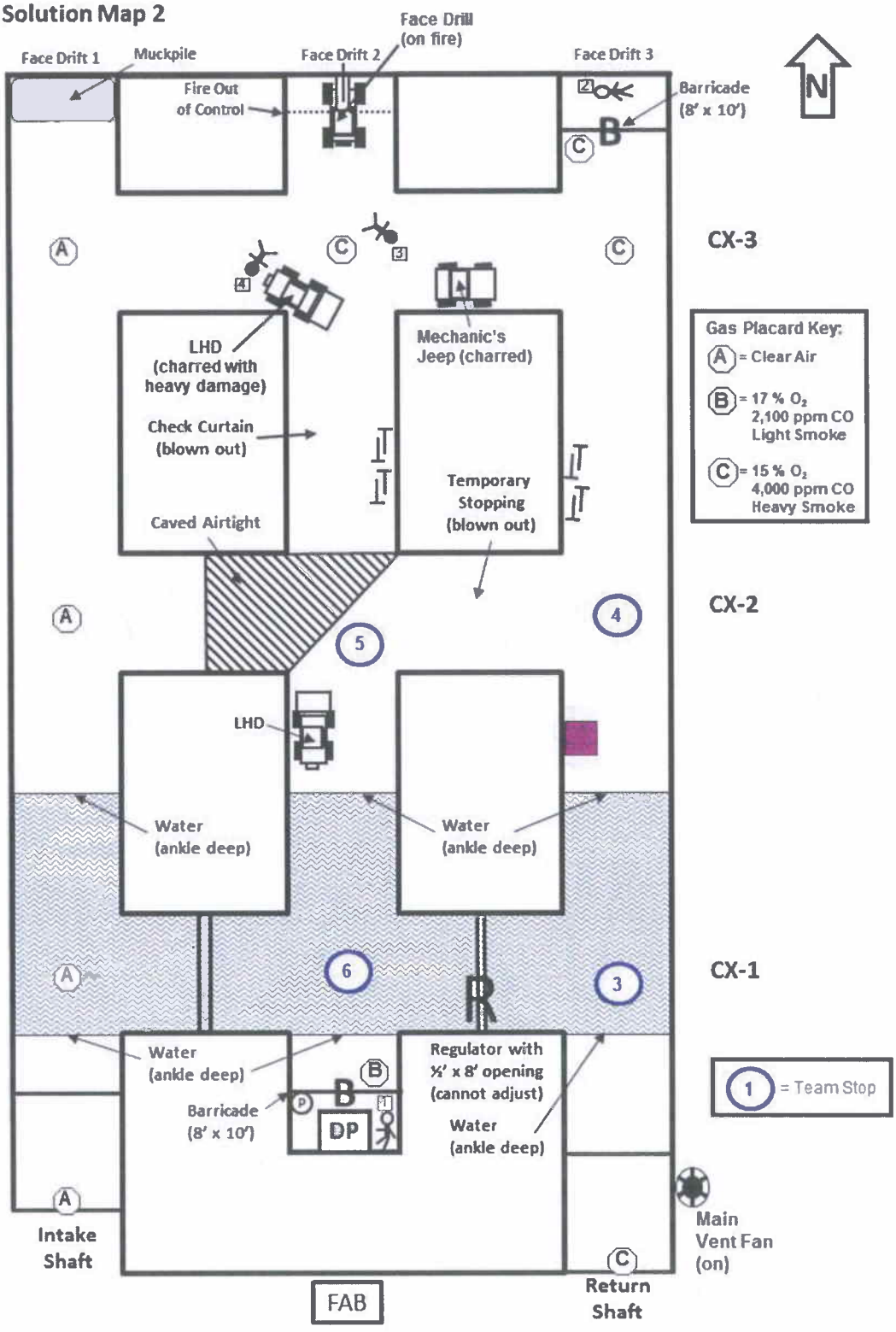
Team Stop No. 4
Now, the team can advance northward in the drift toward CX-2. As they travel about ten feet north of CX-1, they will exit the area of ankle deep water. The team will also find the gas testing box located along the western rib about 5 feet south of CX-2. **A team member must use the team's multi-gas instrument to determine the gas concentrations in the unknown mixture. Judge #2 will assess the team's measurements and, if warranted, apply appropriate discounts (Judge #2 – UG Rule #4).**

Now, the team can continue to advance. At the intersection with CX-2, the captain performs roof or back checks, and the team will conduct necessary gas checks. The team will find that the concentrations of gases have not changed from their previous location. The drift is open to the north, and the crosscut is open to the west.

Note: The team cannot advance beyond 3 feet past crosscut CX-2 because they have not tied-in the entries behind them.

Team Stop No. 5
The team will advance westward in CX-2 toward Drift 2. As they travel, they will find that the temporary stopping has been "blown out." At the intersection, the captain performs roof or back checks, and the team will conduct necessary gas checks. The team will find 17 % O_2 and 2,100 ppm CO with light smoke. The team will also find that the drift to the north and the crosscut to the west are blocked by an airtight cave stretching diagonally across the intersection. The captain must remember to D&I the cave as their furthest point of advance in these two directions.

