

2015 Northern Regional Mine Rescue Contest

JUDGES' PACKET Field Competition

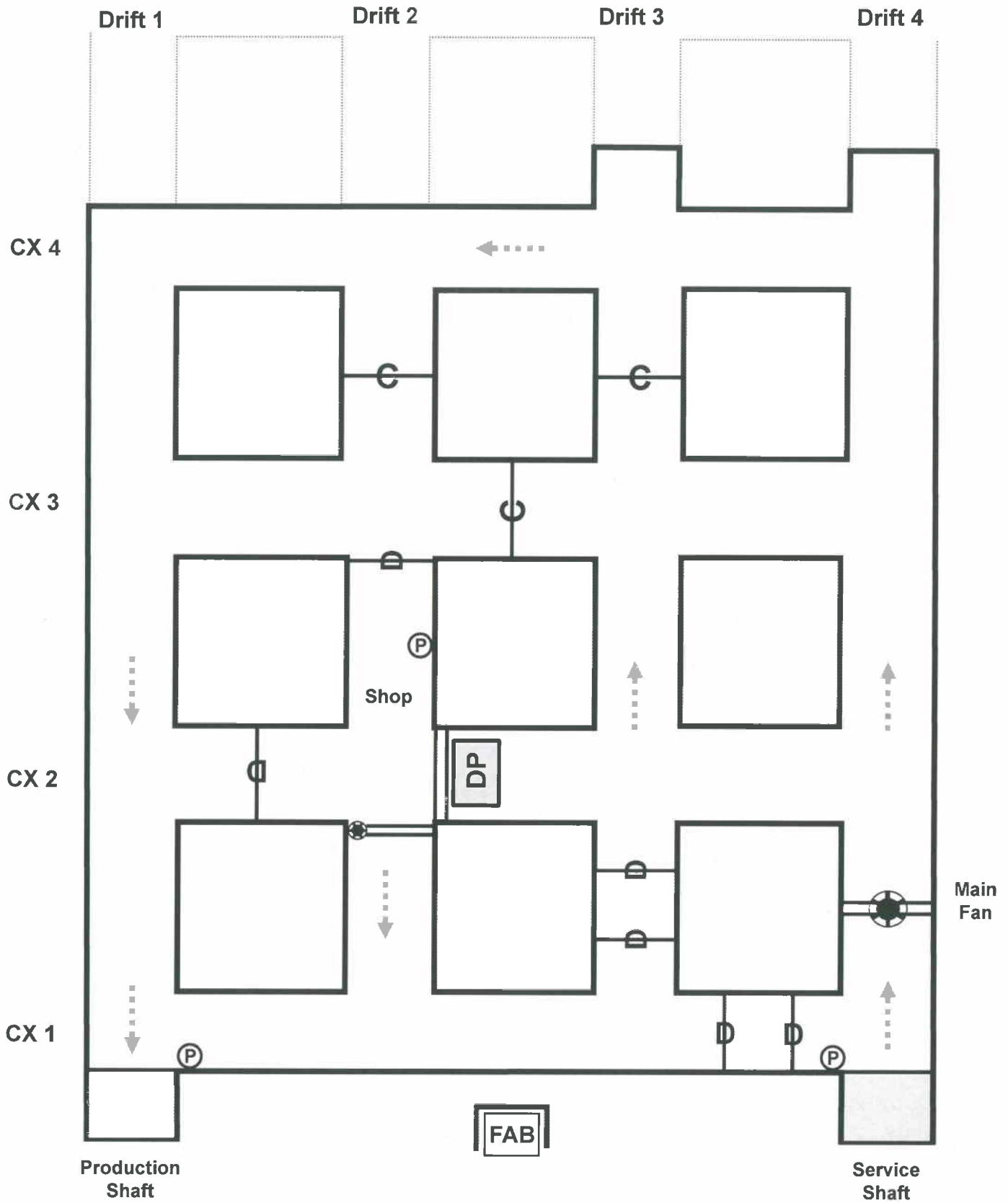


July 29, 2015
Clymer, New York

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Team Map – Level 400



Mine Information Sheet

PNP Mining Co. – Segway Mine

Mining & Equipment:

The mine is projected to be a multi-level mine. Currently, only Level 400 is being developed. On this level, the production crew 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 entries are initially driven 9 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 IV mine, that is, any methane concentrations liberated are not explosive and are not capable of forming explosive mixtures with air, based on the geological area in which the mine is located. Historical hygiene data from the mine, both MSHA and Company's samples, have indicated the presence of methane (CH₄) in only trace amounts. In the past two months, the mine had experienced three separate face ignitions causing a reclassification review by MSHA.

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 which is equipped with skips, as well as an escape compartment which can be used to hoist a maximum of eight persons to the surface.

