

2017 Northern Regional Mine Rescue Contest

JUDGES' PACKET Field Competition Day 1

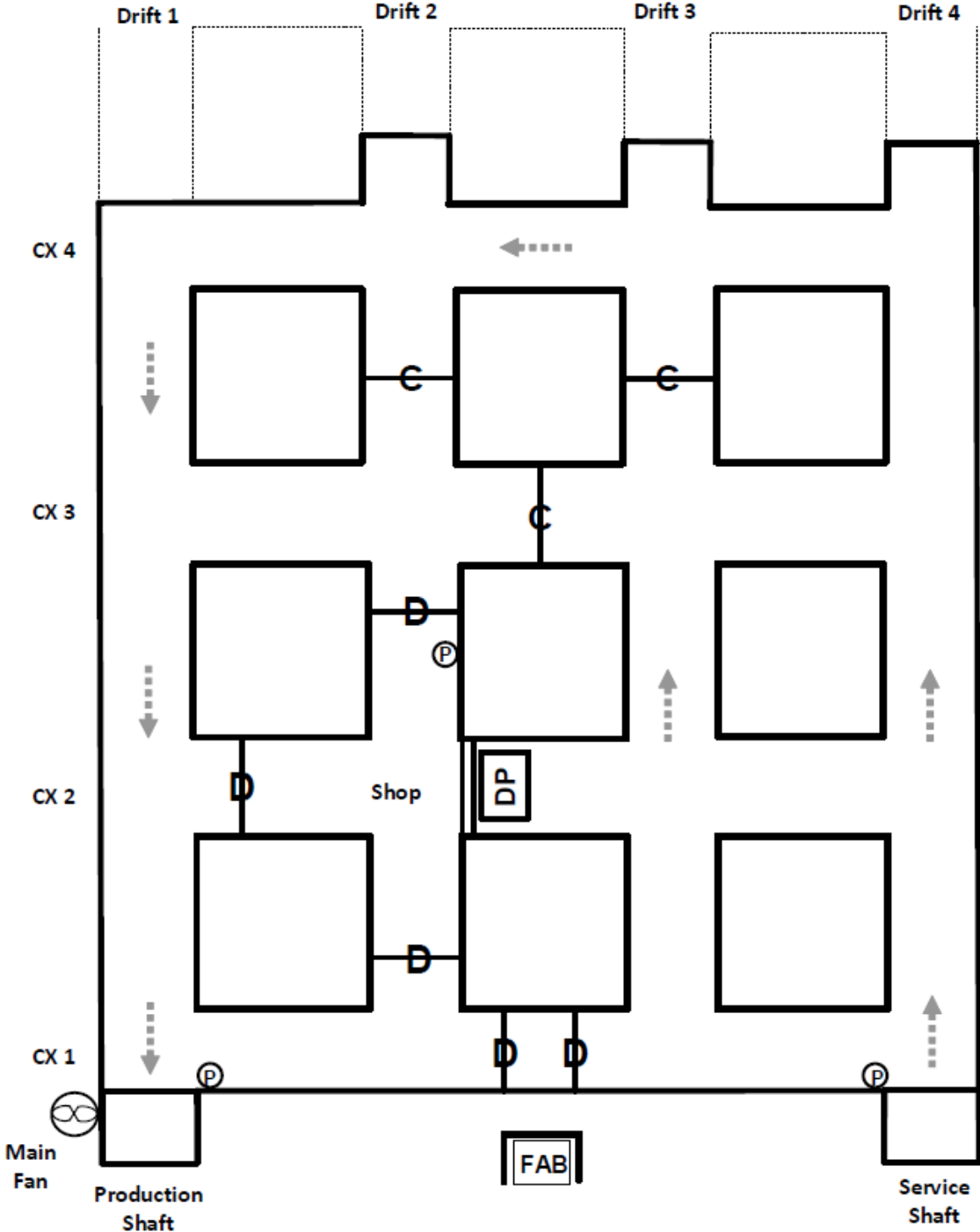


June 6, 2017
Clymer, New York

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Day 1 – Team Map



Mine Information Sheet

PNP Mining Co. – Zipline Mine No. 1

Mining & Equipment:

The newly opened single-level, shaft mine uses a conventional room and pillar method to extract ore. The broken ore is loaded into haul trucks using face loaders and then transported to the shaft dump pocket located in CX 2 between Drift 2 and Drift 3. The ore is then hoisted to the surface via skips in the Production Shaft. The development entries are driven 8-feet high and 10-feet wide. Typical pillar dimensions are 15-feet by 15-feet (W x L). All underground mobile equipment (including the loaders, haul trucks, face drills, roof bolting machines, and transport jeeps) is diesel-powered.

Mine Classification:

In accordance with Title 30 CFR § 57.22003, the mine was classified as a Category VI mine. 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.

Mine Openings:

The mine is opened by two 18-foot diameter shafts approximately 1,750 feet deep. The Service 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 Production Shaft is equipped with two ore skips and a separate compartment containing an escape hoist which can be used to bring a maximum of seven persons to the surface.

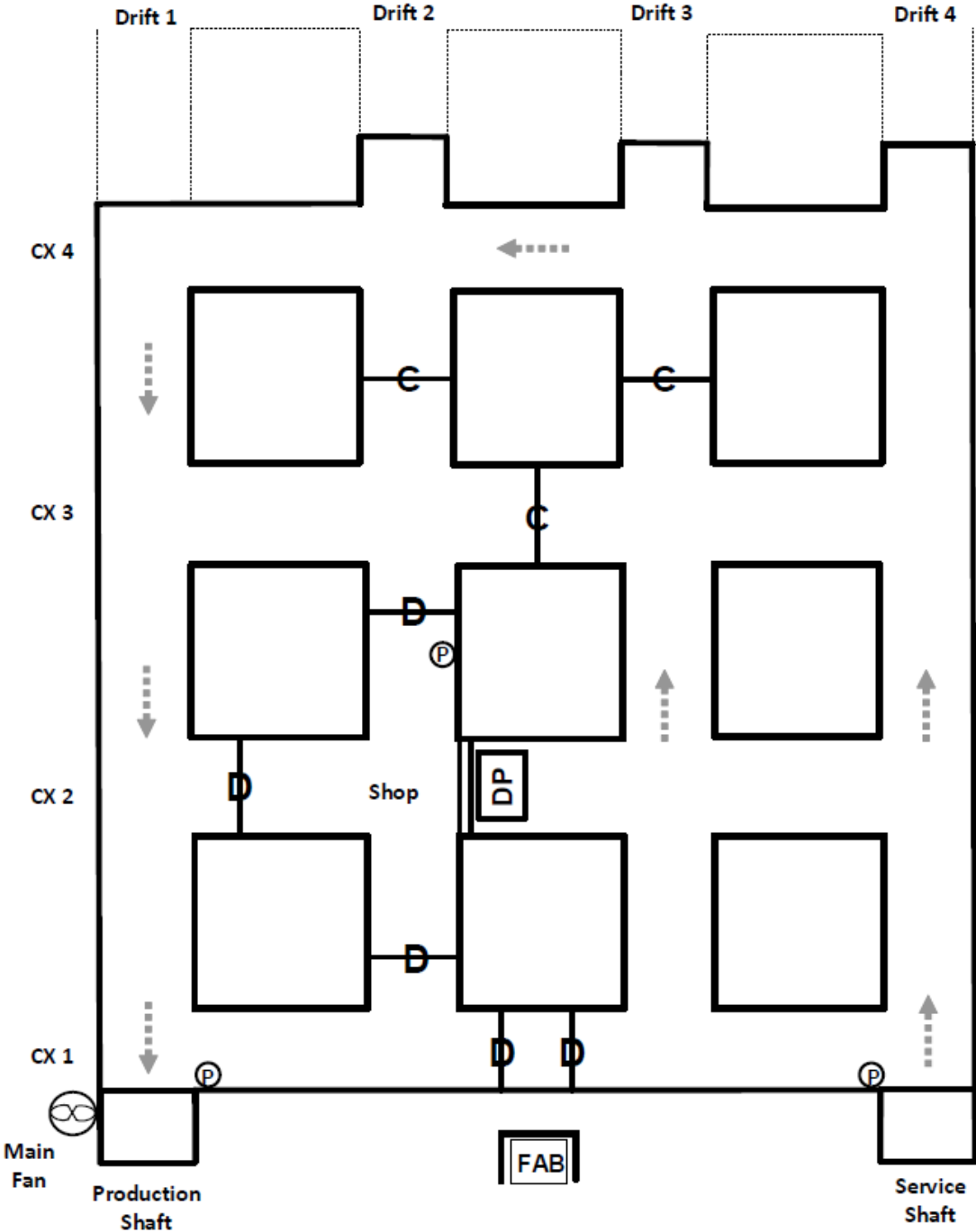
Ventilation:

A 6-ft. diameter exhausting Main Fan is located on the surface near the Production Shaft. The Main Fan is not reversible. The fan produces approximately 100,000 cfm and operates in the stable portion of its performance curve. Airlock doors have been installed in CX 1 to allow passage between the intake and the return drifts without disrupting the established airflow to the faces. The electrical power to the fan is on and the fan is operating. The air enters the mine through the Service Shaft and exhausts from the Production Shaft. Air is directed to the faces using permanent (concrete block) and temporary (brattice cloth) ventilation controls. The typical airflow direction is marked on the Team and Fresh Air Base Maps.

Water and Pumps:

The mine has no history of water problems in the active workings. Each shaft is equipped with a ten-foot deep sump. The main water pumps, located on the surface, can easily handle the volume of water produced in the mine and the shafts. The main water pumps have been activated along with the power to the shafts.

Day 1 – Team Map



Mine Information Sheet (continued)

PNP Mining Co. – Zipline Mine No. 1

Ground/Rib and Roof Control:

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.

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 truck.

Electric Power:

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

Mine Map:

The onsite Engineering Department updated the mine map on May 30, 2017.

Other Mines:

There are several known mines, active and abandoned, in Clymer, New York. At this time, the Zipline Mine No. 1 is not connected to any of these mines.

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 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:

Three pager phones are available in the mine for contact with the surface. The current phone locations are 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.

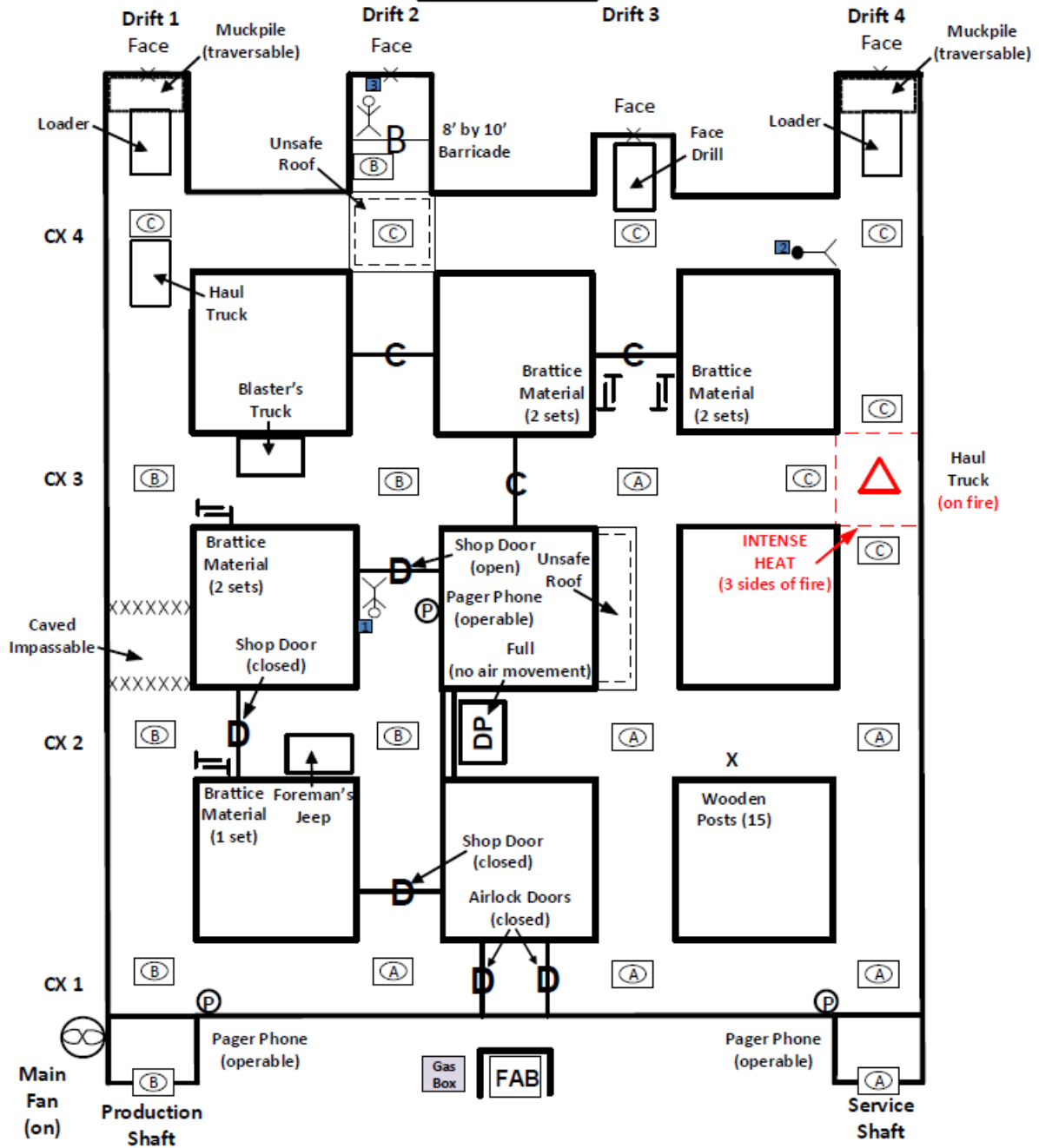
Day 1 – Problem Map

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppmCO Heavy Smoke

Missing Miners:

[Blue Square]	Miner #1 (ID - 0327)
[Green Square]	Miner #2 (ID - 1958)
[Red Square]	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Team Briefing Statement

You are located at the surface of the PNP Mining Company's Zipline Mine No. 1. The newly opened single-level, shaft mine uses a conventional room and pillar method to extract ore. The mine is opened by two shafts approximately 1,750 feet deep. Air enters the mine through the Service 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 Production Shaft which is equipped with skips, as well as an escape compartment which can be used to hoist a maximum of seven persons to the surface. This shaft serves as the secondary escapeway from the mine. The mine is ventilated by a surface-mounted Main Fan located near the Production Shaft. The Main Fan exhausts 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. Typical pillars dimensions are 15-feet by 15-feet (W x L). 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. The mine has no history of water problems in the active workings.