Day 2 - Solution Map 2



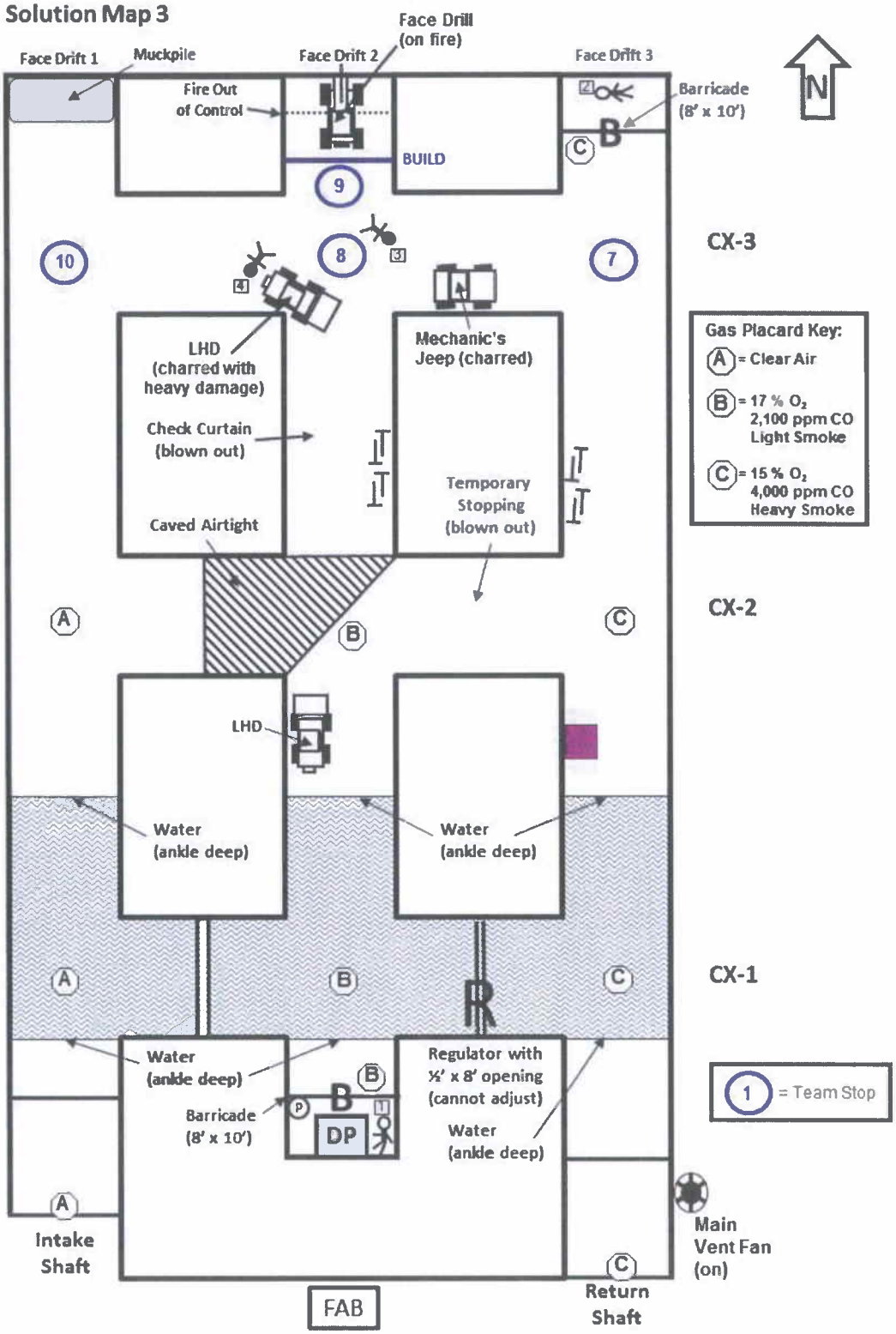
Team Stop No. 6

The team will advance southward in the drift toward CX-1. As they travel, they will locate a load-haul-dump (LHD) parked along the western rib, just south of CX-2. As they travel about 10 feet south of CX-2, they will enter an area of ankle deep water. At the intersection, the captain performs roof or back checks, and the team will conduct necessary gas checks. The team will find that the concentrations have not changed from their previous location. The team can stretch westward and find the backside of the permanent stopping between Drift 1 and Drift 2. The captain will check the roof or back and necessary gas tests will be taken. The captain must D&I the stopping as their furthest point of advance in this direction. Then, the team can stretch eastward to the permanent stopping with a regulator that has a ½-foot by 8-foot opening which cannot be adjusted. After again checking the roof or back and taking necessary gas tests, the captain must D&I the stopping as their furthest point of advance in this direction. Finally, the team will stretch southward toward the shaft dump pocket. They will find an 8-foot by 10-foot brattice cloth extending from rib-to-rib. They will also find that the area of ankle deep water extends to within 5 feet of the barricade. A placard near the barricade shows 15 % O_2, 4,000 ppm CO with heavy smoke. They can communicate with the one person inside (Miner #1). **The miner can relate the following facts (as revealed through a placard handed to the team captain):**

> *"I am Miner #1. I was operating an LHD to muck the face of Drift 1 when the foreman told me that the face drill was on fire. He instructed me to go to the dump pocket and call for help. While I was calling the hoist man, I heard a large blast, and smoke poured down the drift. The phone went dead, so I decided to barricade. I used my W-65 self-rescuer all up, but the air in here is OK. Get me out of here!"*

The team cannot open the barricade due to the dangerous gas concentrations in the vicinity. The team will instruct Miner #1 to stay inside the barricade and wait. They will return and get him out as soon as possible. The captain must D&I the barricade before leaving the area.

Day 2 – Solution Map 3



Note: Team Stop Nos. 7 - 10 (see Solution Map 3)

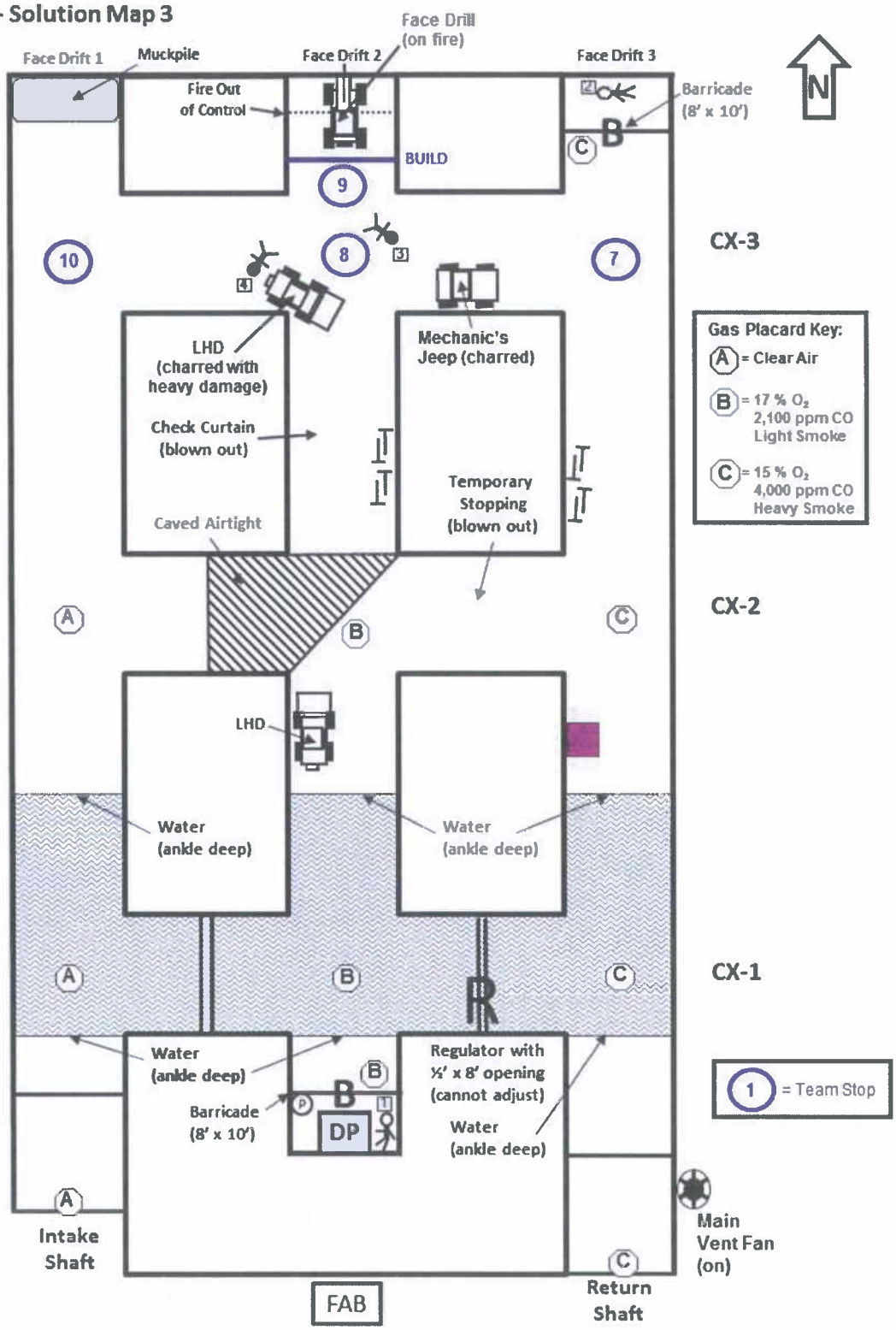
Team Stop No. 7
Now that all accessible areas have been tied-in behind, the team can continue systematic exploration of the mine by retreating to Drift 3. Then, they can advance northward toward the intersection with CX-3. As they travel, the team will find two sets of brattice material lying along the western rib just north of CX-2. They must leave the brattice material there because they are still carrying two sets with them. At the intersection with CX-3, the captain performs roof or back checks, and the team will conduct necessary gas checks. The team will find heavy smoke with 15 % O_2 and 4,000 ppm CO. The crosscut to the west, and the drift to the north are open. The team can stretch toward the face area.

When the team advances northward toward the face, they will find an 8-foot by 10-foot brattice cloth extending from rib-to-rib. The captain will perform roof or back checks, and the team will conduct gas checks. A placard near the barricade shows 15 % O_2 and 4,000 ppm CO with heavy smoke exists immediately in front of the curtain. There is no response from inside. **The team cannot open the barricade because of the dangerous gas concentrations in the vicinity and the unknown behind the curtain.** They can now retreat to CX-3 and continue westward.