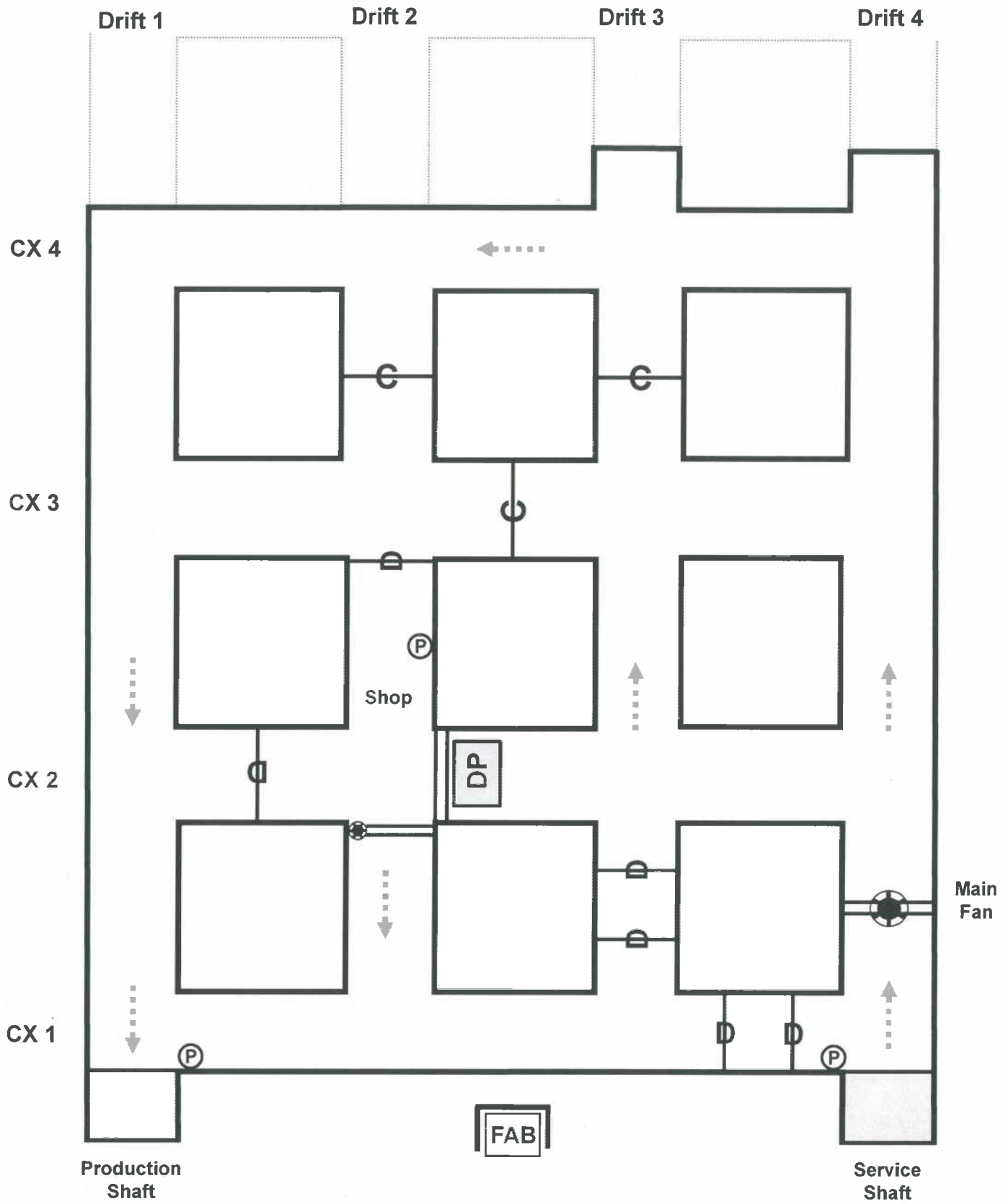
Ventilation:

The 6-ft. diameter blowing Main Fan is located underground in Drift 4 between CX 1 and CX2. The Main Fan is mounted in a permanent stopping and cannot be moved. The fan is not reversible. The fan produces approximately 100,000 cfm and operates in the stable portion of its performance curve. A series of airlock doors have been installed in the adjacent crosscuts near the fan to allow passage to drifts inby 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 of 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.

Team Map – Level 400



Mine Information Sheet (continued)

PNP Mining Co. – Segway Mine

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 July 20, 2015.

Other Mines:

There are several known mines, active and abandoned, in Clymer, New York. At this time, the Segway Mine 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.