This morning at 5:00 a.m., a foreman and his five-person crew went underground to start the day shift. At about 6:15 a.m., the foreman called out from the underground shop and informed the hoist engineer that a piece of equipment caught fire and dark black smoke was filling the mine. At that time, communication was lost. The hoist engineer called the superintendent who immediately gave the order to activate the warning system to evacuate the mine. A short time later, three miners called out from the Service Shaft station and asked to be hoisted out of the mine. They reported that they had difficulty traveling in the exhaust drifts due to heavy smoke. Once they found their way, they headed toward the Service Shaft. They had no specific information as to what had happened nor were they aware of the condition or location of the rest of their crew. Since that time, no one has entered or exited the mine. We do not know the status of the mine's communication system since there has been no further contact with the missing miners.

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 Service Shaft and 16.5 % oxygen (O₂) and 1,300 ppm carbon monoxide (CO) with smoke at the Production Shaft.

We have called all of the government agencies for help. Guards have been posted at the shafts and at the main power supply for the mine. 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

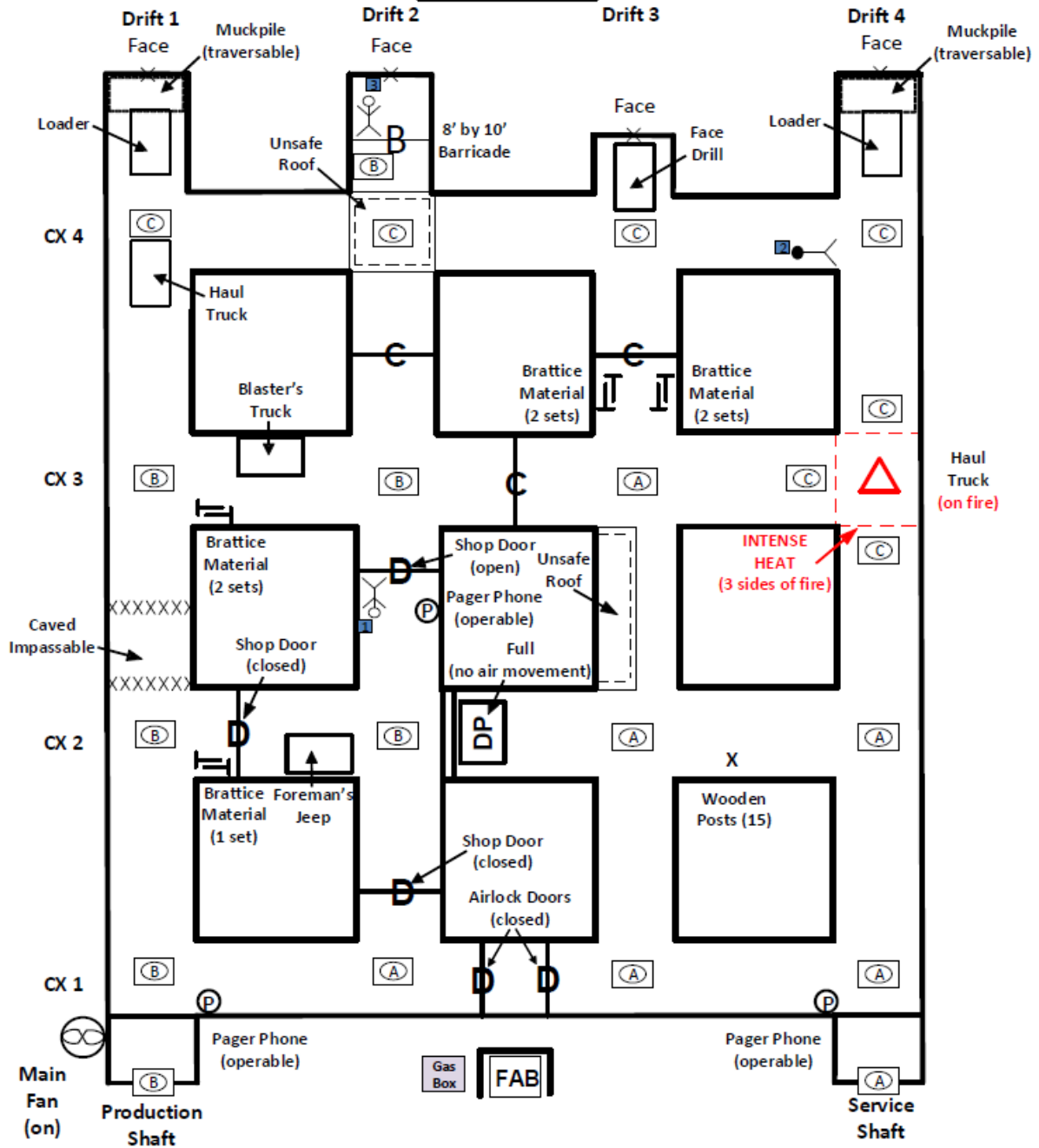
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Missing Miners:

(Miner #1)	(ID - 0327)
(Miner #2)	(ID - 1958)
(Miner #3)	(ID - 5432)



Note: Main Fan Not Reversible

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 90 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 conditions found in the mine (problem field) and any changes made by the team;
- Extinguish or seal any fires;
- Account for the three 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 assistant will be assigned a location where they can study the team briefing information, mine information, and map.
- Only one attendant or assistant 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 assistant 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 No. 1 Judge and the "Mine Manager." Then, introduce the #2 Judge. 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 no new information for your team. 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 assistant must remain at the surface fresh air base. Only the fresh air base 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 assistant will be allowed to assist them. However, neither the attendant nor the assistant 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 assistant'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 and assistant not allowed to converse with anyone except 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 assistant'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 three 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 in isolation. At that time, the teams 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 conclusion of the briefing session.

Upon arrival at the fresh air base, the team will meet the Mine Manager (Judge #1) and will be introduced to Judge #2. The Mine Manager will read the Problem Orientation and update the team with any information obtained since their briefing.

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). **The captain's failure to perform any of these tasks will result in discounts (4 x each infraction) per Judge 1 – Surf Rule #8.**

After receiving the information from the Mine Manager (i.e., team briefing statement, mine information sheet, instructions for rescue teams and fresh air base attendants, and the mine maps), 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.

Note: The 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.

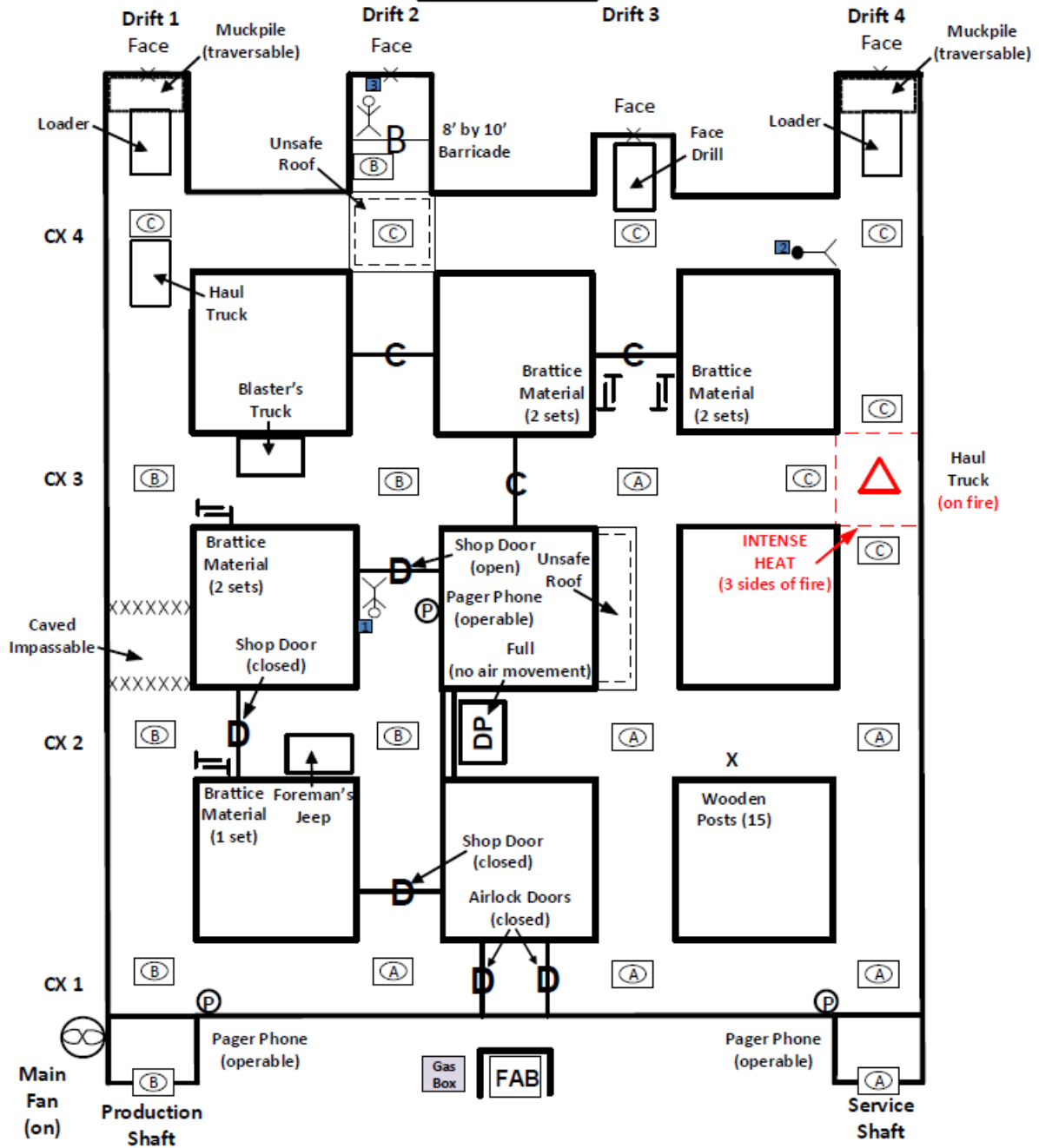
Day 1 – Problem Map

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppmCO Heavy Smoke

Missing Miners:

	Miner #1 (ID - 0327)
	Miner #2 (ID - 1958)
	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

The team's failure to wear apparatus while checking the mine openings will result in individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(6).

Note: These checks must be made to assure the conditions are safe to proceed. The team's failure to take necessary gas tests where required (each gas and each infraction) assess discounts (1x each omission) per Judge 2 - UG - Rule #1.

Service 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. The team's failure to check both shafts for damage will result in a team endangerment (75 discounts) per Judge 1 – UG Rule #10(b)(1).

Note: At each shaft, Judge No. 1 will allow 10 seconds for the conveyance to travel in each direction.

Production Shaft checks reveal:

A placard at the shaft shows 16.5 % oxygen (O₂) and 1,300 ppm carbon monoxide (CO) with 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: Gas concentrations found at this shaft was provided 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. The team's failure to conduct a team check before entering smoke will result in discounts (5 x each infraction) per Judge 1 – UG Rule #12. Additionally, a team member's failure to be attached to or have hold of the lifeline when in smoke will result in discounts (2 x each infraction) per Judge 2 – UG Rule #9.

Gas Box Testing Station:

The team will also find the gas box testing station located at the fresh air base. A team member must use the team's multi-gas instrument to determine the gas concentrations in the unknown mixture. The team must provide its own calibration cup to report: O₂, CH₄, CO, and NO₂. **This will be the only gas box on the mine rescue field.** Judge No. 2 will assess the team's measurements and, if warranted, apply appropriate discounts (15 x each incorrect gas measurement) per Judge 2 – UG Rule #4.