Team Stop No. 8
As the team travels in CX-3 toward Drift 2, they will find a mechanic's jeep parked along the southern rib. A placard indicates that the jeep is "charred." At the intersection, they will find the second missing miner (Miner #3) on the ground and unresponsive. The team captain must perform necessary roof or back checks over the miner. After a primary assessment, Judge #1 will hand the team member a placard which reads: **"The miner is badly burned and exhibits no vital signs. The miner is dead."** The captain must D&I the location of the body.

As the team continues to sweep across the intersection, the team captain can check the roof or back while the team conducts necessary gas tests. They will find an LHD located on the northeast corner of the support pillar to the west of Drift 2. A placard indicates the LHD is "charred with heavy damage." They will also find the third missing miner (Miner #4) on the ground and unresponsive. The team captain must perform necessary roof or back checks over the miner. After a primary assessment, Judge #1 will hand the team member a placard which reads: **"The miner is badly burned and exhibits no vital signs. The miner is dead."** The captain must D&I the location of the body. Afterward, the team can stretch southward in Drift 2 to tie-in. As they travel, they will find that the check curtain has been "blown out." They will also find two sets of brattice material lying along the eastern rib. At the intersection with CX-2, they will find the northern extent of the airtight cave stretching rib-to-rib and blocking the intersection. The captain must assess the roof or back conditions at the cave and gas tests must be conducted. They will find that the concentrations have not changed from their previous location. The captain must remember to D&I the cave as their furthest point of advance in this direction.

Day 2 – Solution Map 3

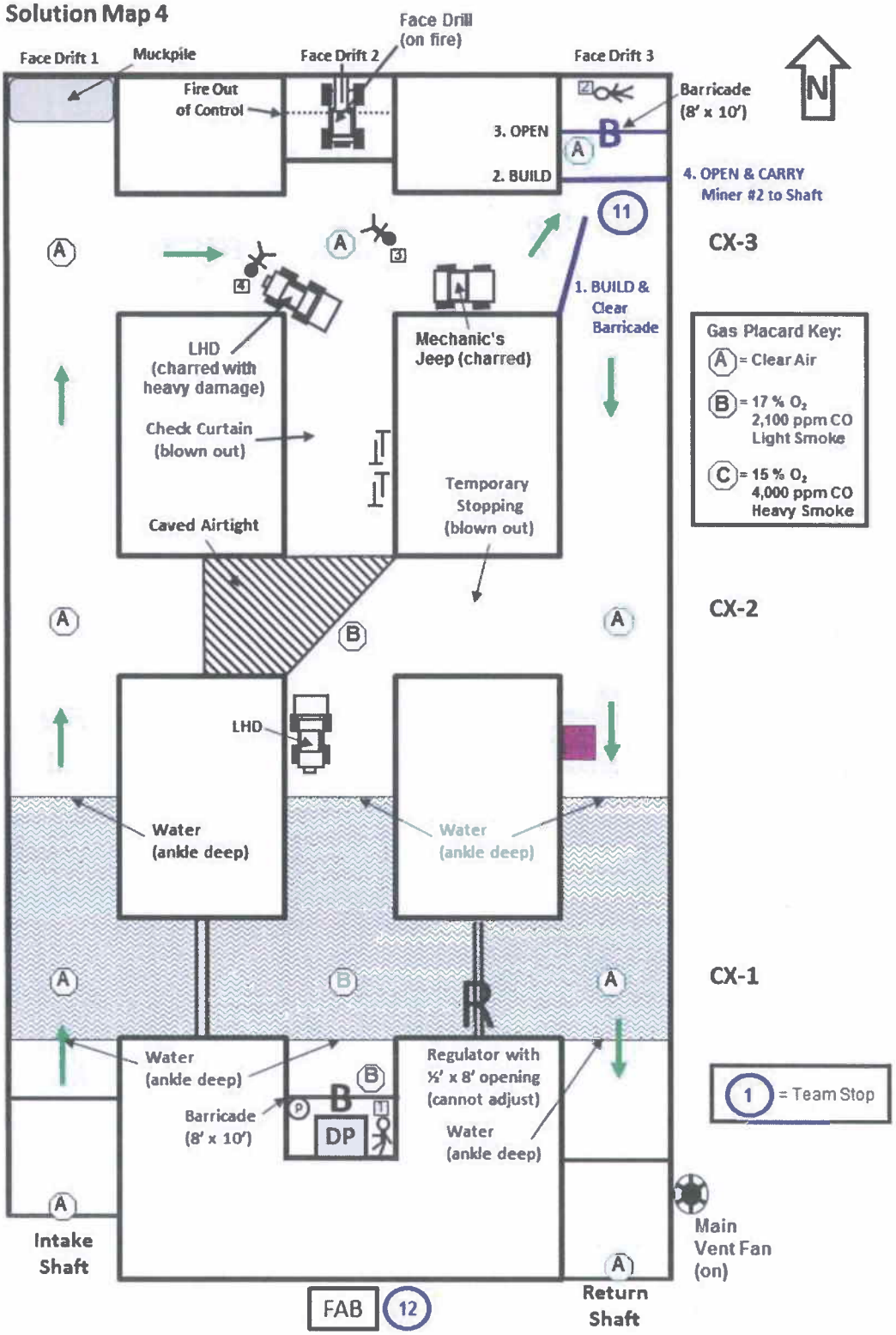


Team Stop No. 9
The team will retreat to CX-3 and advance toward the face area. They will see the face drill located in the middle of the drift, and it is on fire. A placard will indicate that the fire is "out of control." The team must immediately retreat and use one set of brattice material to seal the fire. Since there are no explosive gases present in the mine, the area can be completely sealed. However, before erecting the seal the captain must check the roof or back above the proposed seal location. After the seal is built, the captain must D&I the seal as their furthest point of advance in this direction. Once this is done, the fire has been controlled.

Team Stop No. 10
The team can retreat to CX-3 and then advance westward toward Drift 1. At the intersection, the captain performs roof or back checks and the team will conduct necessary gas checks. The team will find clear air. They can stretch southward in the open drift to tie-in.

Now that all accessible areas have been tied-in behind, the team can retreat CX-3 and stretch northward to the face of Drift 1. They will find a muckpile stretching rib-to-rib and extending four feet outby the face. The captain will perform roof or back checks, and the team will conduct necessary gas checks. The team will find clear air. The captain can traverse the muckpile to D&I the face as their furthest point of advance in this direction. At this point, the gas placards in CX-3 will be flipped to show clear air as the contaminants are swept from the mine.

Day 2 – Solution Map 4



Note: Team Stop Nos. 11 and 12 (see Solution Map 4)

Team Stop No. 11
The team can now retreat to CX-3 and Drift 3. At the intersection, they will find that the gas placard has been flipped to show clear air. When the team advances northward to the barricade, they find that the placard near the barricade still shows 15 % O_2 and 4,000 ppm CO with heavy smoke.

Since the fresh air is now clearing the mine, the team can build a wing curtain and sweep the barricade. Before taking this action, they must discuss it with the fresh air base and the mine manager. Afterward, they can erect the wing curtain and sweep the barricade.

Now, the team can erect a temporary stopping to form an airlock, so that they can enter the barricade. Afterward, they can open the barricade to find Miner #2 who is not responsive. The captain must examine the roof or back above the miner as the team makes a gas check inside. After a primary assessment, Judge #1 will hand the team member a placard which reads: ***"The miner is unconscious with no apparent injuries."***

Since there are no injuries, the team must follow the prescribed treatment for prevention of shock (listed in Brady's 9th Edition on pages 402 – 403).