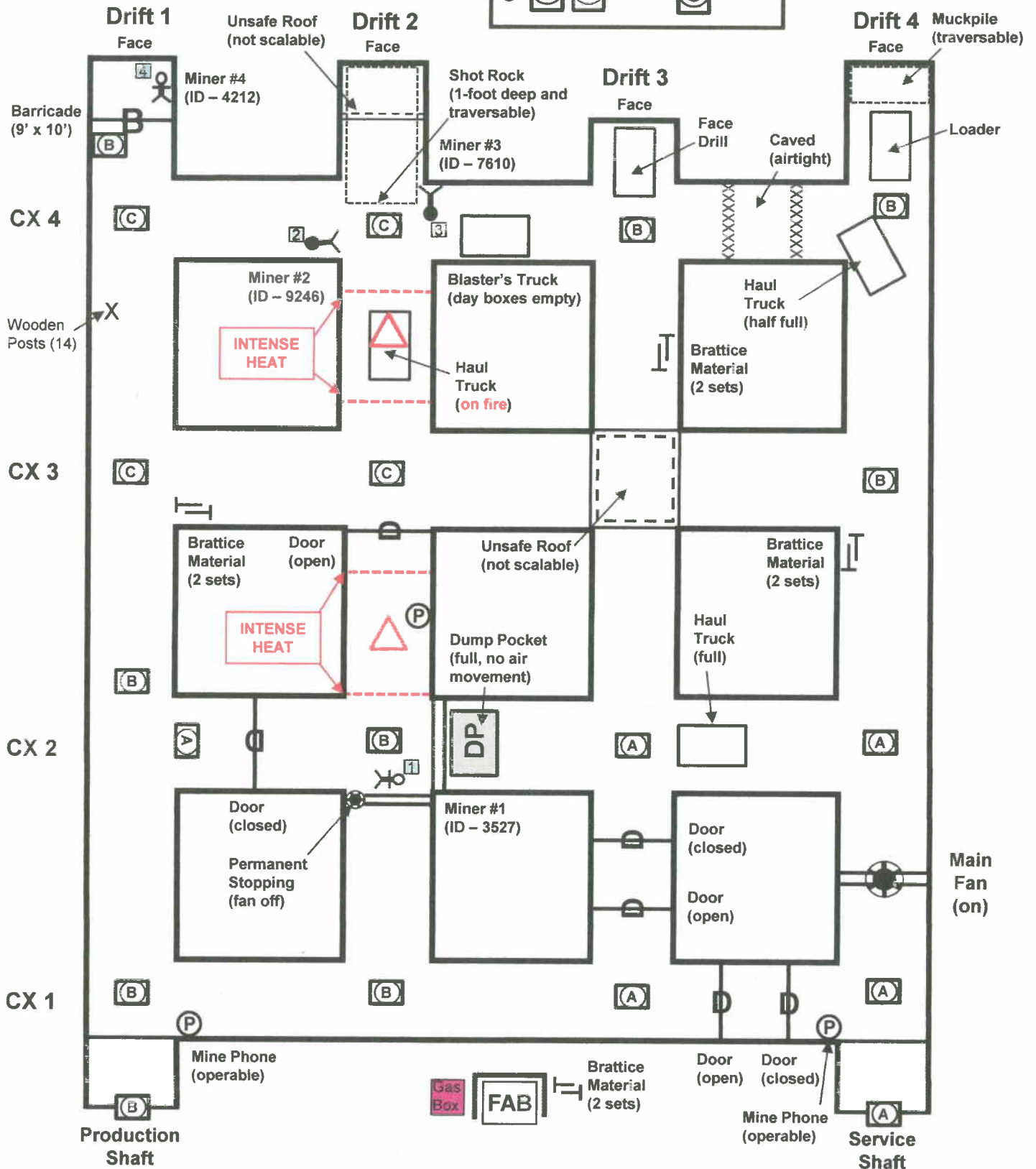
Communications:

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.

Problem Map

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Team Briefing Statement

You are located at the surface of the PNP Mining Company's Segway Mine. The mine is projected to be a multi-level mine and started production on January 6, 2014. Currently, Level 400 is the only active workings underground. 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 eight persons to the surface. The mine is ventilated by an underground Main Fan which is mounted in a permanent stopping in Drift 4 and cannot be moved. The blowing Main Fan produces 100,000 cfm for the mine and cannot be reversed.

Ore is mined by the traditional room and pillar method. The entries are initially driven 9-feet high and 10-feet wide. Pillars dimensions are typically 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., an eight-person crew went underground to start their shift. At about 6:15 a.m., a mechanic called out from the Shop and informed the hoist engineer that there was an apparent explosion underground and dark black smoke was filling the mine. At that time, communication was lost. The 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 getting to Drift 4 due to smoke in the face areas. 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 17 % oxygen (O₂), 0.5 % methane (CH₄), 1,300 ppm carbon monoxide (CO), and 3.0 ppm nitrogen dioxide (NO₂) with light smoke at the Production Shaft.

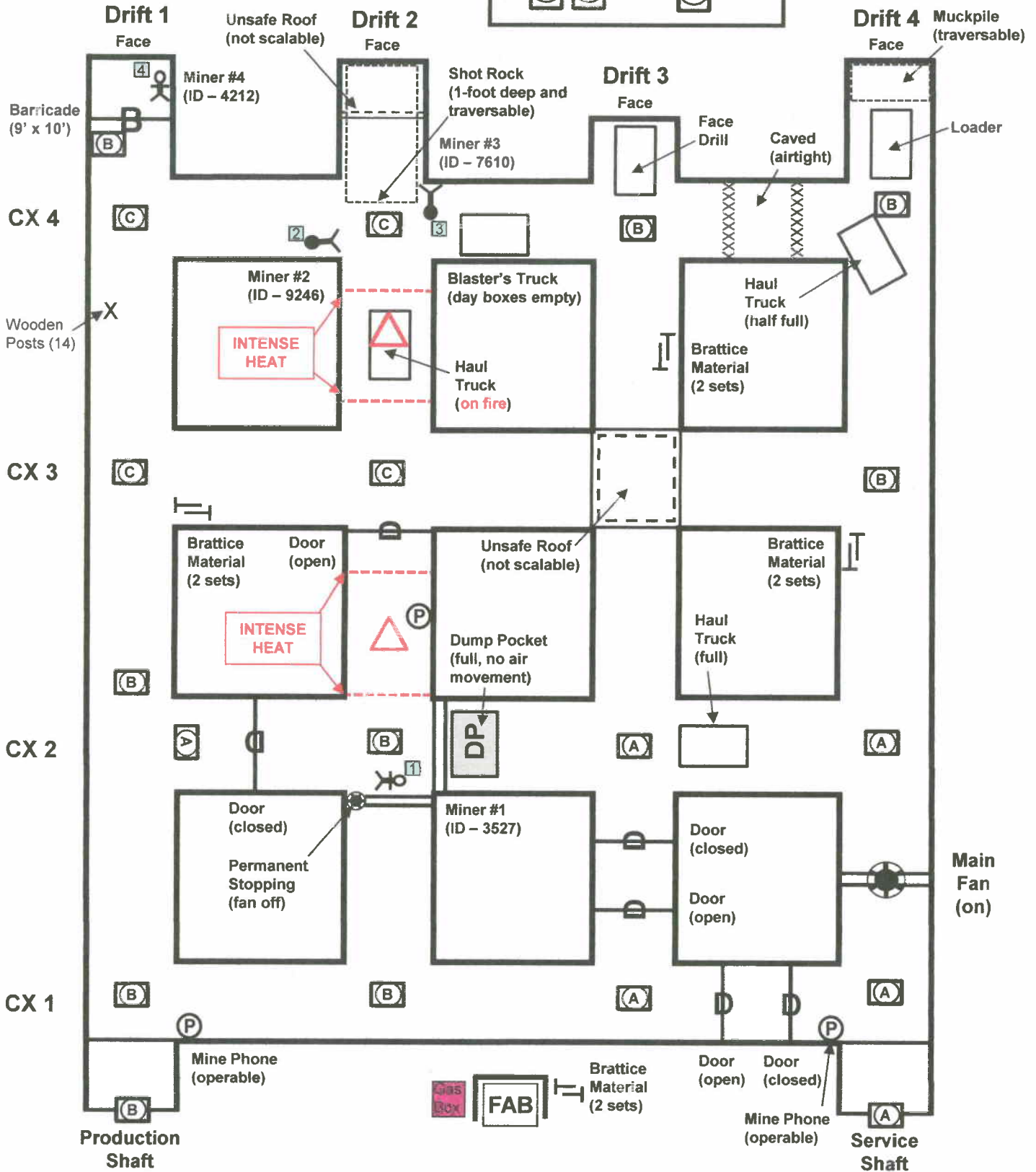
We have called all of the government agencies for help. Guards have been posted at the shafts and at the main power supply for the mine. There is a fully equipped mine rescue team located on the surface and they are ready to serve as your team's backup.