Day 1 – Solution Map 1

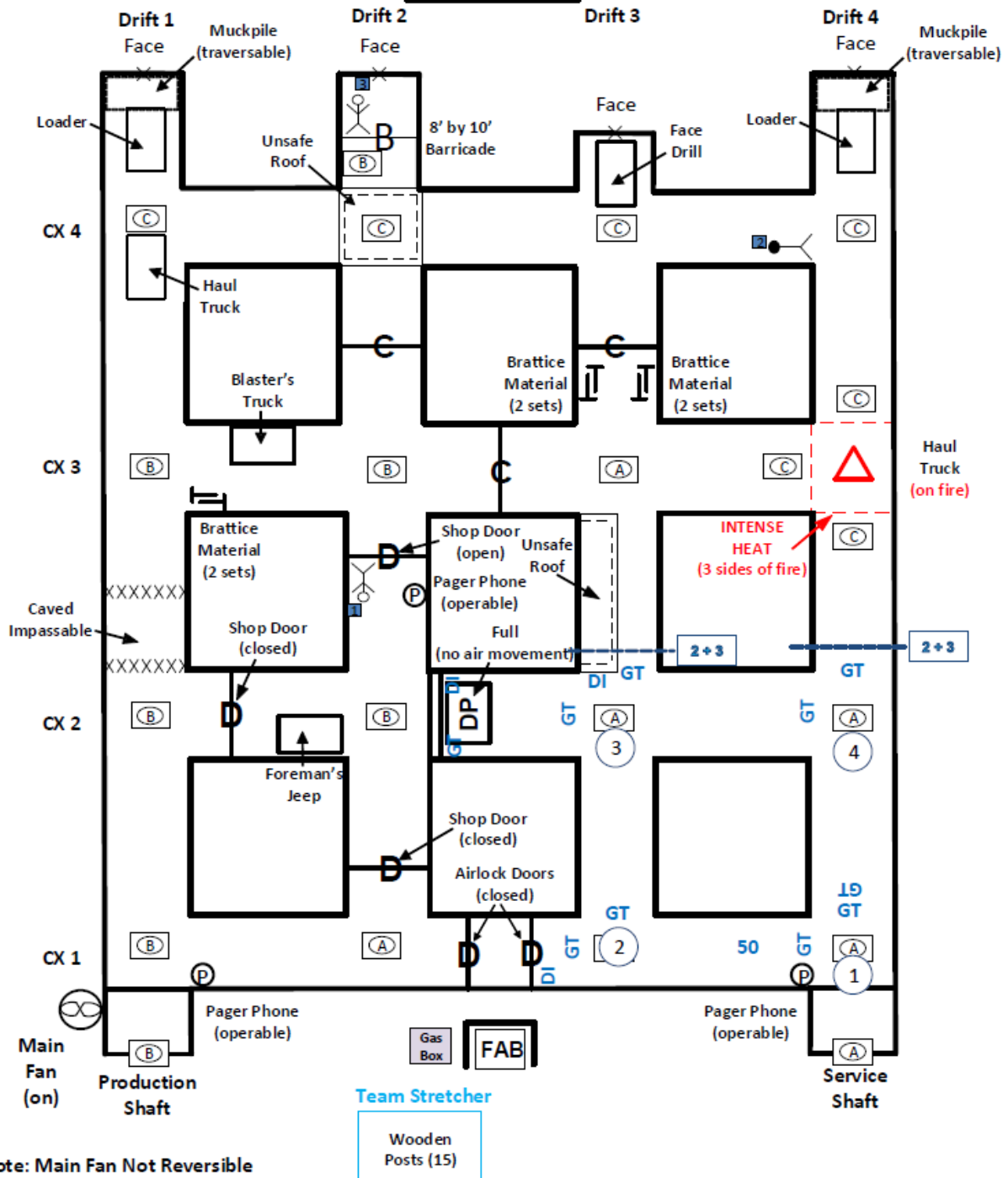
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

[Blue Box]	Miner #1 (ID - 0327)
[Green Box]	Miner #2 (ID - 1958)
[Red Box]	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Note: Team Stop Nos. 1 - 4 (see Solution Map 1)

Team Stop No. 1

The team can travel to the Service Shaft. They must count off before entering the cage (first time they go underground). Then, they must close the shaft gate and signal the hoist engineer. Afterward, the team will descend to the Service Shaft station in Crosscut 1 (designated as CX 1 on the team and fresh air base maps).

The team's failure to "count off" upon first entry into and final exit from the mine will result in discounts (2 x each infraction) per Judge 1 – Surf Rule #10.

The team's failure to close the shaft gate will result in discounts (5 x each infraction) per Judge 1 – UG Rule #7.

The team's failure to use the posted hoisting signals will result in discounts (1 x each infraction) per Judge 1 – UG Rule #6.

Before exiting the cage the captain must check for loose roof in front of the cage. A gas check will show "clear air." After exiting the cage, the team will close the shaft gate. At the shaft station, the team will find a working mine phone. They will also find that Drift 4 to the north and CX 1 to the west are open. The captain will check the roof or back and the team will conduct necessary gas tests. They will find "clear air."

The captain's failure to verbally indicate he/she is checking the back or roof where required will result in discounts (5 x each occurrence) per Judge 1 – UG Rule #8(b)(4).

The team's failure to take necessary gas tests where required (each gas and each infraction) assess discounts (1x each omission) per Judge 2 - UG Rule #1. **Areas requiring gas testing by the team are shown on the Solution Maps as "GT".**

Note: After advancing not more than fifty (50) feet from the fresh air base, the captain must give a signal for the team to stop. At this time, 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 from impact must be checked before continuing. **If team fails to conduct 50 foot check, assess 10 discounts per Judge 1 – UG Rule #3. Also, if the team fails to conduct apparatus examinations exceeding 20-minute intervals, assess discounts per Judge 1 - UG Rule #5 (5x each occurrence).**

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 any map while the team is at the surface fresh air base. **See Judge 2 – Surf Rule #5 (25 total discounts).**

Day 1 – Solution Map 1

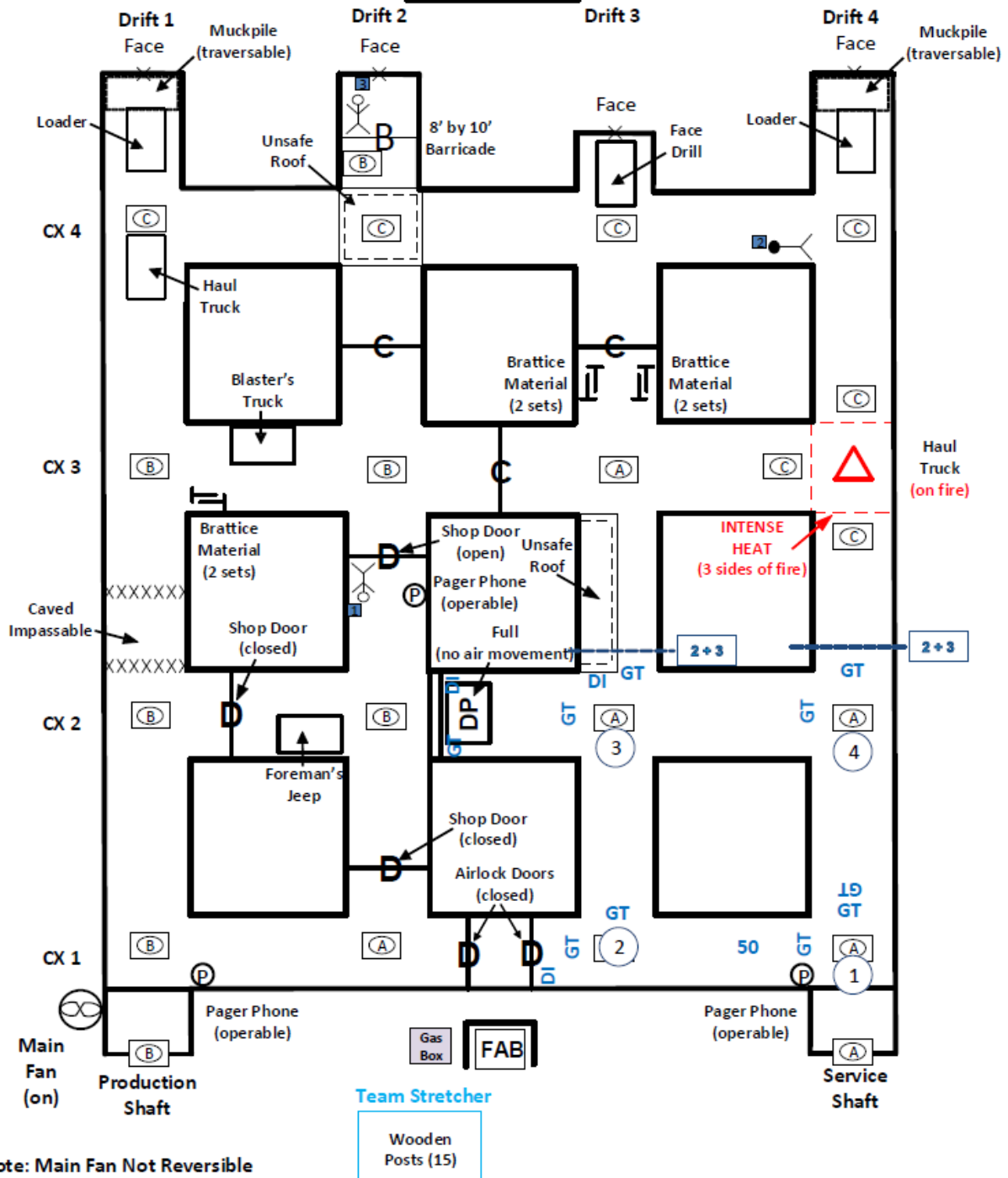
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

[Blue Box]	Miner #1 (ID - 0327)
[Green Box]	Miner #2 (ID - 1958)
[Red Box]	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Team Stop No. 2

Since CX 1 is not blocked to the west, the team must advance in the crosscut toward Drift 3. At the intersection, the captain will check the roof or back and the team will conduct necessary gas tests. They will find clear air and Drift 3 to the north is open. The team can stretch westward in CX 1 to the eastern most airlock door and find that it is “closed.” The captain must date and initial (D&I) the door as their furthest point of advance in this direction.

The captain’s failure to D&I where required (at the point of farthest advance of the team in any direction such as at stoppings, faces of rooms and drifts, water over knee deep, impassable falls, barricades, fires out of control, and at the location of any survivors or bodies) assess discounts (2 x each place – max 10) per Judge 1 - UG Rule #9. **Areas requiring a D&I by the team captain are shown on the Solution Maps as “DI”.**

Team Stop No. 3

The team will advance northward in Drift 3 toward CX 2. At the intersection, the captain will check the roof or back and the team will conduct necessary gas tests. They will find clear air and the crosscuts to the east and west are open. To the north, the team will find a placard indicating an area of “unsafe roof” extending out about 5 feet from the western rib. The captain must warn the rest of the team members to avoid this hazard. The team can stretch westward in CX 2 toward the dump pocket. A placard at the dump pocket indicates that it is “full with no air movement.” The team can stretch around the dump pocket to the permanent stopping. The captain must warn the other team members to avoid this fall of person hazard. 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: The team cannot advance beyond 3 feet past CX 2, because they had not tied-in the entries behind them. **If the team travels beyond this limit and fails to explore systematically, assess discounts (25 x each infraction) per Judge 1 – UG Rule #11.**

Team Stop No. 4

Then, the team will advance eastward in CX 2 toward Drift 4. As they travel, they will find 15 wooden posts along the southern rib. They can take the posts with them for future use. At the intersection, the captain will check the roof or back and the team will conduct necessary gas tests. They will find clear air and Drift 4 open to the north. The team can stretch southward toward the Service Shaft to tie in. The team can now retreat to the Service Shaft Station, enter the conveyance, close the shaft gate and signal the hoist engineer. Afterward, they will ascend to the surface (fresh air base).

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

Day 1 – Solution Map 2

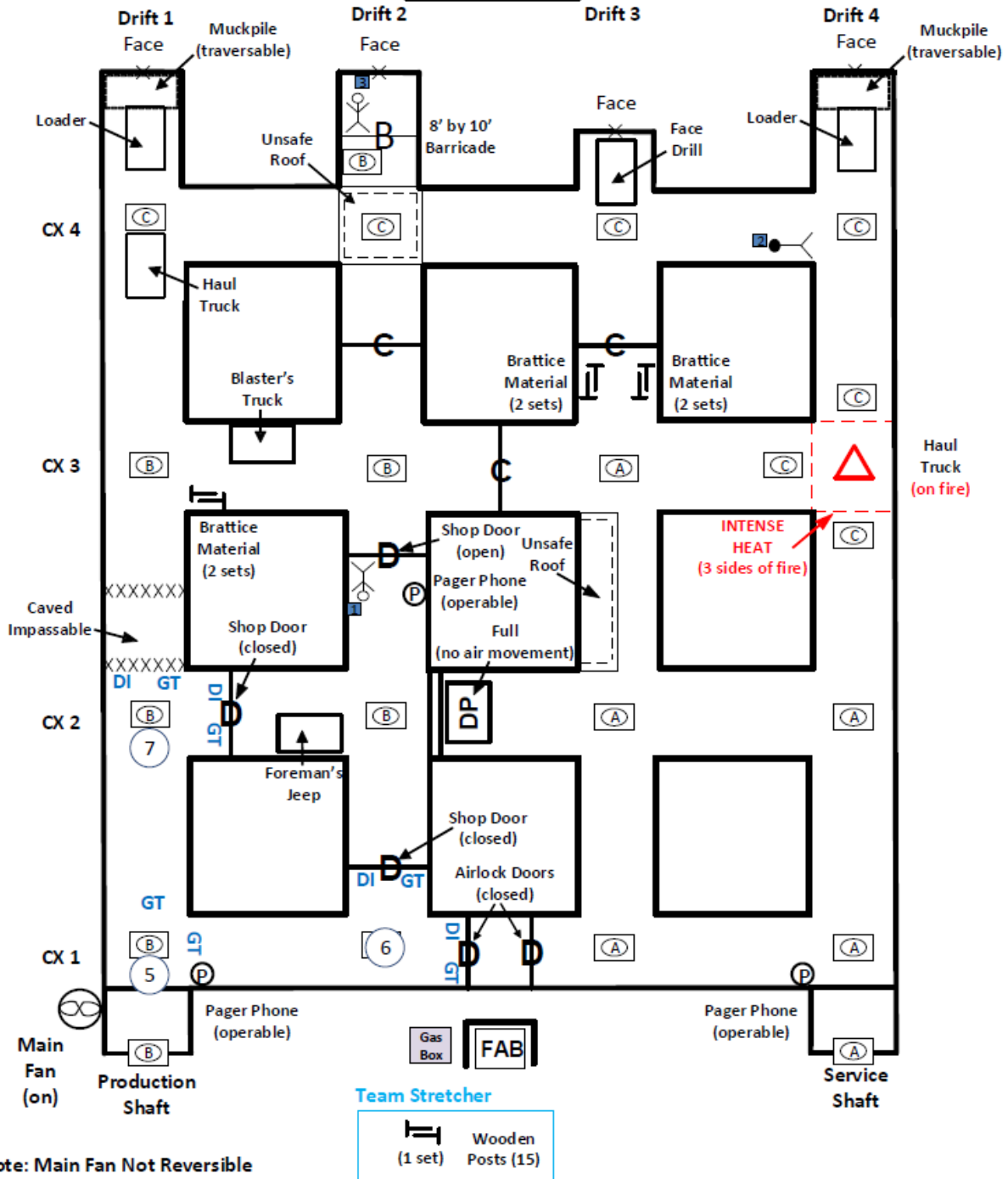
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

1	Miner #1 (ID - 0327)
2	Miner #2 (ID - 1958)
3	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Team Stretcher
 (1 set) Wooden Posts (15)

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

Team Stop No. 5

To continue systematic exploration, the team must reenter the mine through the Production Shaft. At the shaft, the team will enter the escape hoist, close the shaft gate, signal the hoist engineer and descend to the mine level. Before exiting the cage the captain must check for loose roof in front of the cage. A gas check will show “16.5 % O₂ and 1,300 ppm CO with smoke.” After exiting the cage, the team will close the shaft gate. At the shaft station, the team will find a working mine phone. They will also find that Drift 1 to the north and CX 1 to the east are open.