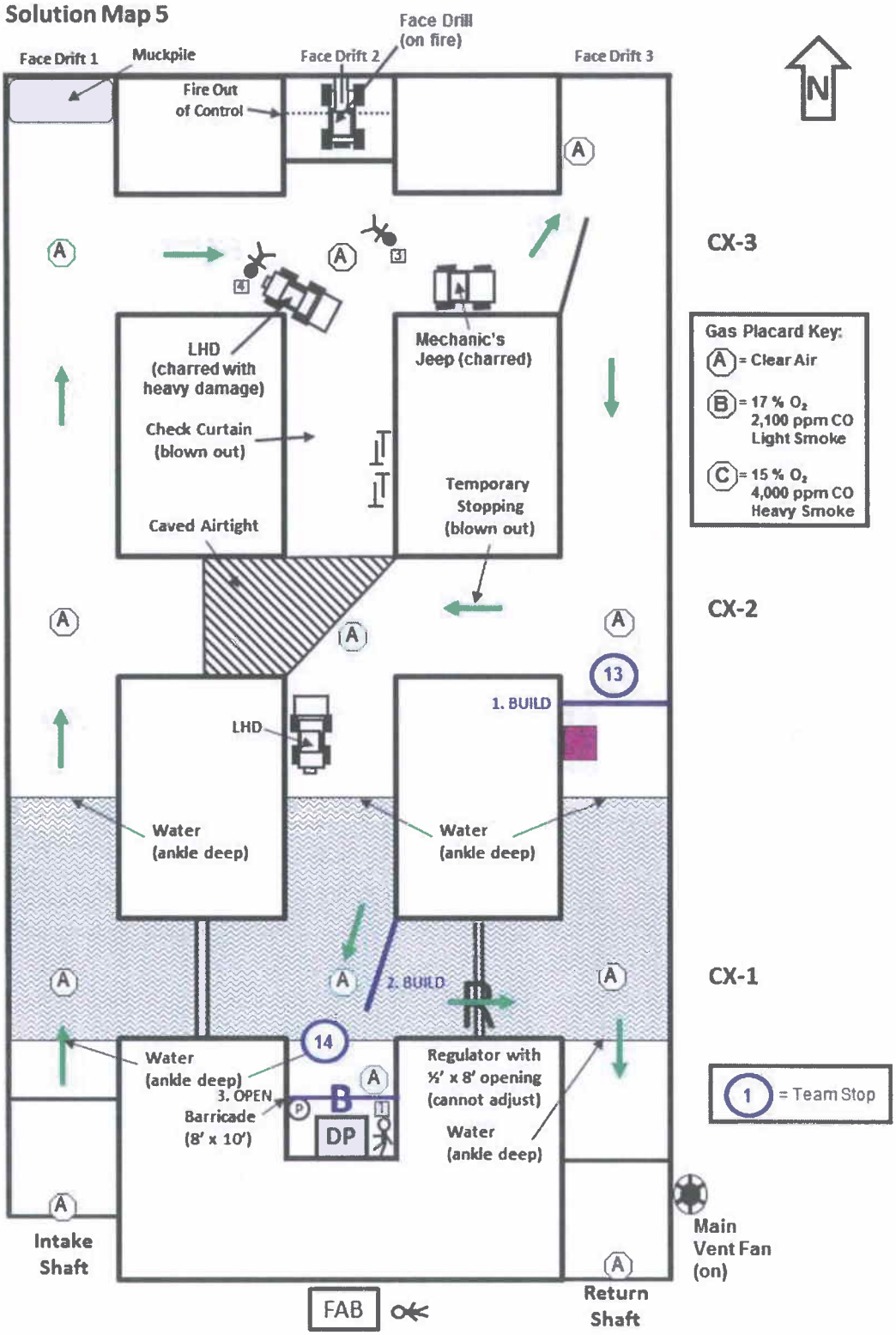
At this time, the team needs to prepare Miner #2 for travel. The team must secure the miner to the stretcher and carry him out. Before leaving the area, the captain can perform back checks, and the team can conduct necessary gas tests. The captain must D&I the location of the miner and the face as the team's furthest point of advance.

Note: Unconscious Miner #1 must be fitted with proper respiratory protection before being transported to the fresh air base. On their way out, the team must re-test all areas that were cleared of smoke or toxic or dangerous gases.

Note: At this point, the team has used both sets of brattice material that they had brought in from the surface fresh air base. On their way out of Drift 3, they can take two sets of brattice material with them for future use.

Team Stop No. 12
The team can carry Miner #2 to the Return Shaft station, exit the mine via the escape hoist, and return to the surface fresh air base. The fresh air base can arrange for follow-up medical treatment.

Day 2 – Solution Map 5



Note: Team Stop Nos. 13 - 14 (see Solution Map 5)

Team Stop No. 13

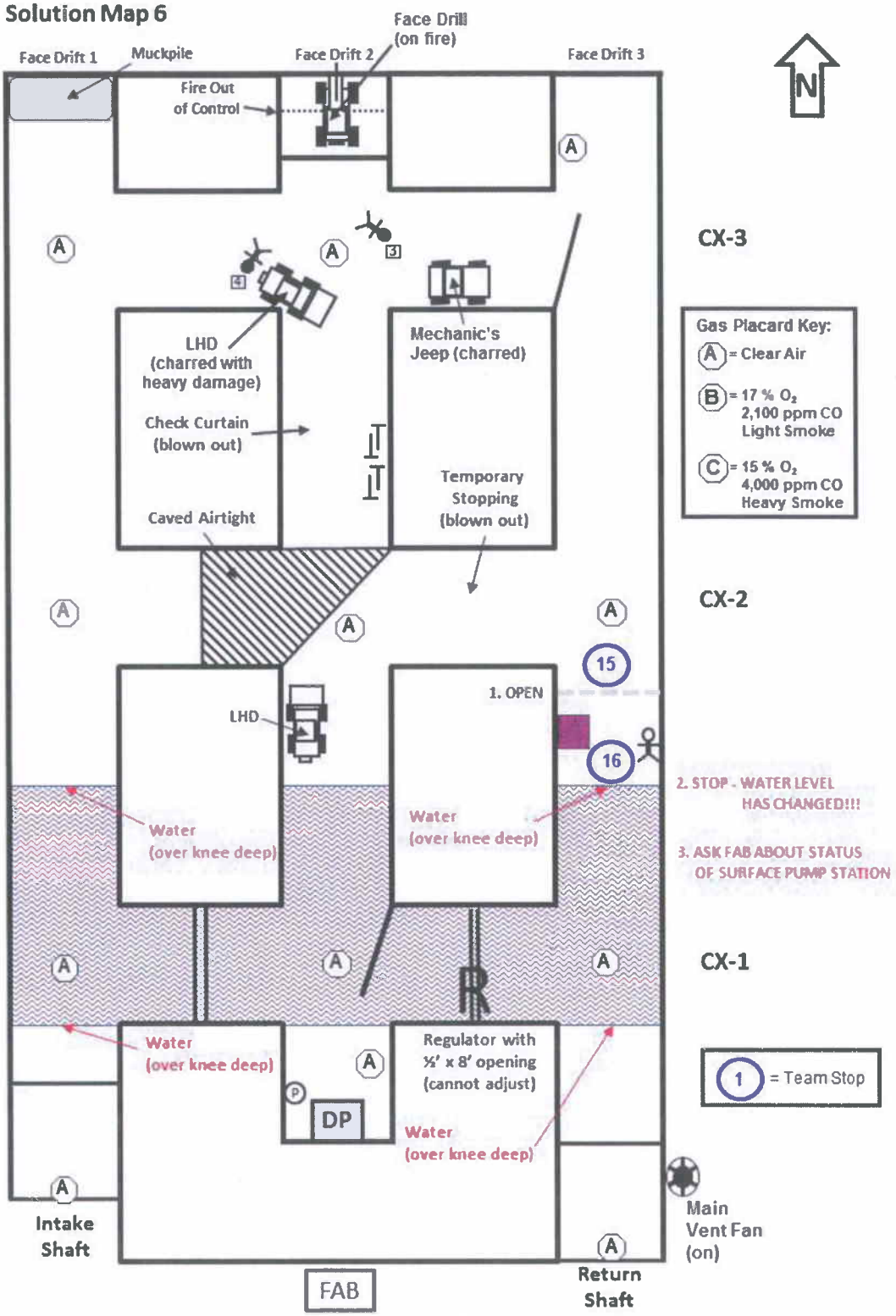
Now the team can return underground to the shaft dump pocket to rescue Miner #1. First, they must enter the mine at the return shaft and enter via the escape hoist. Then, they proceed northward in Drift 3 to CX-2. They can then travel westward in the crosscut to Drift 2. Here, they will find that the gas concentrations have not been swept away. That is, 15% O_2 and 4,000 ppm CO with heavy smoke. The team must make a change to force air from Drift 3 toward Drift 2, exiting through the regulator. Before this is done, they must discuss with the fresh air base and mine manager. After receiving the O.K., they can build a temporary stopping across Drift 3 just south CX-2. This will divert the air and clear the drift. However, when they advance to the barricade, the placard directly in front of the regulator has not cleared. They must erect a wing curtain and flush these gas concentrations away from the area.