If your team is willing to help, we would like you to account for all missing miners; bring any live miners to the surface; extinguish or seal any fires; and explore and map all

Problem Map

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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 accessible areas of the mine;
- Extinguish or seal any fires;
- Account for the five 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 the #1, and #2 Judges. 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 mine rescue team alternate 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 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 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 alternate's map will also be collected at this time but it will not be scored.

Do you understand these instructions?

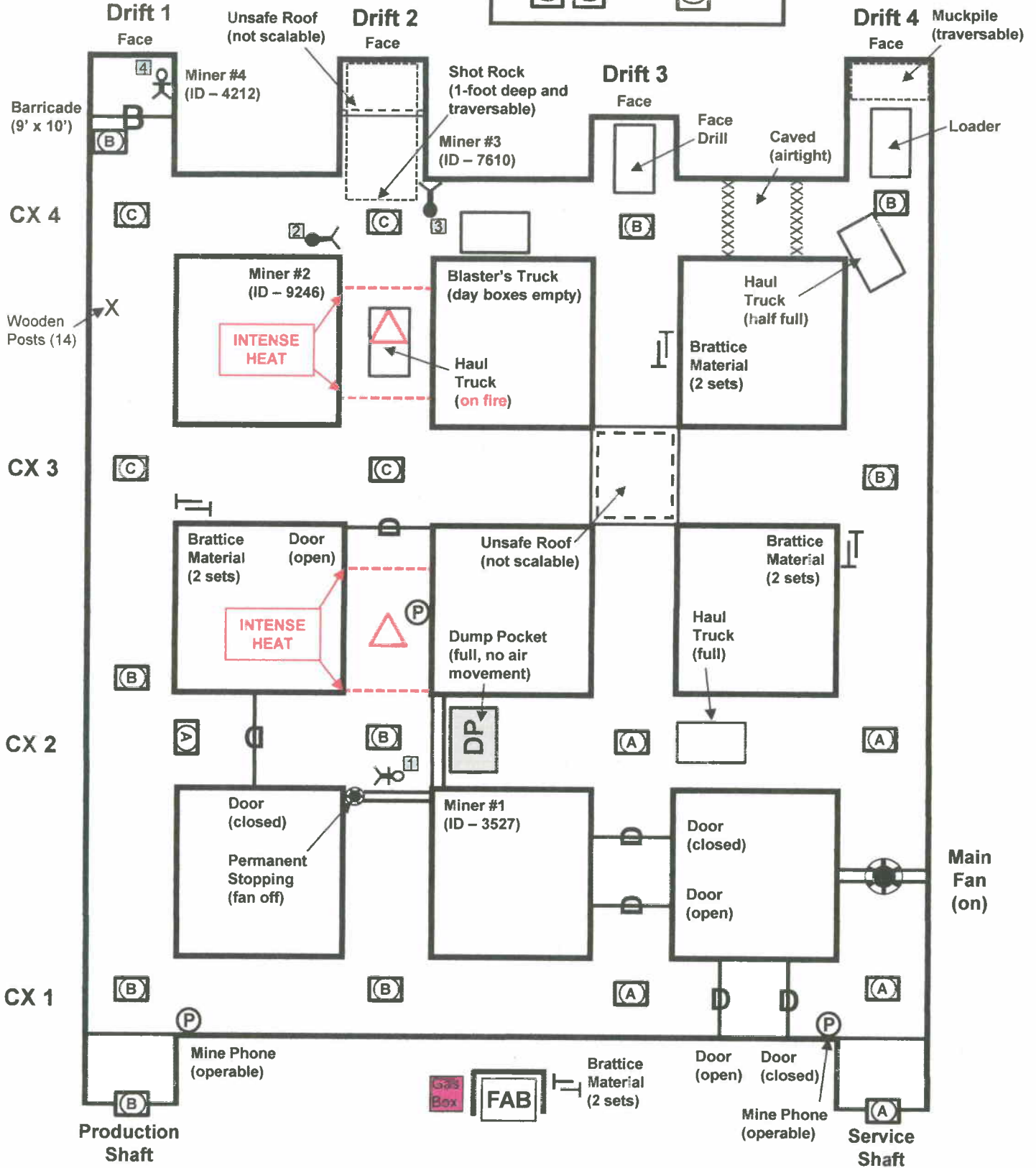
When they verify understanding the instructions, have the Team Captain start the clock and hand the team their copies of the Team Briefing Information, the Mine Information Sheets, and the three mine maps.