Note: Due to gas concentrations at this shaft, the team must perform an apparatus and personnel check before entering smoke at this location (per Judge 1 – UG Rule #12). They must also be attached to their lifeline (per Judge 2 – UG Rule #9).

Team Stop No. 6

Since CX 1 is not blocked to the east, the team must advance in the crosscut toward Drift 2. At the intersection, the captain will check the roof or back and the team will conduct necessary gas tests. They will find clear air. The team can stretch eastward in CX 1 to the western most airlock door and find that it is “closed.” The captain must D&I the door as their furthest point of advance in this direction. The team can stretch northward in Drift 2 to the shop door and find that it is “closed.” The captain must D&I the door as their furthest point of advance in this direction.

Note: Conditions behind both the shop and airlock doors are unknown. Therefore, neither door can be opened without the team erecting a temporary stopping. At this point in the problem, no building materials have been found. **If either door is opened, the team's failure to erect a temporary stopping will result in discounts (10 x each infraction) per Judge 2 – UG Rule #10. In addition, if the shop door is opened, the team makes a ventilation change resulting in 15 discounts per Judge 2 – UG Rule #12.**

Team Stop No. 7

The team must now retreat to Drift 1 and advance northward to CX 2. At the intersection, the captain will check the roof or back and the team will conduct necessary gas tests. They will find “16.5 % O₂ and 1,300 ppm CO with smoke.” To the north, they will find the southern extent of an impassable cave. The captain must D&I the cave as their furthest point of advance in this direction. The team can stretch eastward in CX 2 to the westernmost shop door and find that it is “closed.” The captain must D&I the door as their furthest point of advance in this direction. They will also find one set of brattice material lying along the southern rib.

Note: Since the concentrations of O₂ and CO in front of the westernmost shop door represent an IDLH atmosphere, as defined on under “Barricades” on Page 29 of the 2017-18 MNM MRC Rules, the team cannot enter the shop without first re-ventilating.

Day 1 – Solution Map 3

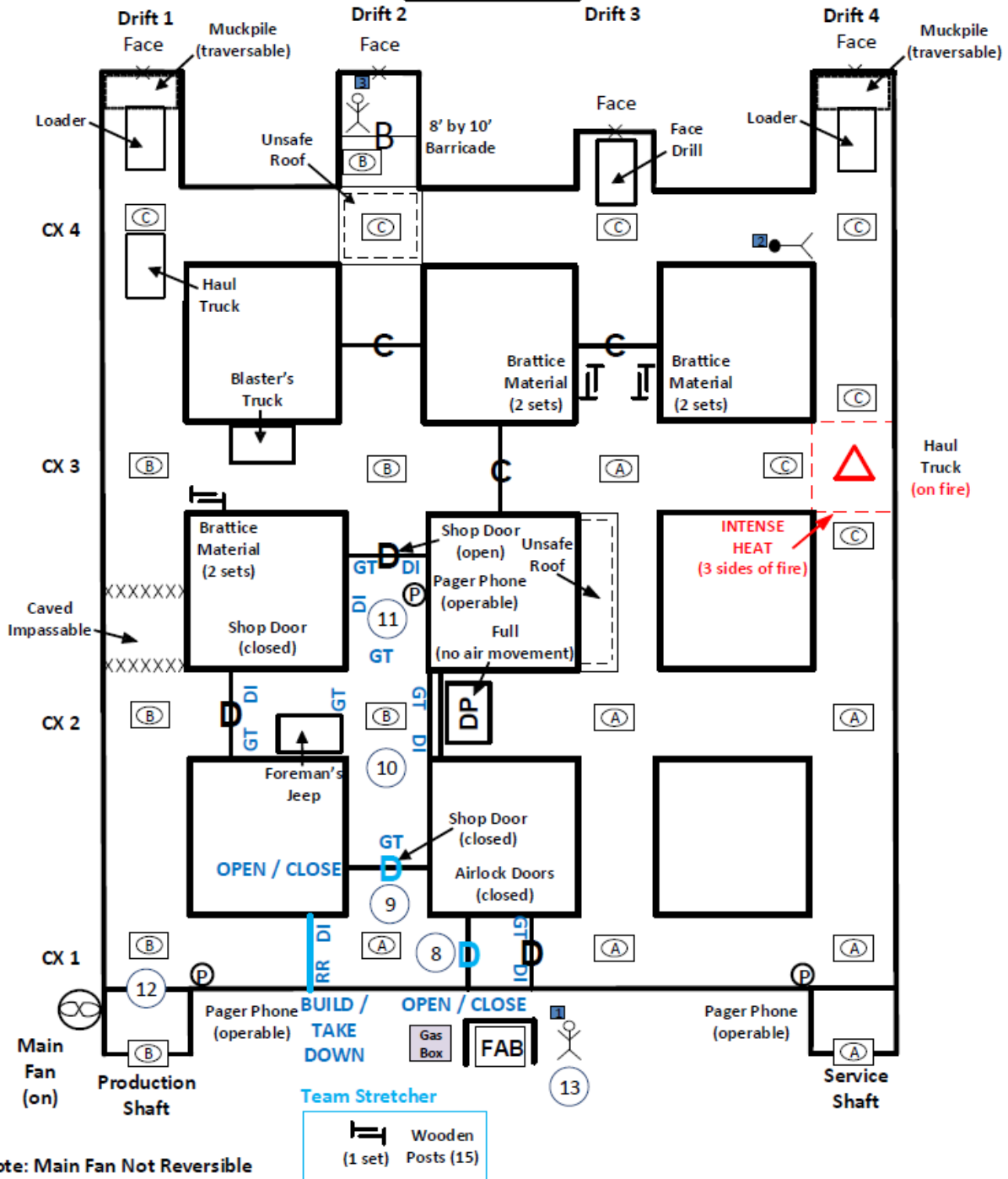
1 = Team Stop

Gas Placard Key:

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(C)	= 15.0 % O ₂ 2,000 ppmCO Heavy Smoke

Missing Miners:

Miner #1 (ID - 0327)
Miner #2 (ID - 1958)
Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Note: Team Stop Nos. 8 - 13 (see Solution Map 3)

Team Stop No. 8

Now, the team has the materials necessary to build a temporary stopping. They can return to CX 1. Because of the limited area in front of the airlock and the shop, one temporary stopping can be erected in CX1 to allow access to both doors. However, before building the temporary stopping, the captain must check the roof and ribs in the immediate area. Afterward, the stopping can be erected and the captain must D&I the installation. Then, the westernmost airlock door can be opened and the captain must check the roof or back before any team member passes through. A gas test will show that the concentrations have not changed from their previous location (clear air). Once inside of the airlock, the captain can D&I the inside of the easternmost door as their furthest point of advance in this direction. The team can now retreat and close the airlock door behind them.

The captain's failure to verbally indicate he/she is checking the back or roof where required will result in discounts (5 x each occurrence) per Judge 1 – UG Rule #8(b)(4).

Team Stop No. 9

The team can now open the southernmost shop door. Again, the captain must check the roof or back before the team passes through. A gas test will show that the concentrations have not changed from their previous location (clear air).

Team Stop No. 10

Now, the team can advance northward in Drift 2 toward CX 2. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find the drift to the north is open and a placard indicating “16.5 % O₂ and 1,300 ppm CO with smoke.” To the east, the team will find a permanent stopping. The captain must D&I the stopping as their furthest point of advance in this direction. To the west in the crosscut, the team will find a foreman's jeep parked along the southern rib. The team can stretch along side of the jeep to the westernmost shop door. The captain will check the roof or back and the team will conduct necessary gas tests. The captain must D&I the door as their furthest point of advance in this direction.

The team's failure to conduct a team check before entering smoke at this location will result in discounts (5 x each infraction) per Judge 1 – UG Rule #12. Additionally, a team member's failure to be attached to or have hold of the lifeline when in smoke will result in discounts (2 x each infraction) per Judge 2 – UG Rule #9.

Team Stop No. 11

The team can continue to advance northward in Drift 2 toward CX 3. As they travel, they will find an operable pager phone along the eastern rib and the first missing miner (Miner #1, ID 0327), who is unresponsive and lying along the western rib. The captain must examine the roof or back over Miner #1. After a team member conducts a primary assessment, the #1 Judge will hand the team 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 10th Edition on page 397).

The team must prepare Miner #1 for travel. At this time, the team can continue with their secondary survey and then secure the miner to the stretcher. The unconscious miner must also be fitted with proper respiratory protection (i.e., a 4-hour breathing apparatus, per Judge 1 - UG Rule 18d and page 30 of the Rules booklet for unconscious survivor).

The captain can continue to explore while team members are preparing Miner #1 for transport. The captain will find that the northernmost shop door is open. The captain must perform roof or back checks at the door while a team member conducts necessary gas tests. Before leaving the area, the captain must D&I the location of the miner and the shop door (as their furthest point of advance in this direction).

Team Stop No. 12

The team with Miner #1 on their stretcher can retreat southward in Drift 2 toward CX1. After passing through the southernmost shop door, they can close it behind them. Then, they can take down the temporary stopping that they had erected and take it with them for future use. Afterward, they can advance westward in CX 1 toward the Production Shaft. At the shaft, the team will enter the escape hoist, close the shaft gate, signal the hoist engineer and ascend to the surface.

Team Stop No. 13

Upon exiting the cage, the team can report to the fresh air base and arrange for follow-up medical treatment for Miner #1. Then, the team can prepare to re-enter the mine.

Note: Team Stop Nos. 14 - 18 (see Solution Map 4)

Team Stop No. 14

Now, the team will travel to the Service Shaft, enter the conveyance, close the shaft gate and signal the hoist engineer. Afterward, they will descend in the shaft to the mine level. To continue systematic exploration of the mine, the team will exit the cage and close the shaft gate. Then, they can advance northward in Drift 4 toward CX 3.

Team Stop No. 15

As the team approaches the intersection with CX 3, they will find a gas placard indicating “15.0 % O₂ and 2,000 ppm CO with heavy smoke.” They will also find placards indicating “intense heat” and a haul truck “on fire.” The captain must D&I the location of the “intense heat.” Then, the team must erect a seal across the drift to isolate the fire, leaving a regulator to avoid making a ventilation change. The captain must D&I the build.

The team must conduct a team check before entering smoke at this location and all team members must be attached to or have hold of the lifeline.

If a team member advances past the placard indicating “intense heat” assess individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(4). Also, if the captain doesn’t check the roof and rib prior to building a temporary stopping, assess 5 discounts per Judge 1- UG Rule #8(b)(3). If the captain does not D&I the build, assess discounts per Judge 1 – UG Rule #9 (2x each place - 10 max).

Team Stop No. 16

Without undue delay, the team must find and seal all other approaches to the fire. The team will retreat to the intersection of CX 2 and Drift 4. Then, the team can advance westward in CX 2 and then northward in Drift 3 toward CX 3. As they pass the area of unsafe roof extending from the western rib, the captain must warn the other team members to avoid the hazard. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find “clear air” and the crosscuts to the east and west and the drift to the north are open. They will also find four sets of brattice material in the drift inby the intersection to the north. They can take two sets of brattice material with them and stretch eastward in CX 3 to find a gas placard indicating “15.0 % O₂ and 2,000 ppm CO with heavy smoke.” They will also find placards indicating “intense heat” and a haul truck “on fire.” The captain must D&I the location of the “intense heat.” Then, the team must again erect a seal across the drift to isolate the fire, leaving a regulator to avoid making a ventilation change. The captain must D&I the build.

The team must conduct a team check before entering smoke at this location and all team members must be attached to or have hold of the lifeline.

Team Stop No. 17

Without undue delay, the team must find and seal all other approaches to the fire. The team will retreat to the intersection of CX 3 and Drift 3. Then, the team can take another set of brattice material with them (two sets onboard their stretcher) and advance northward in Drift 3 through the check curtain toward CX 4. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. At this location, the team will be in “15.0 % O₂ and 2,000 ppm CO with heavy smoke.” They will also find a face drill parked in the face area of the drift with its rear section extending into the crosscut. Finally, they will find that CX 4 is open to the west and east.

The team must conduct a team check before entering smoke at this location and all team members must be attached to or have hold of the lifeline.

Note: The team cannot advance beyond 3 feet past CX 4, because they had not tied-in the entries behind them.