Note: The team must perform an apparatus and personnel check before entering smoke at this location. They must also be attached to their lifeline.

Team Stop No. 14

When the placard is flipped to show "clear air," they can open the barricade and go inside. They will find Miner #1. Team members can assess his condition and find that he is not injured and able to walk out with the team. The captain should warn the team to stay away from the shaft dump pocket which presents a fall of person hazard. Before leaving the area, the captain can perform back checks, and the team can conduct necessary gas tests. The team will find that the mine phone (shown on the team and fresh air base maps) is inoperable. The captain must D&I the location of the miner and the shaft dump pocket as the team's furthest point of advance. Then, the team and Miner #1 can advance to the intersection of CX-2 and Drift 3.

Day 2 – Solution Map 6



Note: Team Stop Nos. 15 - 16 (see Solution Map 6)

Team Stop No. 15

The team can open the temporary stopping that they had erected to re-ventilate Drift 2.

Team Stop No. 16

Now, the team can advance southward in the Drift #3. When they reach the area that was initially placarded as "water ankle deep," the placard has been flipped to show that the water has risen to "water over knee deep" in depth. The team must stop.

Note: Any person (team member or Miner #1) passing the placard will be endangered. Appropriate docks will be applied, as follows:

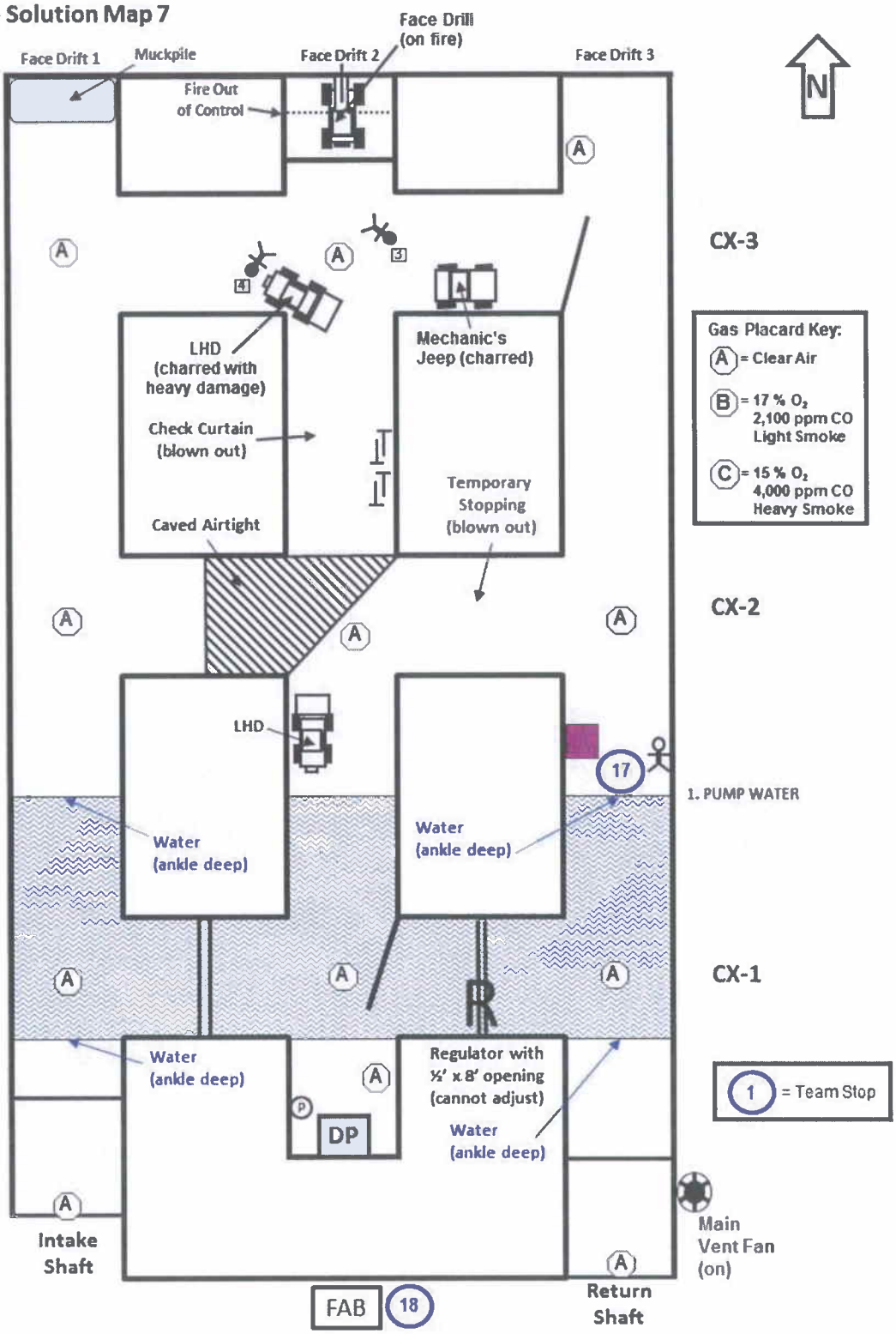
Judge #1 UG Rule 10 a. Item 2:
Captain or other team member doing anything to endanger himself/herself or other team members, 15 points each infraction for team member so endangered while traveling into water over knee deep (up to a maximum of 5 x 15 = 75 discounts).

Judge #1 UG Rule 18 - The team performing an act that may result in the death or injury of survivor by allowing him/her to travel into water over knee deep, 50 discounts for each survivor (50 x 1 = 50 discounts).

The team must contact the surface fresh air base and ask the mine manager for the status of the surface pumping station which had been down since the beginning of the problem. If they inquire, they will be told that the pump station has been repaired and can be activated. The team can request that the pump is turned on, and it will be done.

Note: If the team attempts to exit the mine from the Intake Shaft, the "water (ankle deep)" placards will also be flipped to show "water (over knee deep). The same team precautions and applicable rules will apply.

Day 2 – Solution Map 7



Note: Team Stop Nos. 17 - 18 (see Solution Map 7)

Team Stop No. 17
When the pump has been turned on the placards in Drift 3 will be flipped to show "ankle deep water" once again. The team can safely continue.

Note: The same changes will occur in Drift 1 if the team decides to exit from the Intake Shaft.