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

Problem Map

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



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 received a briefing in isolation. At that time, each team was 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 were collected at the conclusion 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.

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, 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.

Due to the presence of methane in the mine atmosphere, the team must use non-sparking tools to work the problem. They must notify the judges that they are using such tools. 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's failure to notify the judges that they have non-sparking tools to work the problem or need non-sparking tools and request them will result in a team endangerment (75 discounts) per Judge 1 – UG Rule #10(b)(2).**

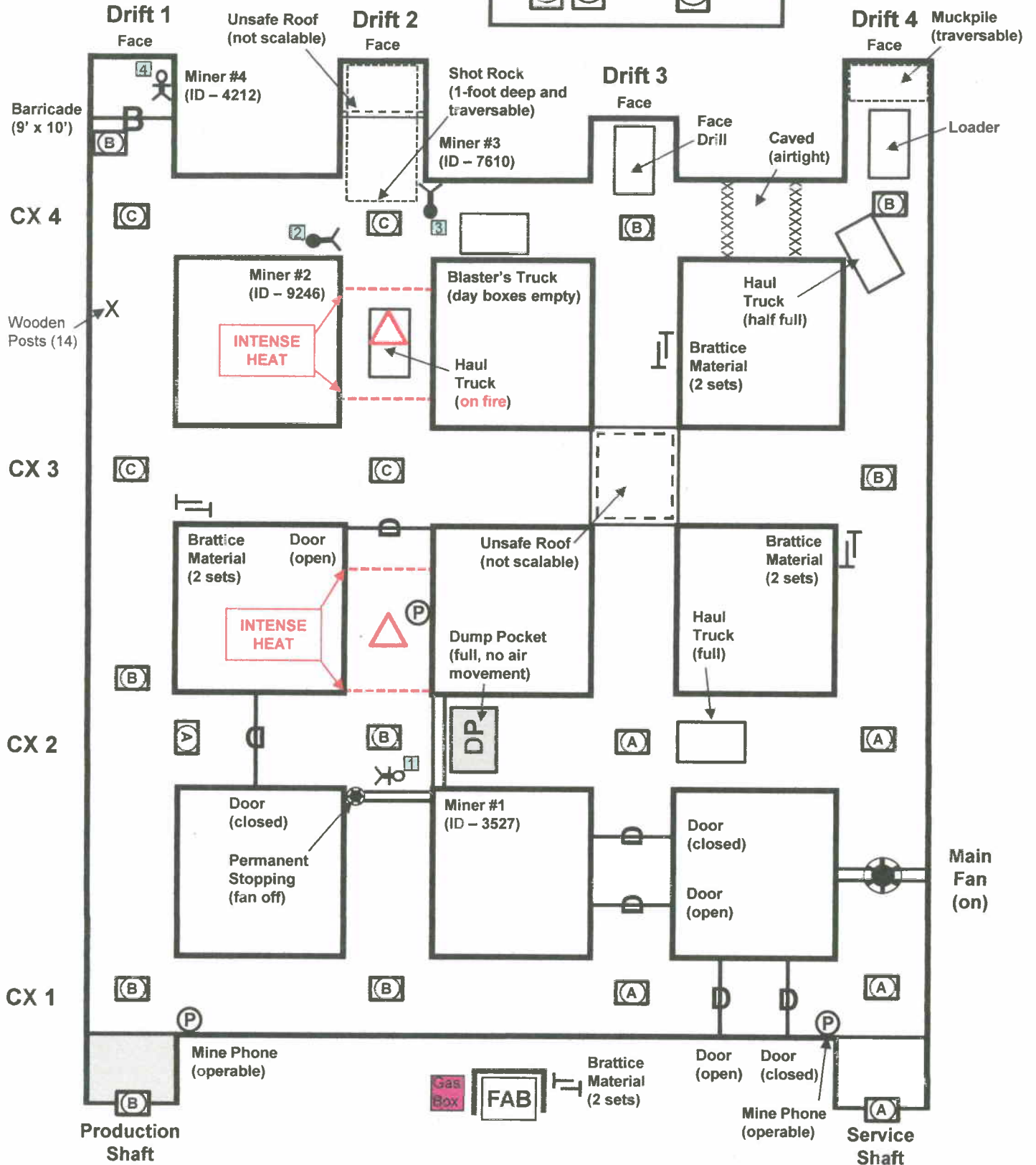
The team will find that there are two sets of brattice material at the fresh air base to be used as needed during the working of the problem. The team may elect to take these along with them during exploration of the mine.