Team Stop No. 18

Now, the team can advance eastward in CX 4 to Drift 4. As they travel, they will find the second missing miner lying along the southern rib, Miner #2 (ID – 1958), who is unresponsive. The team captain must perform necessary roof or back checks over the miner. After a primary assessment, the #1 Judge 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, the captain will perform roof or back checks and the team conducts necessary gas tests. They will find that the gas concentrations had not changed from their previous location. They will also find a loader parked in the face area. Stretching southward in Drift 4, they will find a gas placard indicating “15.0 % O₂ and 2,000 ppm CO with heavy smoke.” They will also find placards indicating “intense heat” and a haul truck “on fire.” The captain must D&I the location of the “intense heat.” Then, the team must again erect a seal across the drift to isolate the fire, leaving a regulator to avoid making a ventilation change. The captain must D&I the build.

At this point, seals have been erected at all approaches in order to contain the fire and airflow has been regulated through the area. The team can now continue exploring the remaining accessible areas of the mine.

Day 1 – Solution Map 5

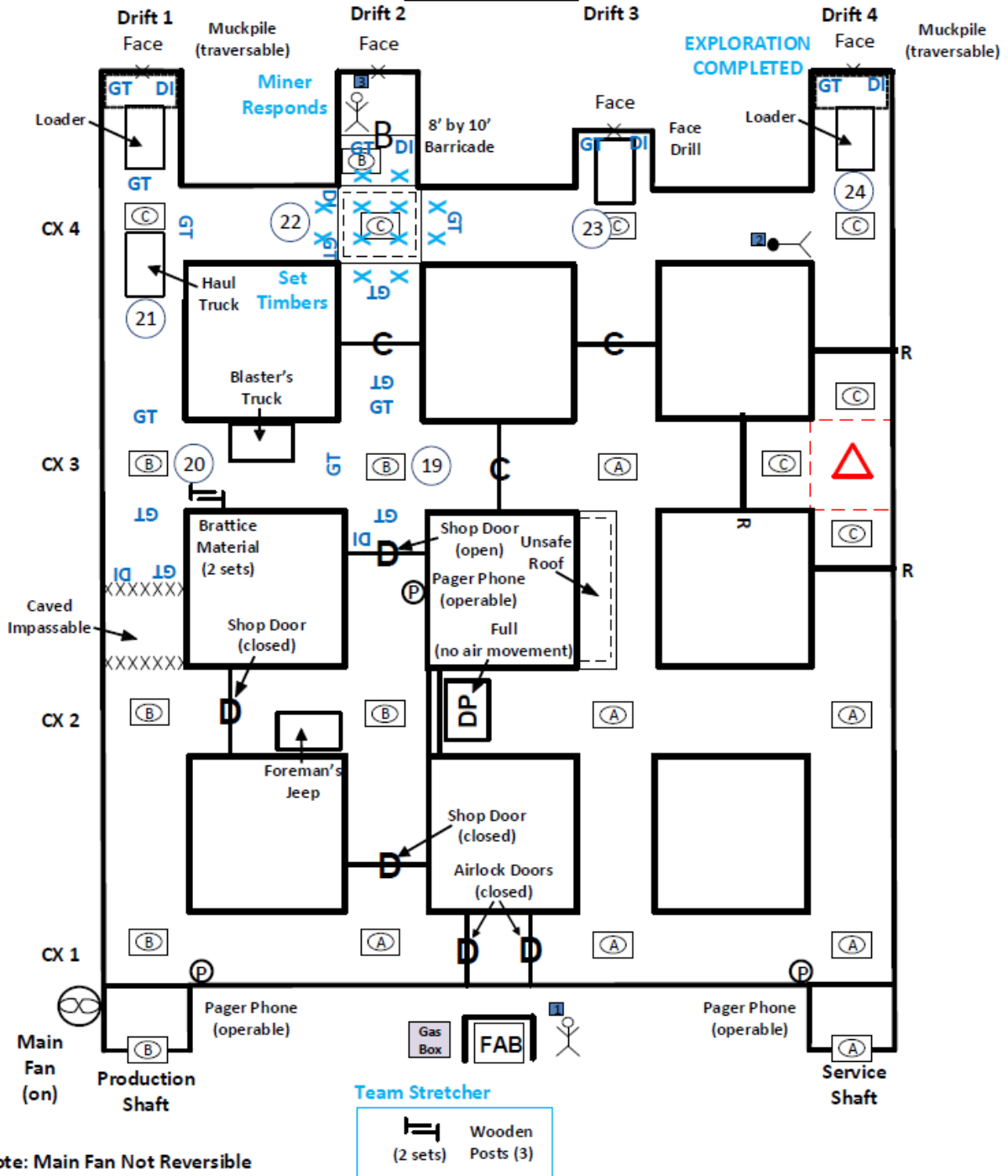
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

	Miner #1 (ID - 0327)
	Miner #2 (ID - 1958)
	Miner #3 (ID - 5432)



Note: Team Stop Nos. 19 - 24 (see Solution Map 5)

Team Stop No. 19

To continue systematic exploration and tie in all areas behind them, the team will retreat to the intersection of Drift 3 and CX 3. They can take the remaining set of brattice material in Drift 3 with them for future use (two sets onboard their stretcher). Then, the team can advance westward in CX 3 through the check curtain toward Drift 2. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. At this location, the team will find “16.5 % O₂ and 1,300 ppm CO with smoke.” They can stretch southward in the drift to the open shop door. The captain must D&I the door as their furthest point of advance in this direction.

The team must conduct a team check before entering smoke at this location and all team members must be attached to or have hold of the lifeline.

Team Stop No. 20

To tie-in, the team must continue to advance westward in CX3 toward Drift 1. They will find a “blaster’s truck” parked along the northern rib and two sets of brattice material lying along the southern rib. They must leave the brattice material in place since they already have two sets onboard their stretcher. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find that the gas concentrations in this area had not changed from their previous location.

Now, the team can stretch further southward in Drift 1 toward CX 2 to tie-in. They will find the northern most extent of the impassable cave. The captain performs roof or back checks and the team conducts necessary gas tests. The captain must D&I the cave as their furthest point of advance in this direction.

Team Stop No. 21

The team will advance northward in Drift 1 toward CX 4. As they travel, they will find a haul truck parked in the middle of the drift extending into the crosscut. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find “15.0 % O₂ and 2,000 ppm CO with heavy smoke.” Since all of the crosscuts have been tied-in behind them, they can stretch into the face area to find a loader parked in the middle of the drift. They can stretch along side of the loader to find a muckpile extending approximately 4 feet from the face. The placard at this location indicates that the muckpile is traversable. Therefore, the captain can check the roof or back while the team conducts necessary gas tests. Before leaving the area, the captain must D&I the face as the team’s furthest point of advance in this direction.

Day 1 – Solution Map 5

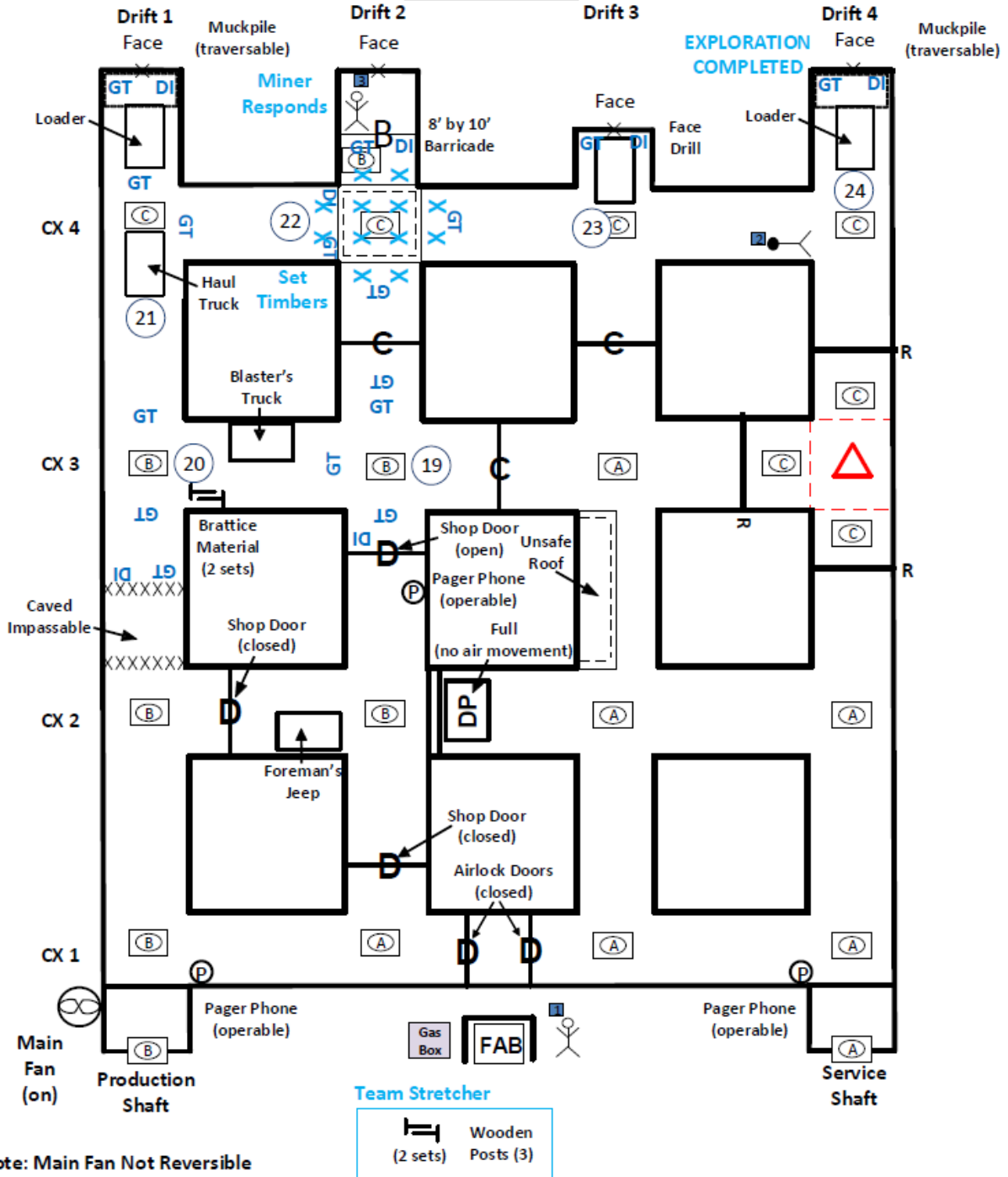
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

[Blue Square]	Miner #1 (ID - 0327)
[Green Square]	Miner #2 (ID - 1958)
[Red Square]	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Team Stop No. 22

The team can retreat to CX 4 and advance eastward toward Drift 2. At the intersection, the team will find placards indicating an area of “unsafe roof” completely encompassing the intersection. The captain must warn the other team members to avoid this hazard and D&I the location. The team must conduct necessary gas tests and then proceed to support the area using 12 of the 15 wooden posts that they had found in CX 2 and carried on their stretcher. **The team should follow the example shown in Figure 3 on page 38 of the 2017 - 2018 Metal and Nonmetal Mine Rescue Contest Rules booklet.** If the team removes any installed post after it has been set, assess a team endangerment (75 discounts) or individual endangerment (15 x each person) per Judge 1 – UG Rule #10(b)(7).

In the middle of the intersection, the team will find a placard indicating that the gas concentrations had not changed from their previous location. Afterward, the team can stretch southward in Drift 2 to tie-in. Then, they can advance northward in the drift toward the face area. Approximately 5 feet in by the intersection, the team will find an “8-foot by 10-foot barricade” stretching from rib-to-rib. At the barricade, the captain must perform roof or back checks and the team will conduct necessary gas tests. They will also find a placard indicating “16.5% O₂ and 1,300 ppm CO with smoke.” The team can converse with the missing miner inside. Judge No. 1 will hand the team a placard with the following statement:

“I am Miner #3 (ID – 5432). I was operating a face drill in Drift 3 when the mine filled with smoke. I tried to leave but could not see to find my way out. I retreated and found a place to barricade. The air inside of this barricade is O.K. There is a solid face behind me. Please get me out of here.”

Note: Since the atmosphere immediately in front of the barricade contains oxygen and carbon monoxide concentrations that represent an IDLH atmosphere, as defined on under “Barricades” on Page 29 of the 2017-2018 Metal and Nonmetal Mine Rescue Contest Rules, the team cannot enter the barricade without first re-ventilating.

Therefore, the team must instruct Miner #3 to remain safely inside of the barricade until they can make a ventilation change to flush the contaminants from the area.

Team Stop No. 23

After retreating to CX 4, the team can travel eastward in the crosscut to Drift 3. At the intersection, the team can advance northward beside the face drill to the face of the drift. The captain can check the roof or back while the team conducts necessary gas tests. Before leaving the area, the captain must D&I the face as the team’s furthest point of advance in this direction.