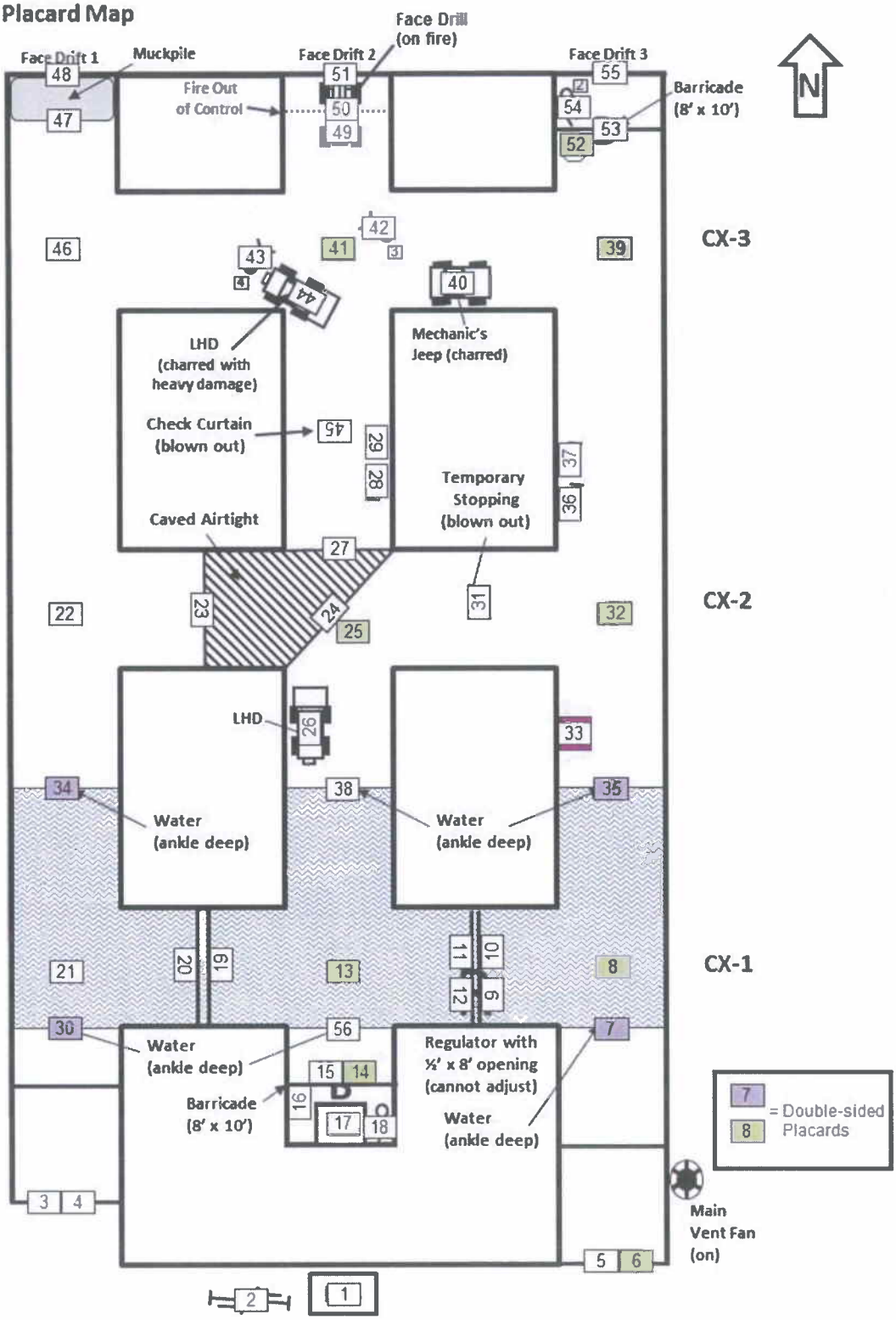
Team Stop No. 18
The team can escort Miner #1 to the Return Shaft station, exit the mine via the escape hoist, and return to the surface fresh air base.

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

Note: Since the ventilation has been restored and the air is clear, the survivor will not need to wear an apparatus. To ensure the safety of the survivor, all areas that have been cleared of smoke or toxic or dangerous gases must be re-tested.