Note: The 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.

Problem Map

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



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. **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 17 % oxygen (O₂), 0.5 % methane (CH₄), 1,300 ppm carbon monoxide (CO), and 3.0 ppm nitrogen dioxide (NO₂) with light 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.**

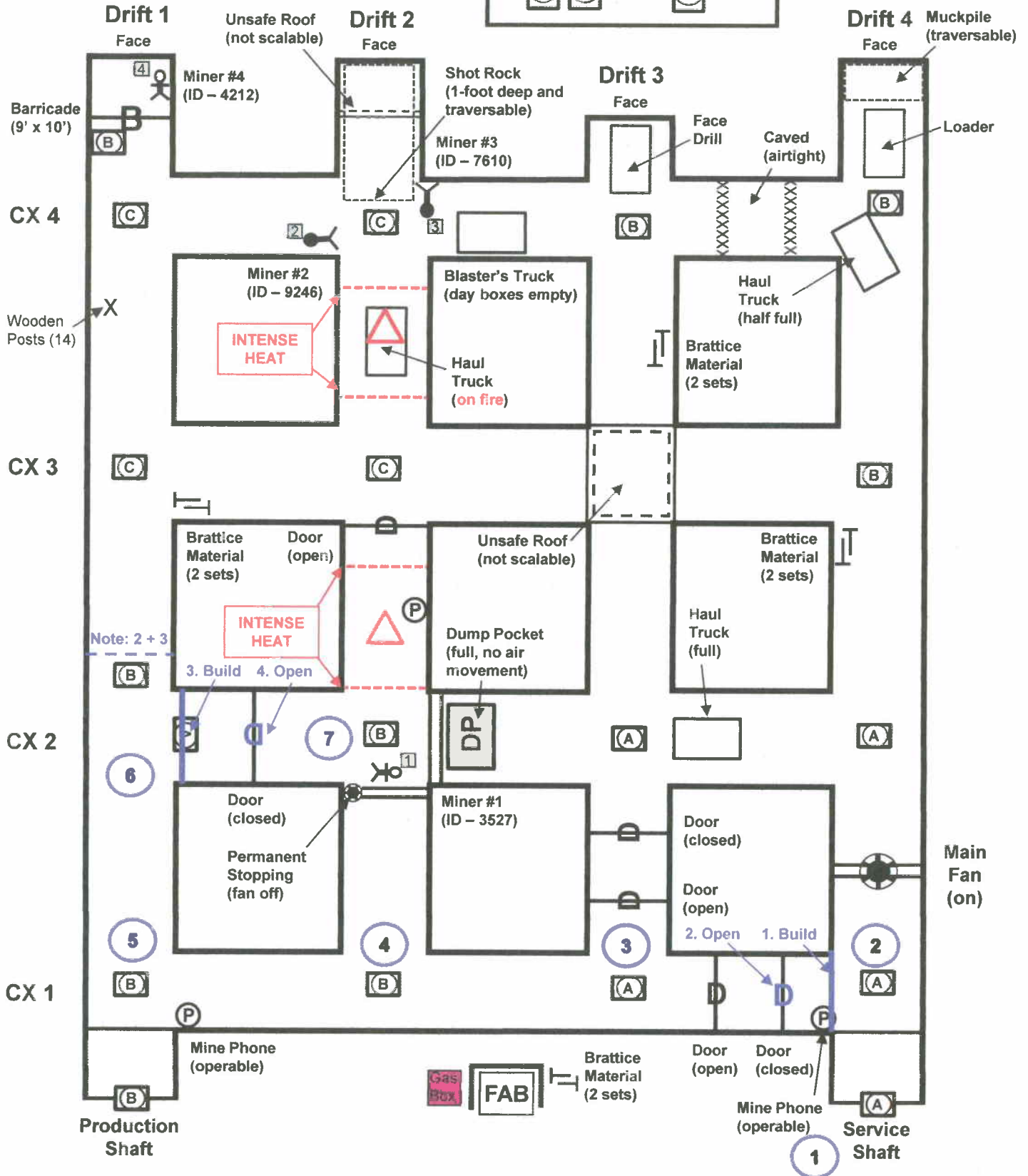
Solution Map - 1



1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



Note: Team Stop Nos. 1 - 7 (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). Before exiting the cage the captain must check for loose roof in front of the cage. A gas check will show "clear air." At the shaft station, the team will find a working mine phone.

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.

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.

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. If the team or fresh air base attendant does not adhere to this rule, 25 discounts will be assessed per Judge 2 – Surf Rule #5.

Team Stop No. 2

The team can advance northward in Drift 4 to the permanent stopping and the Main Fan. They will find the stopping is intact and the Main Fan is "on." After 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 can retreat to the shaft station and stretch westward to the airlock to find that the easternmost airlock door is "closed."

The captain's failure to D&I where required assess discounts (2 x each place – max 10) per Judge 1 - UG - Rule #9.