Day 1 – Solution Map 5

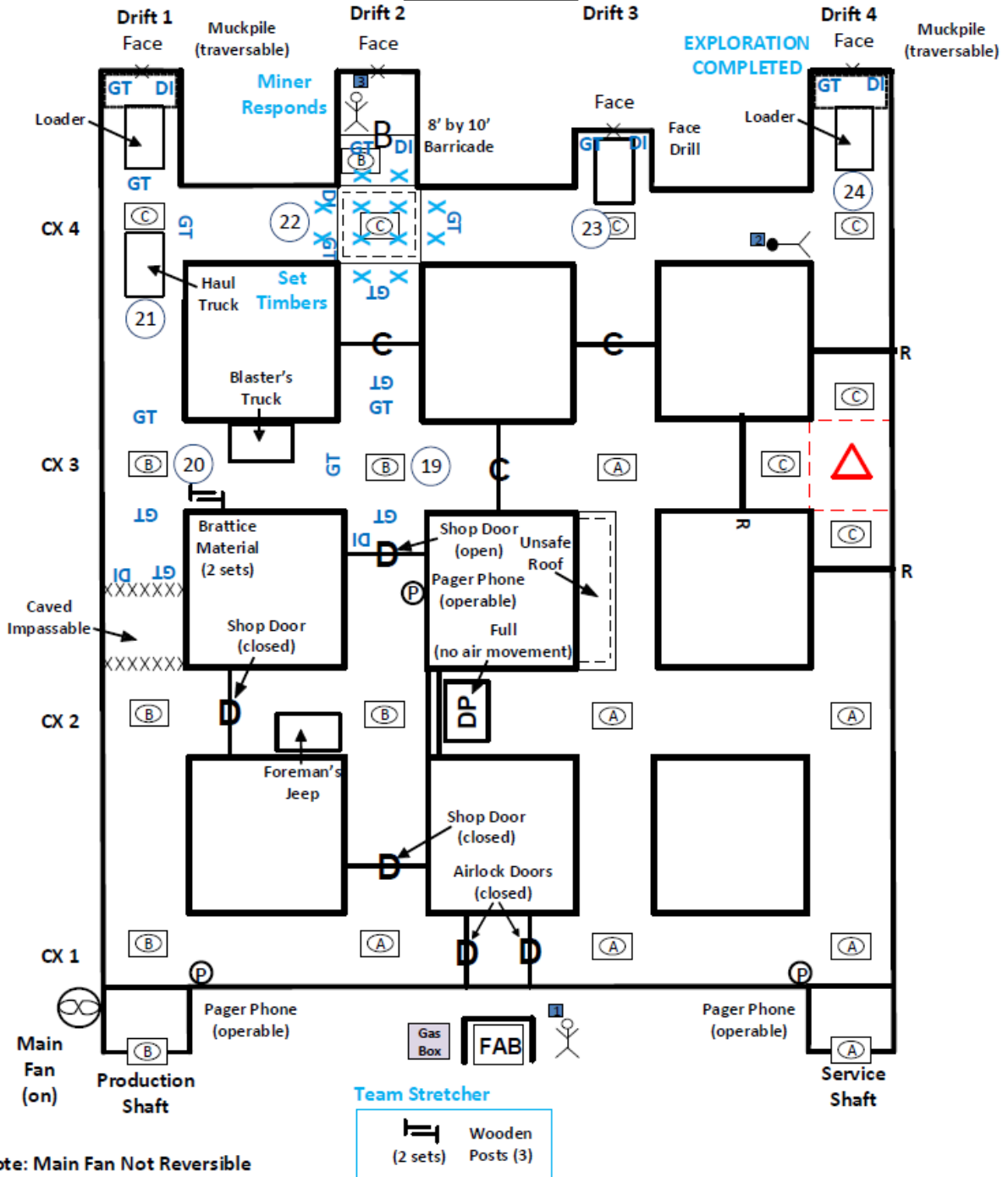
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

[Blue Square]	Miner #1 (ID - 0327)
[Green Square]	Miner #2 (ID - 1958)
[Red Square]	Miner #3 (ID - 5432)



Note: Main Fan Not Reversible

Team Stop No. 24

After retreating to CX 4, the team can travel eastward in the crosscut to Drift 4. At the intersection, the team can advance northward beside the loader to find a muckpile extending approximately 4 feet from the face. The placard at this location indicates that the muckpile is traversable. Therefore, the captain can check the roof or back while the team conducts necessary gas tests. Before leaving the area, the captain must D&I the face as the team's furthest point of advance in this direction.

At this point in the problem, all accessible areas have been explored and all three missing miners have been accounted for.

Day 1 – Solution Map 6

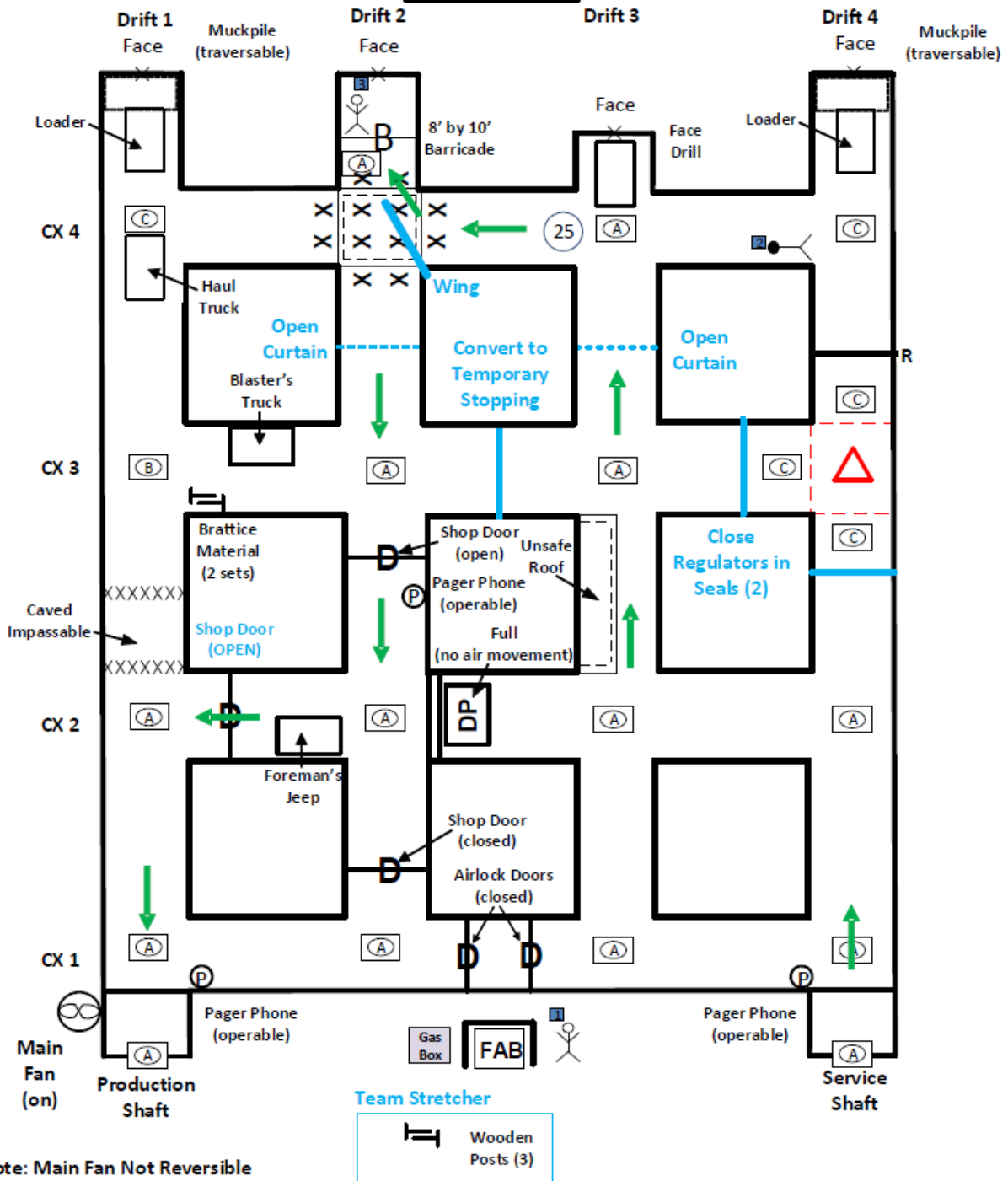
1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 16.5 % O ₂ 1,300 ppm CO Smoke
(C)	= 15.0 % O ₂ 2,000 ppm CO Heavy Smoke

Missing Miners:

[Blue Square]	Miner #1 (ID - 0327)
[Green Square]	Miner #2 (ID - 1958)
[Red Square]	Miner #3 (ID - 5432)



Note: Team Stop No. 25 (see Solution Map 6) – Re-ventilation

Team Stop No. 25

Now, the team must make a ventilation change to direct fresh air toward the face area of Drift 2 in order sweep the gas concentrations away from the barricade. They must discuss the needed changes with the Mine Manager and the Fresh Air Base. That is:

- 1) Close the regulator in the fire seal located in CX 3 and the regulator in the southernmost fire seal located in Drift 4;
- 2) Convert the check curtain located in CX 3 between Drift 2 and Drift 3 to a temporary stopping;
- 3) Open the check curtain located in Drift 2 between CX 3 and CX 4 and the check curtain located in Drift 3 between CX 3 and CX 4; and
- 4) Open the westernmost shop door located in CX 2.

If all of these changes are made, seven gas placards along the way from the intersection of Drift 3 and CX 4 along the route in Drift 2 and Drift 1 back to the Production Shaft (Placard - Nos. 66, 69, 41, 27, 35, 6, and 4) can be flipped to show “clear air.”

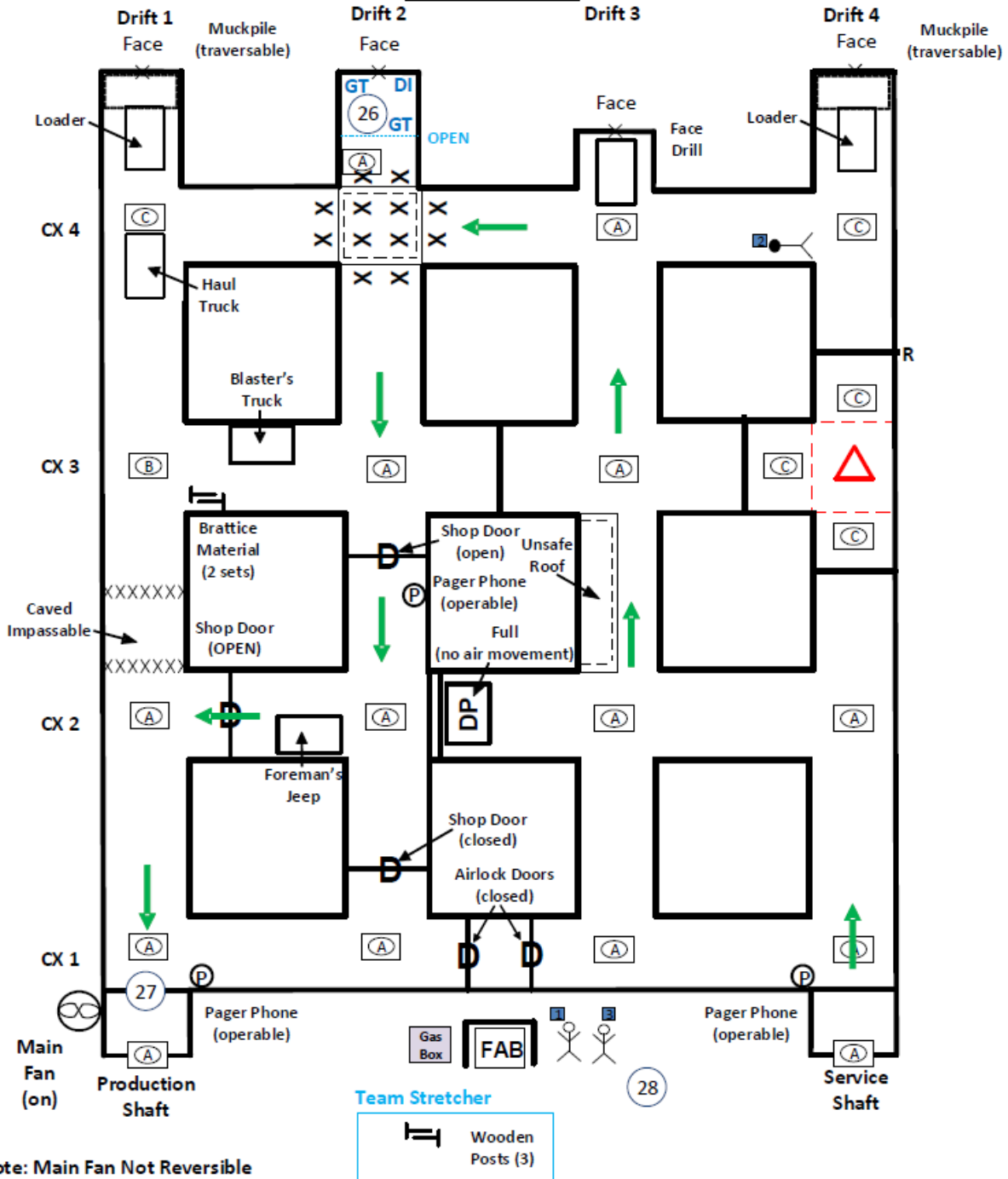
Finally, the team will need to erect a “wing” curtain in CX 4 to direct additional airflow toward the face area of Drift 2 and flush the last remaining contaminants away from the barricade. At that time, the last placard (No. 74) can be flipped to show “clear air.”

Day 1 – Solution Map 7

1 = Team Stop

Gas Placard Key:
 (A) = Clear Air
 (B) = 16.5 % O₂
 1,300 ppm CO
 Smoke
 (C) = 15.0 % O₂
 2,000 ppmCO
 Heavy Smoke

Missing Miners:
 Miner #1 (ID - 0327)
 Miner #2 (ID - 1958)
 Miner #3 (ID - 5432)



Note: Team Stop Nos. 26 - 28 (see Solution Map 7)

Team Stop No. 26

With “clear air,” the team can open the barricade. Inside they will find Miner #3. Team members can assess the miner’s condition and find that he is not injured and able to walk out with the team. Before leaving the area, the captain can 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. Then, the team can escort Miner #3 southward toward the Production Shaft station.

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

Team Stop No. 27

Once at the Production Shaft Station, they can enter the conveyance, close the shaft gate, signal the hoist engineer and ascend in the escape hoist to the surface.