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

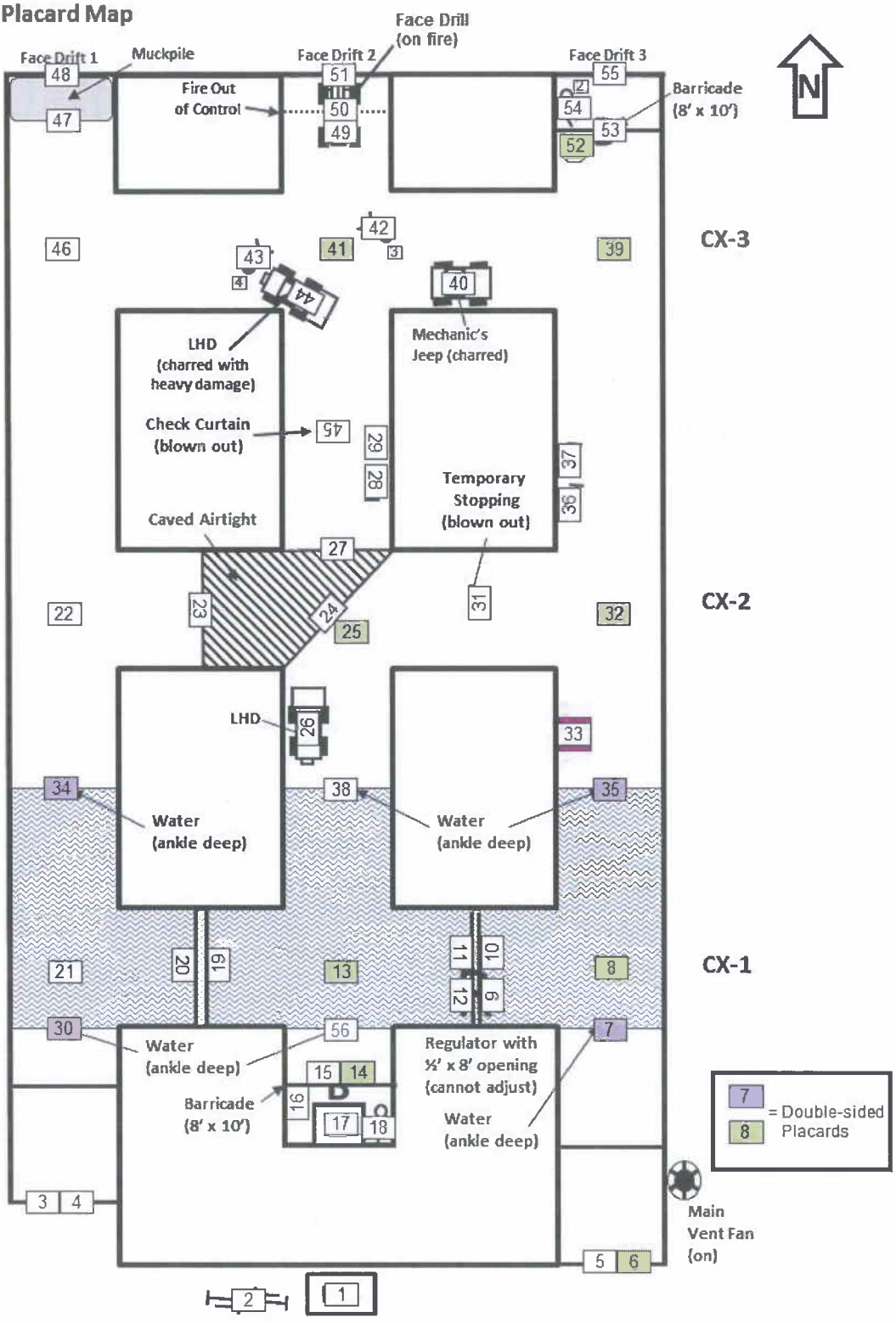
Day 2 - Placard Map



Placard Key

1. Fresh Air Base
2. Brattice Material (two sets)
3. Intake Shaft
4. Clear Air
5. Return Shaft
6. 15 % O_2
   4,000 ppm CO
   Heavy Smoke
7. Water (ankle deep)
8. 15 % O_2
   6,000 ppm CO
   Heavy Smoke
9. Regulator with 2' x 2' Opening
   (cannot adjust)
10. Permanent Stopping
11. Permanent Stopping
12. Regulator with 2' x 2' Opening
    (cannot adjust)
13. 17 % O_2
    2,100 ppm CO
    Light Smoke
14. 17 % O_2
    2,100 ppm CO
    Light Smoke
15. Barricade (8' by 10')
16. Mine Phone (inoperable)
17. Shaft Dump Pocket
18. Miner #1
19. Permanent Stopping
20. Permanent Stopping
21. Clear Air
22. Clear Air
23. Caved Airtight
24. Caved Airtight
25. 17 % O_2
    2,100 ppm CO
    Light Smoke
26. LHD (Load-Haul-Dump)
27. Caved Airtight
28. Brattice Material (one set)
29. Brattice Material (one set)
30. Water (ankle deep)
31. Temporary Stopping (blown out)
32. 15 % O_2
    6,000 ppm CO
    Heavy Smoke
33. Gas Box Test Station
34. Water (ankle deep)
35. Water (ankle deep)
36. Brattice Material (one set)
37. Brattice Material (one set)

Day 2 - Placard Map



38. Water (ankle deep)

39. 15 % O_2
    6,000 ppm CO
    Heavy Smoke

40. Mechanic's Jeep (charred)

41. 15 % O_2
    6,000 ppm CO
    Heavy Smoke

42. Miner #3

43. Miner #4

44. LHD (charred with heavy damage)

45. Check Curtain (blown out)

46. Clear Air

47. Muckpile

48. Face Drift 1

49. Face Drill (on fire)

50. Fire Out of Control

51. Face Drift 2

52. 15 % O_2
    6,000 ppm CO
    Heavy Smoke

53. Barricade (8' by 10')

54. Miner #2

55. Face Drift 3

56. Water (ankle deep)

Note:
Seven gas placards (6, 8, 13, 25, 32, 39, and 41) are double-sided. The backside will indicate "Clear Air" when changes have been made by the team to successfully ventilate these areas.

Two additional gas placards (14 and 52) are also double-sided and the backside indicates "Clear Air." However, this placard will not be turned over until the team erects a "wing" curtain to divert fresh air toward each barricade and clear away the toxic contaminants.

Four "water (ankle deep)" placards are double-sided (7, 30, 34, and 35). When the team attempts to bring Miner #1 out of the mine from Drift 3 or Drift 1, the placards will be turned over to reveal "water (over knee deep)." When the team contacts the mine manager, the surface pumping station is repaired, and the pumps can be activated to lower the water level in either drift. When the placards are turned, they will revert to "water (ankle deep)" once again, and the team can safely travel toward the respective shaft and exit the mine.

Bluegrass Mining Inc.
Blue Mare Mine
I.D. No. 15-02014
Lexington, KY

Updated July 21, 2014
Approx. Scale 1 in . = 10 ft.

Map Legend:

DP — Shaft Dump Pocket

Ⓟ — Pager Phone

——— Temporary Stopping

═══ Permanent Stopping

Airlock

—R— Regulator

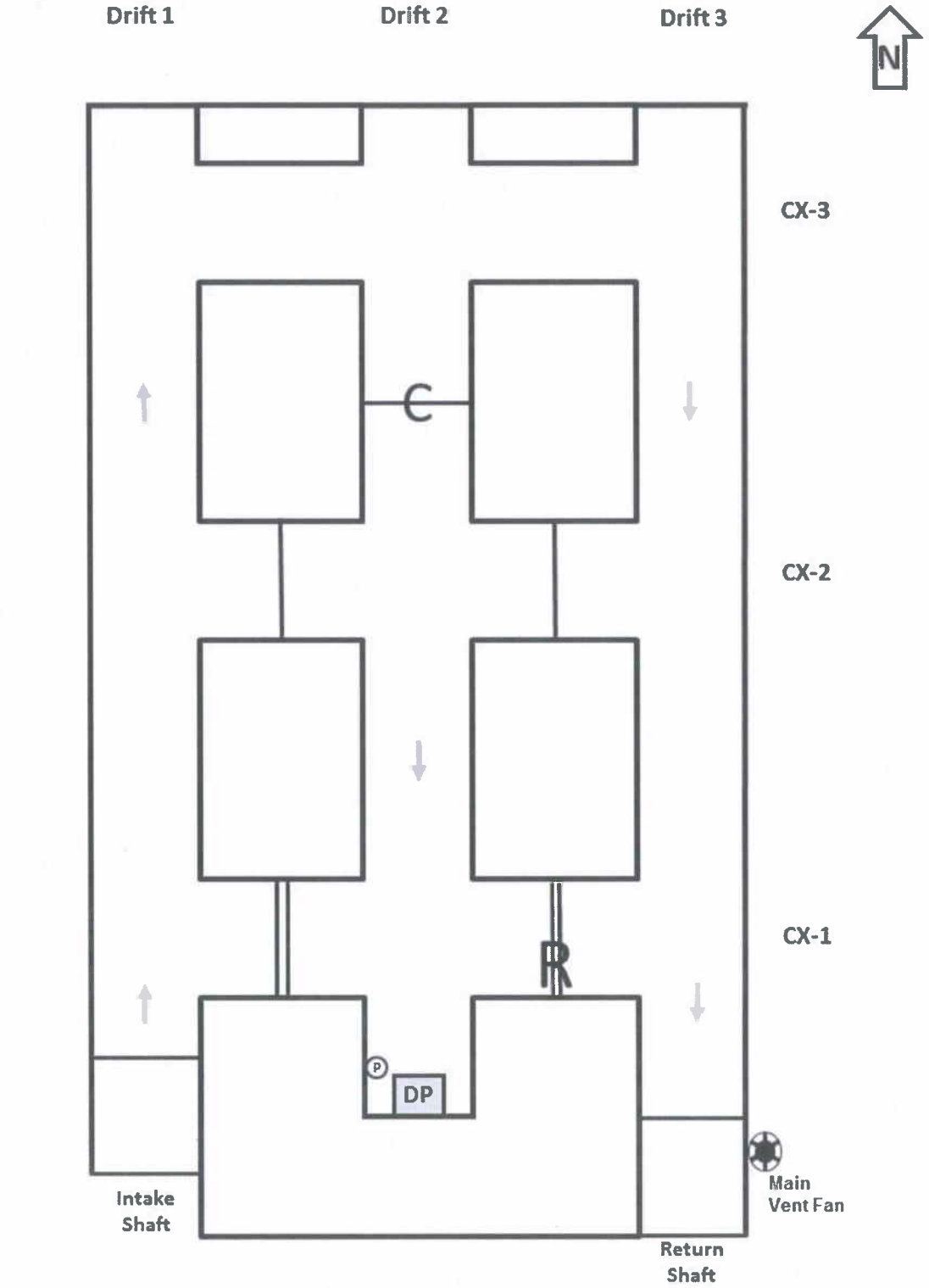
—C— Check Curtain

→ Airflow & Direction

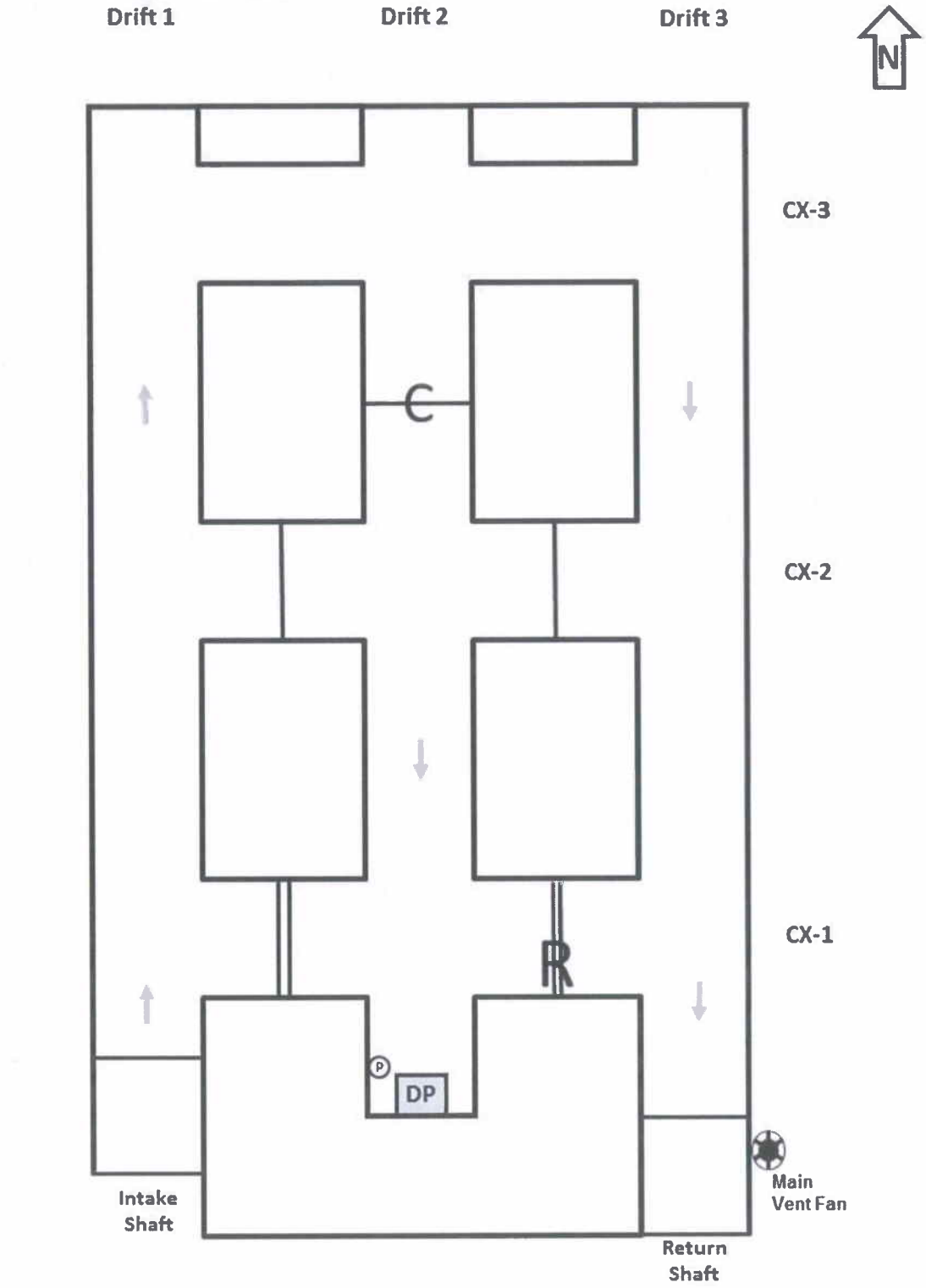
≡≡≡ Conveyor Belt

Ventilation Fan

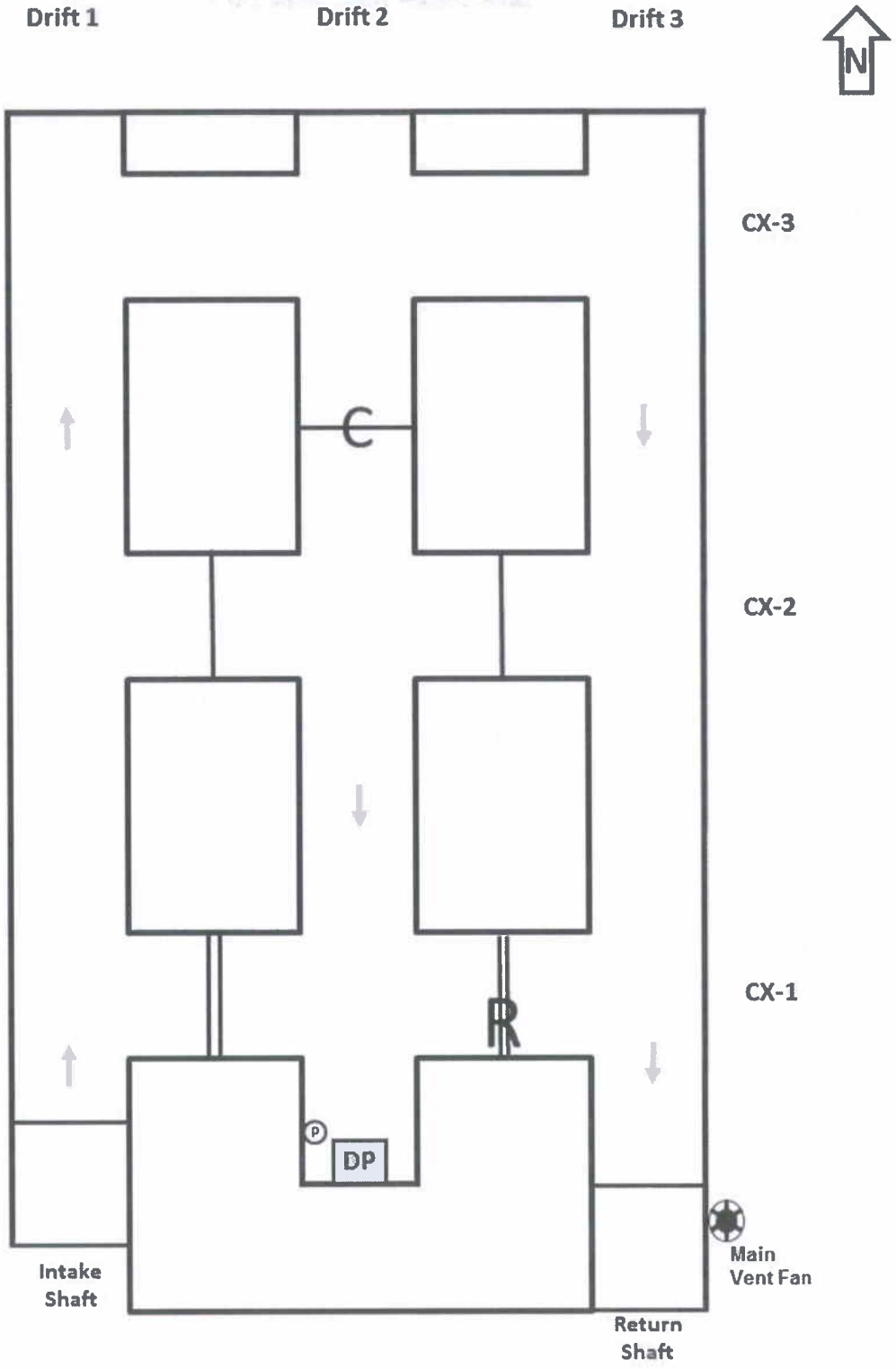
Day 2 - Team Map



Day 2 – Fresh Air Base Map



Day 2 – Fresh Air Base Map (Alternate – Do not score)



Day 2 – Field Construction Map