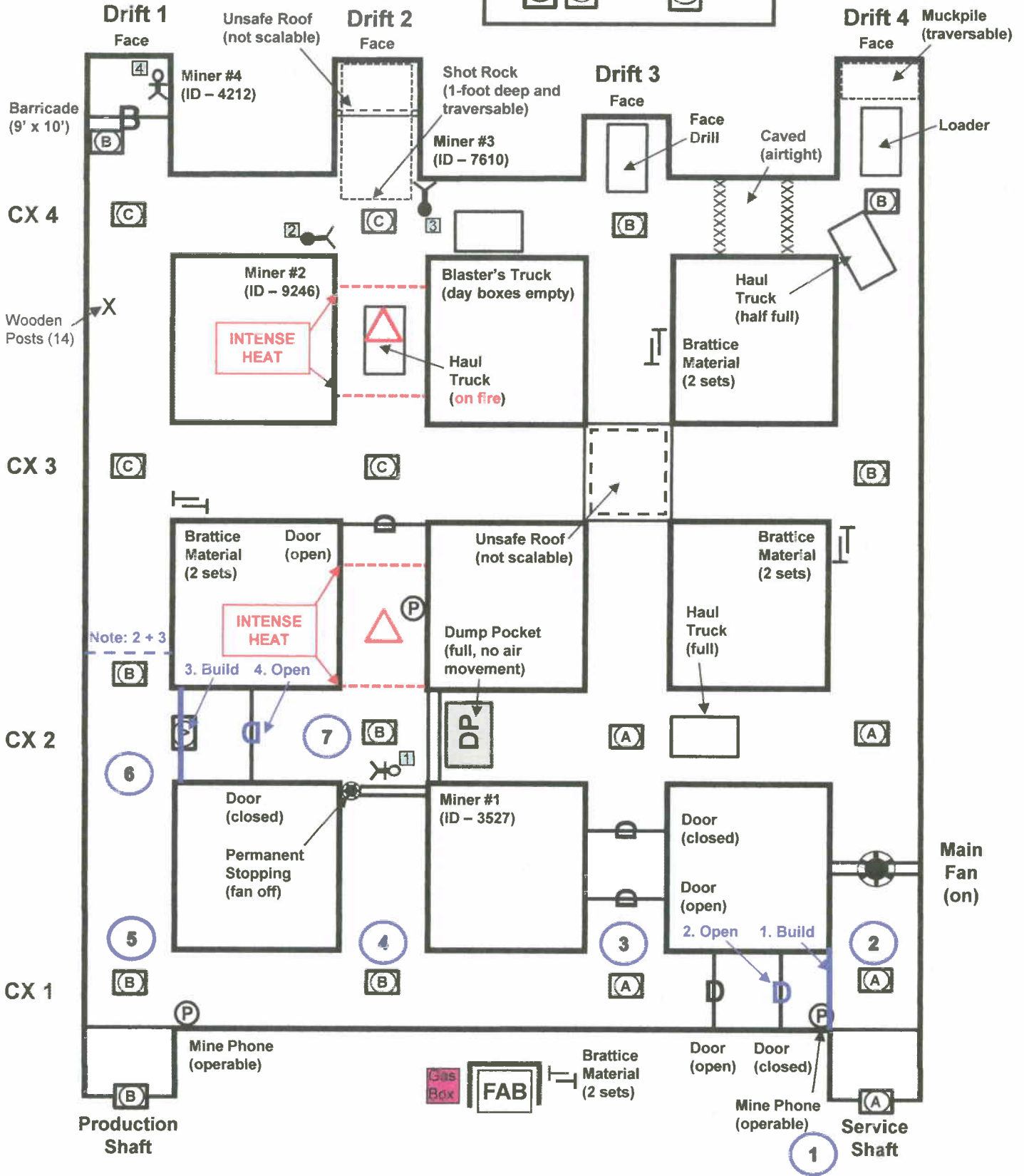
Note: After advancing into the mine, not more than fifty (50) feet from the shaft, the captain must give a signal for the team to stop. At this team stop, all team members and their apparatus must be checked. After the first 50 feet apparatus check, the team is required to conduct apparatus examinations 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.

Solution Map - 1

1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



The team's failure to perform personnel and apparatus checks within 50 feet of the fresh air base or shaft station upon first entry into the mine will result in discounts (4 total) per Judge 1 – UG Rule #3. Thereafter, the team's failure to perform apparatus examinations every 20 minutes will result in discounts (5 x each infraction) per Judge 1 – UG Rule #5. Finally, the team's failure to perform apparatus examinations after removal or possible damage will result in discounts (4 x each infraction) per Judge 1 – UG Rule #4.

Team Stop No. 3

The team can travel through the existing airlock to access Drift 3. However, in order to prevent an unintentional ventilation change, the team must build a temporary stopping before opening the door. Afterward, they can enter the airlock to find the second door is "open." They can travel westward through open door to the intersection with Drift 3. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find "clear air." To the north, the team will find a second airlock and the southernmost door is "open." They can stretch northward to find that the northernmost airlock door is "closed." After again checking the roof or back and taking necessary gas tests, the captain must D&I the door as their furthest point of advance in this direction.

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, making a ventilation change before the effects of such changes are known will result in discounts (15 x each infraction) per Judge 2 – UG Rule #12.

Team Stop No. 4

Since the CX 1 is open to the west, the team can advance westward to Drift 2. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find "17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke." The team can stretch northward toward CX 2. They will find that the permanent stopping is intact and the auxiliary fan is "off." 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. The team can now retreat to CX 1.