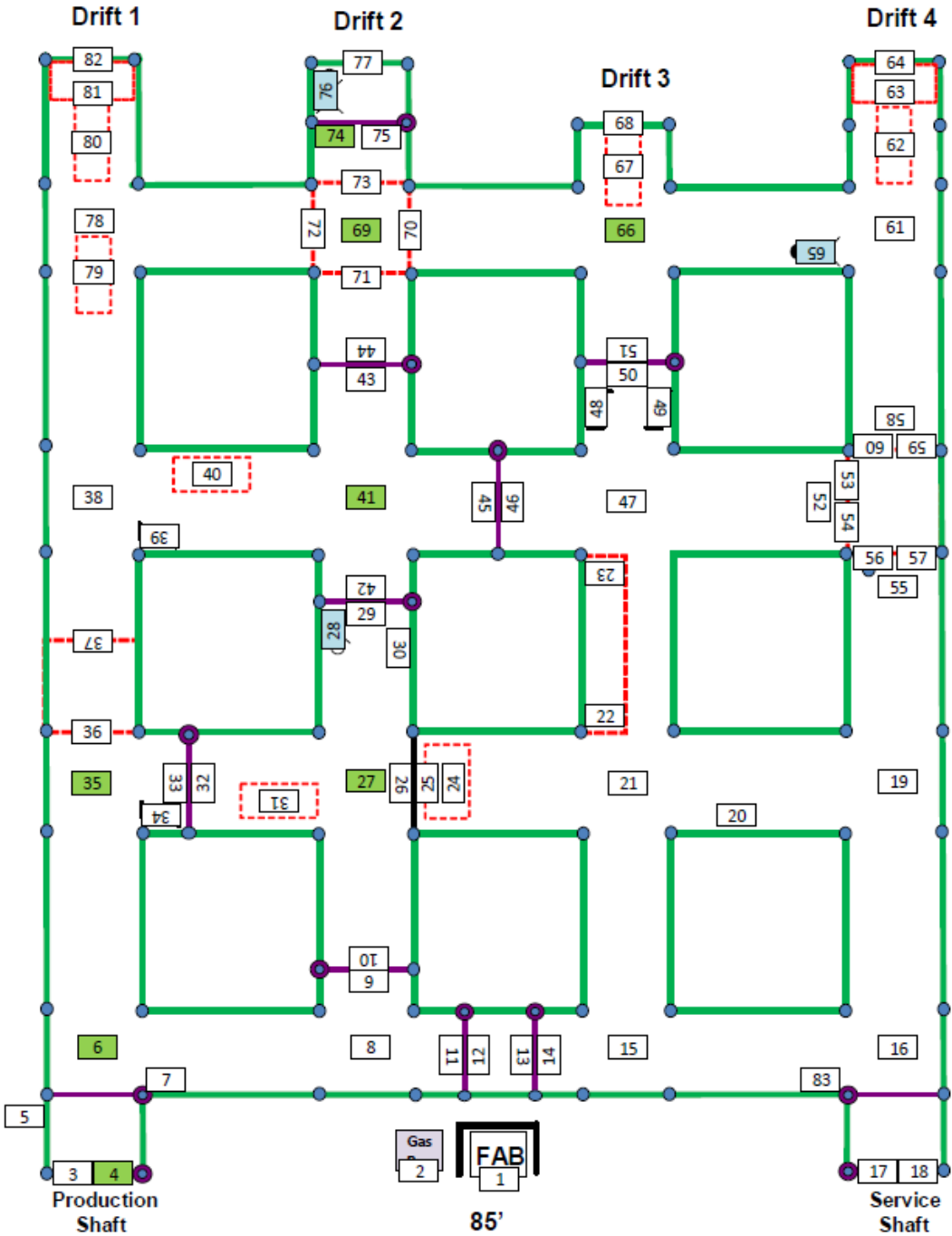
Team Stop No. 28

Upon exiting the cage, the team must count off (this is the last time that the team exits the mine). Afterward, they can leave Miner #3 with the attendants for any follow-up medical treatment. Then, the captain can inform the mine manager that the team has completed their mission. That is, they have explored all accessible areas of the mine, sealed the fire, re-ventilated as needed, located the three missing miners, and brought two of them out alive.

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

Day 1 – Placard Map

1	= Single-sided Placard
18	= Double-sided Gas Placard
76	= Double-sided Miner Placard

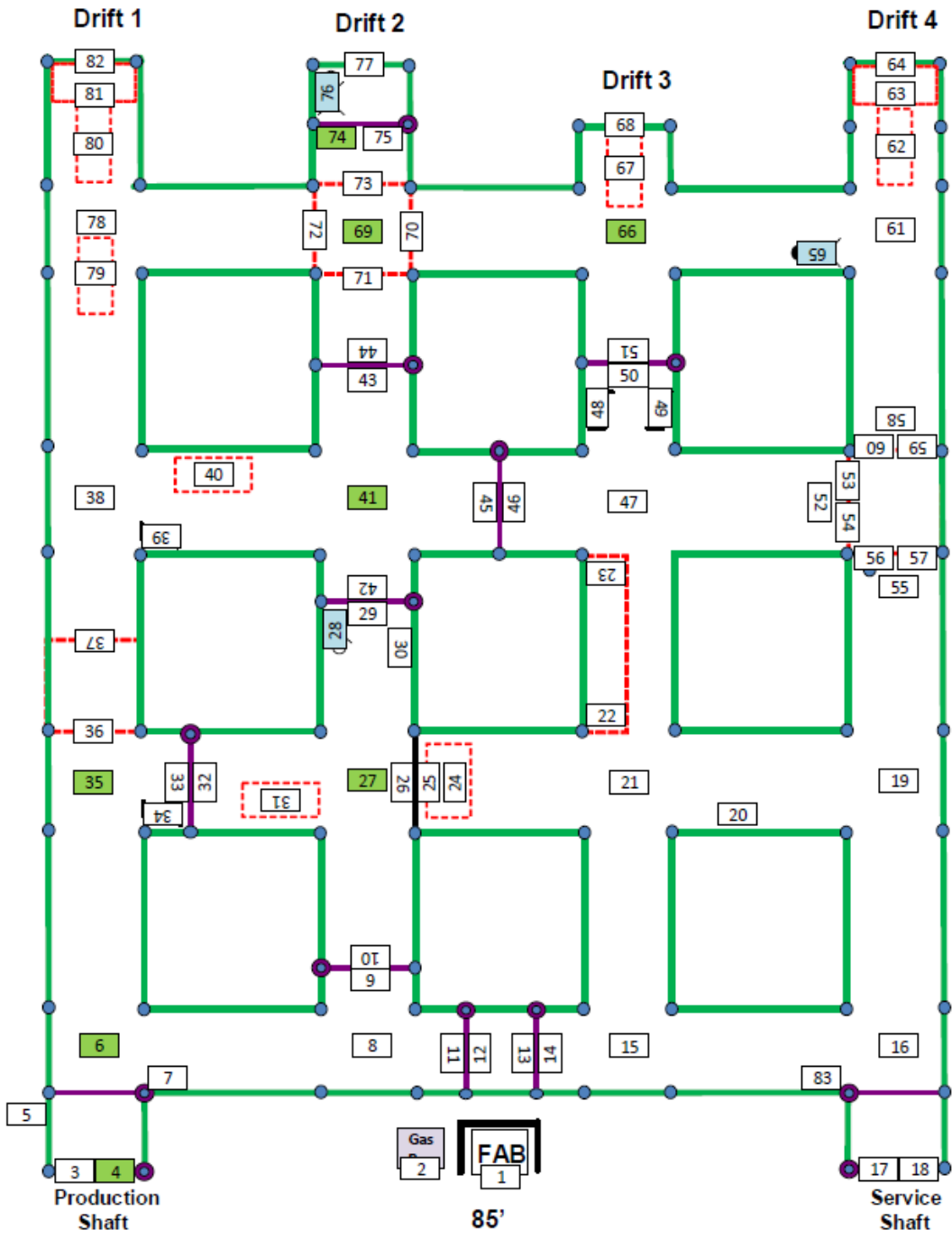


Placard Key:

1. Fresh Air Base
2. Gas Test Station
3. Production Shaft
4. 16.5 % O₂
1,300 ppm CO
Smoke
5. Main Fan (ON)
6. 16.5 % O₂
1,300 ppm CO
Smoke
7. Pager Phone (operable)
8. Clear Air
9. Shop Door (closed)
10. Shop Door (closed)
11. Airlock Door (closed)
12. Airlock Door (closed)
13. Airlock Door (closed)
14. Airlock Door (closed)
15. Clear Air
16. Clear Air
17. Service Shaft
18. Clear Air
19. Clear Air
20. Wooden Posts (15)
21. Clear Air
22. Unsafe Roof
23. Unsafe Roof
24. Dump Pocket
(full, no air movement)
25. Permanent Stopping
26. Permanent Stopping
27. 16.5 % O₂
1,300 ppm CO
Smoke
28. Person / Miner #1 (ID – 0327)
29. Shop Door (open)
30. Pager Phone (inoperable)
31. Foreman's Jeep
32. Shop Door (closed)
33. Shop Door (closed)
34. Brattice Material (1 set)
35. 16.5 % O₂
1,300 ppm CO
Smoke
36. Caved Impassable
37. Caved Impassable
38. 16.5 % O₂
1,300 ppm CO
Smoke

Day 1 – Placard Map

1	= Single-sided Placard
18	= Double-sided Gas Placard
76	= Double-sided Miner Placard

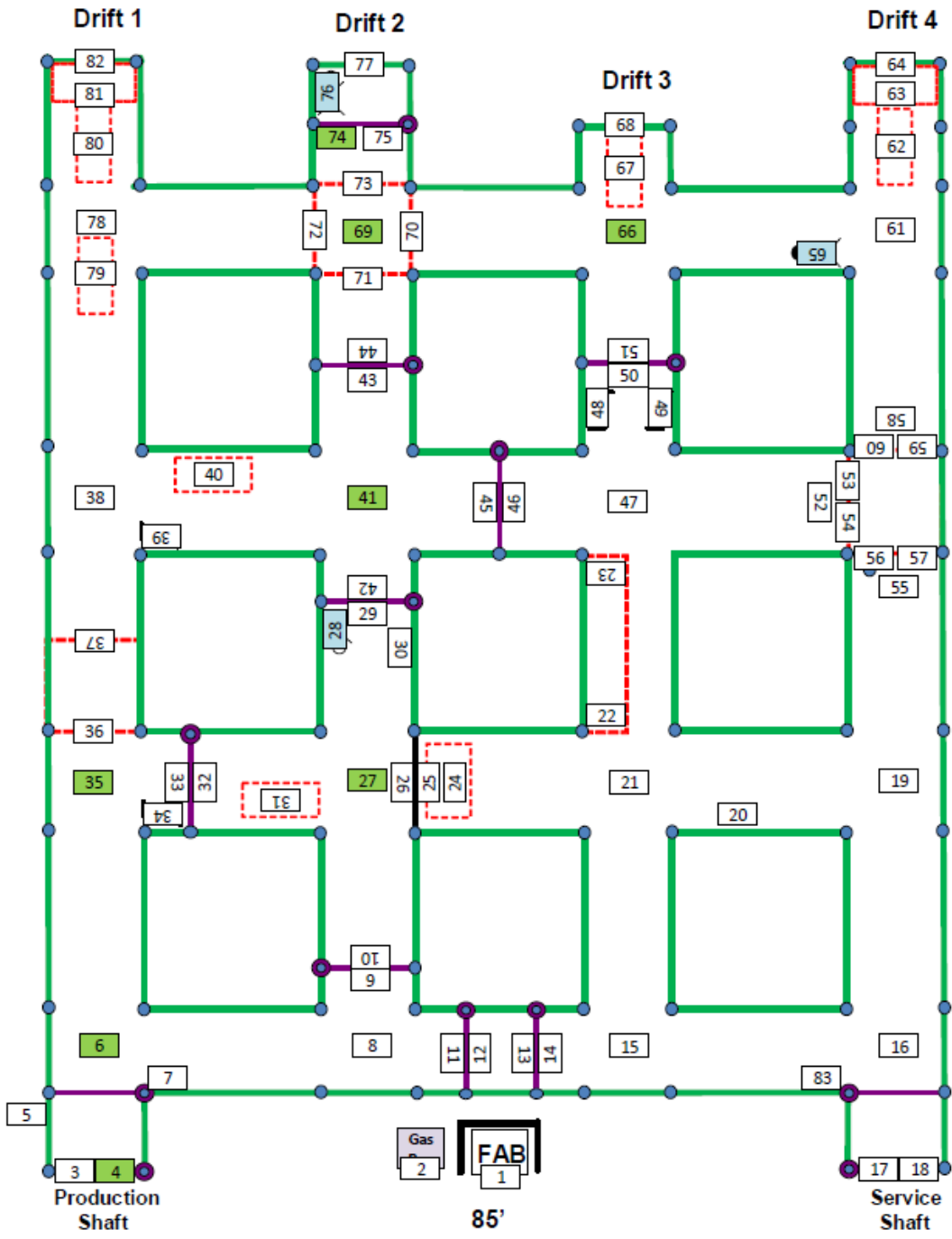


Placard Key (continued):

- | | |
|--|--|
| 39. Brattice Material (2 sets) | 57. Intense Heat |
| 40. Blaster's Truck | 58. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke |
| 41. 16.5 % O ₂
1,300 ppm CO
Smoke | 59. Haul Truck (ON FIRE) |
| 42. Shop Door (open) | 60. Intense Heat |
| 43. Check Curtain | 61. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke |
| 44. Check Curtain | 62. Loader |
| 45. Check Curtain | 63. Muckpile (traversable) |
| 46. Check Curtain | 64. Face – Drift 4 |
| 47. Clear Air | 65. Person / Miner #2 (ID – 1958) |
| 48. Brattice Material (2 sets) | 66. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke |
| 49. Brattice Material (2 sets) | 67. Face Drill |
| 50. Check Curtain | 68. Face – Drift 3 |
| 51. Check Curtain | 69. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke |
| 52. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke | 70. Unsafe Roof |
| 53. Haul Truck (ON FIRE) | 71. Unsafe Roof |
| 54. Intense Heat | 72. Unsafe Roof |
| 55. 15.0 % O ₂
2,000 ppm CO
Heavy Smoke | 73. Unsafe Roof |
| 56. Haul Truck (ON FIRE) | |

Day 1 – Placard Map

1	= Single-sided Placard
18	= Double-sided Gas Placard
76	= Double-sided Miner Placard



Placard Key (continued):

- 74. 16.5 % O₂
1,300 ppm CO
Smoke
- 75. 8' by 10' Barricade
- 76. Person / Miner #3 (ID – 5432)
- 77. Face – Drift 2
- 78. 15.0 % O₂
2,000 ppm CO
Heavy Smoke
- 79. Haul Truck
- 80. Loader
- 81. Muckpile (traversable)
- 82. Face – Drift 1
- 83. Pager Phone (operable)

Note: Double-Sided Placards

Three “Person” placards (28, 65 and 76), one for each missing miner, can be flipped to show their respective identification number.



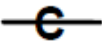







Seven “Gas” placards (4, 6, 27, 35, 41, 66, and 69), can be flipped to show “clear air” when the team has successfully completes changes for re-ventilating the mine.

One additional “Gas” placard (74), can be flipped to show “clear air” if the team erects a “wing” curtain to direct airflow from CX 4 toward the barricade in the face area of Drift 2.

Day 1 – Map Legend

PNP Mining Company
Zipline Mine No. 1
I.D. No. 30-02017
Clymer, NY

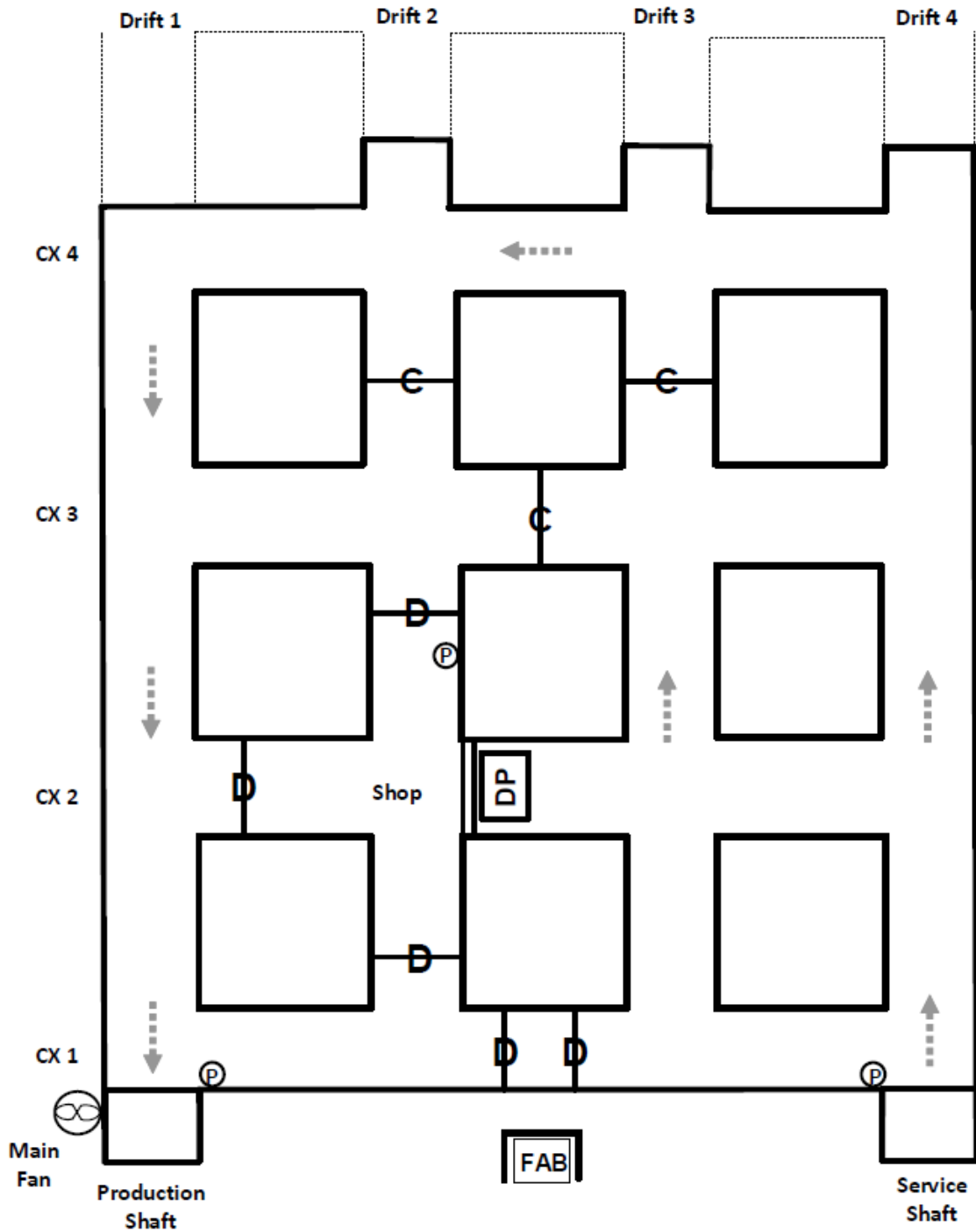
Map Legend:

	Shaft Dump Pocket
	Pager Phone
	Check Curtain
	Permanent Stopping
	Airlock
	Door
	Regulator
	Airflow & Direction
	Ventilation Fan
	Projected Development

Updated May 30, 2017

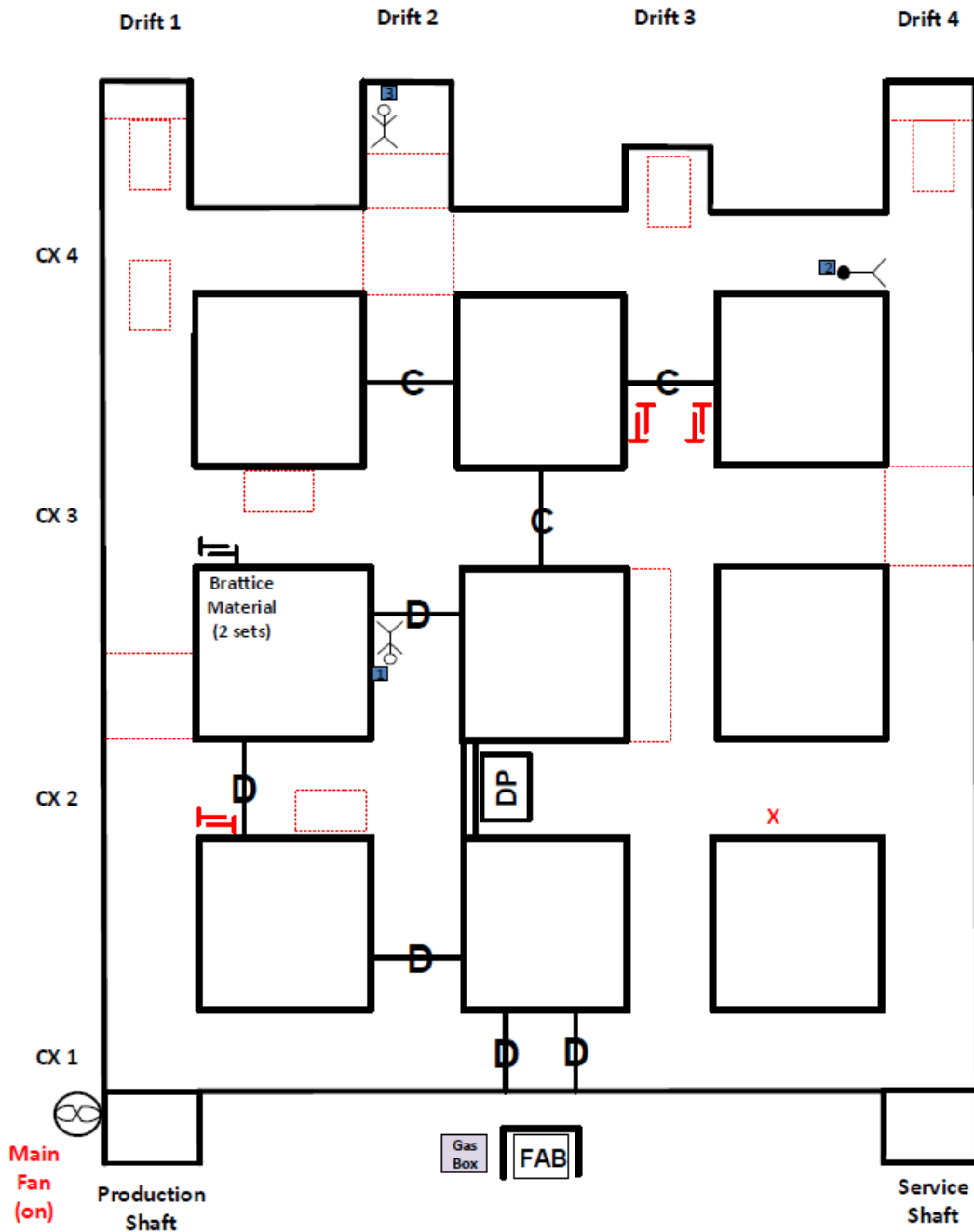
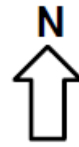
Approx. Scale 1 in . = 10 ft.

Day 1 – Team Map



Day 1 – Judge’s Map

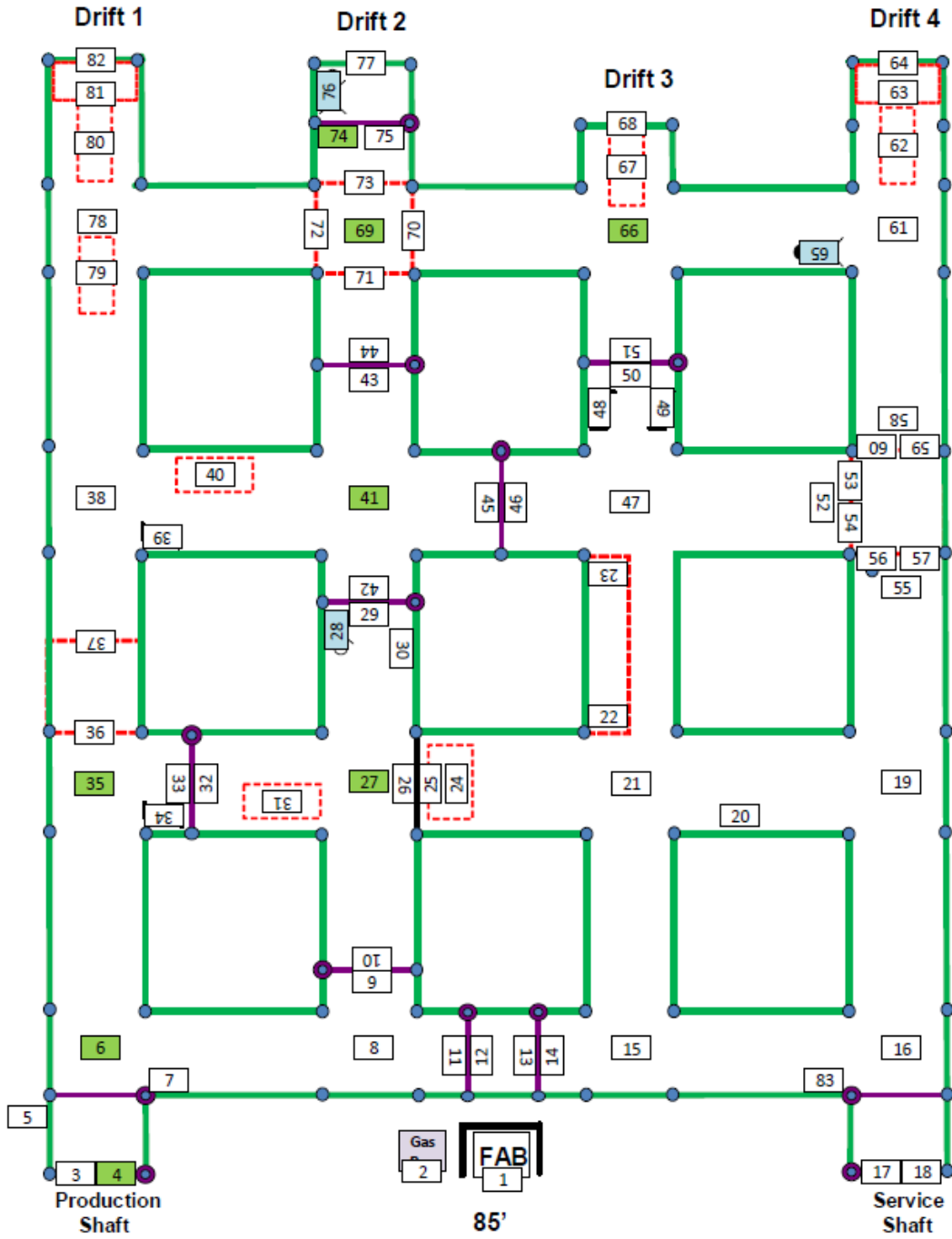
Judge No. _____ Name: _____



Note: Main Fan Not Reversible

Day 1 – Placard Map

1	= Single-sided Placard
18	= Double-sided Gas Placard
76	= Double-sided Miner Placard



Day 1 – Construction Map