Note: The team must perform an apparatus and personnel check before entering smoke at this location. They must also be attached to their lifeline. (Judge 1 – UG Rules #12 and #9)

Team Stop No. 5

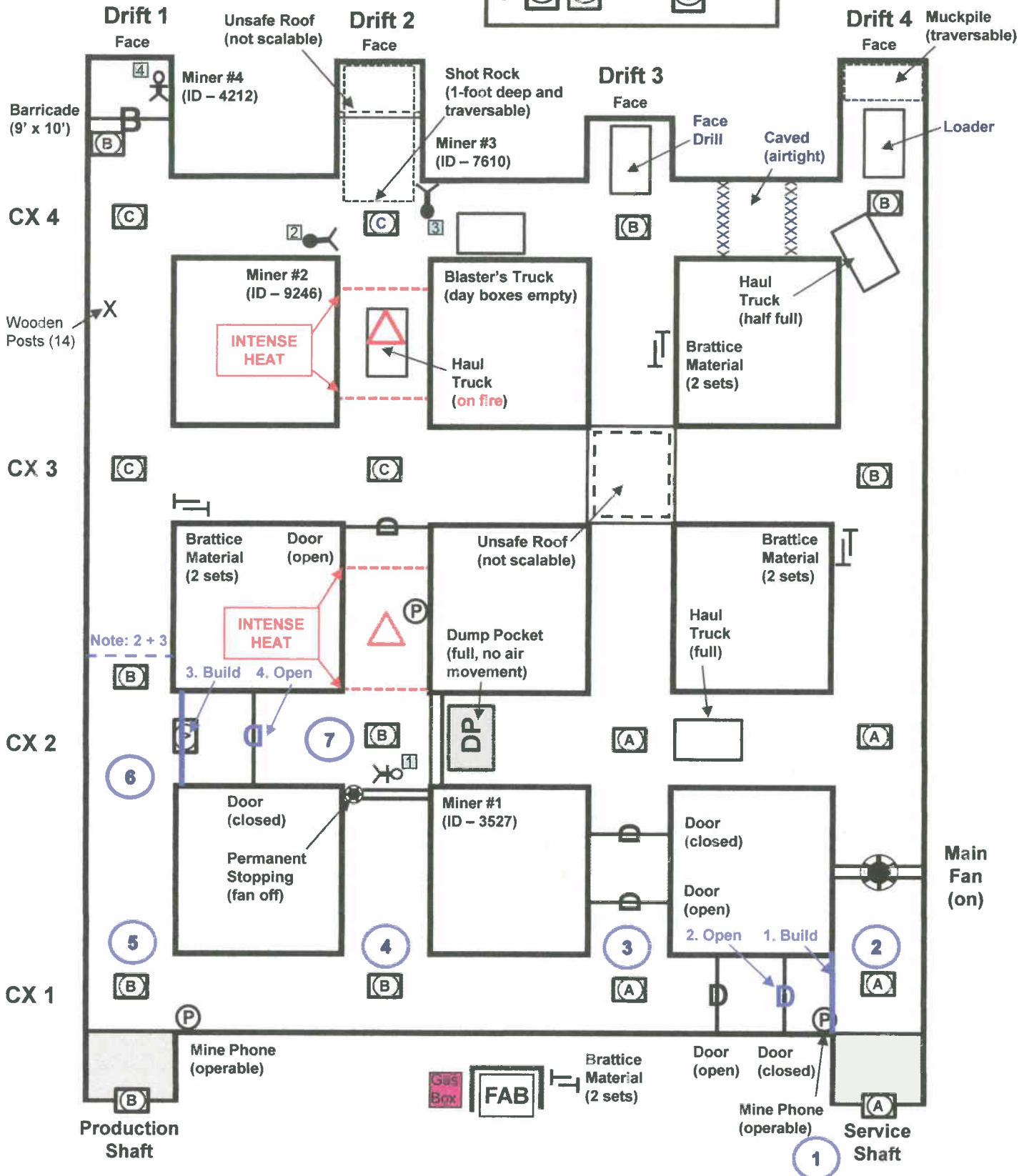
The team can advance westward in CX 1 to Drift 1 and the Production Shaft station. Once there, the captain performs roof or back checks and the team conducts necessary gas checks. They will find that gas concentrations have not changed from their previous location. They will also find a working mine phone.

Solution Map - 1

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Team Stop No. 6

The team can advance northward in Drift 1 to CX 2. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find that the gas concentrations in the intersection have not changed from their previous location. They will also find that the drift is open to the north. When the team stretches eastward in CX 2, they will find placards indicating “clear air” and the shop door is “closed.”

Note: The team cannot advance beyond 3 feet past CX 2, because they have not tied-in the entries behind them. **If the team travels beyond this limit and fails to explore systematically, assess discounts (4 x each infraction) per Judge 1 – UG Rule #11.**

Team Stop No. 7

Since there is “clear air” immediately outby the shop door, the team can enter the shop without endangering anyone inside. However, in order to prevent an unintentional ventilation change, the team must build a temporary stopping before opening the door. Afterward, they can access the shop and advance eastward toward Drift 2. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find that gas concentrations have not changed from their previous location. To the north, the team will find a placard indicating “intense heat” and there is no room to safely erect a fire seal. 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 south, the team will find the first missing miner (Miner #1, ID – 3527).

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).

The captain must examine the roof or back above the miner and D&I the location of the miner. After a primary assessment, the #1 Judge 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).**

The team must prepare Miner #1 for travel and secure him to the stretcher. **Because toxic airborne contaminants exist along the team’s route of travel, Miner #1 must be fitted with proper respiratory protection before being transported to the fresh air base.**

If the team performs any act that may result in death or injury to the survivor, including failure to provide proper respiratory protection when needed, assess discounts (50 x each person) per Judge 1 – UG Rule 18(a) – 18(d).

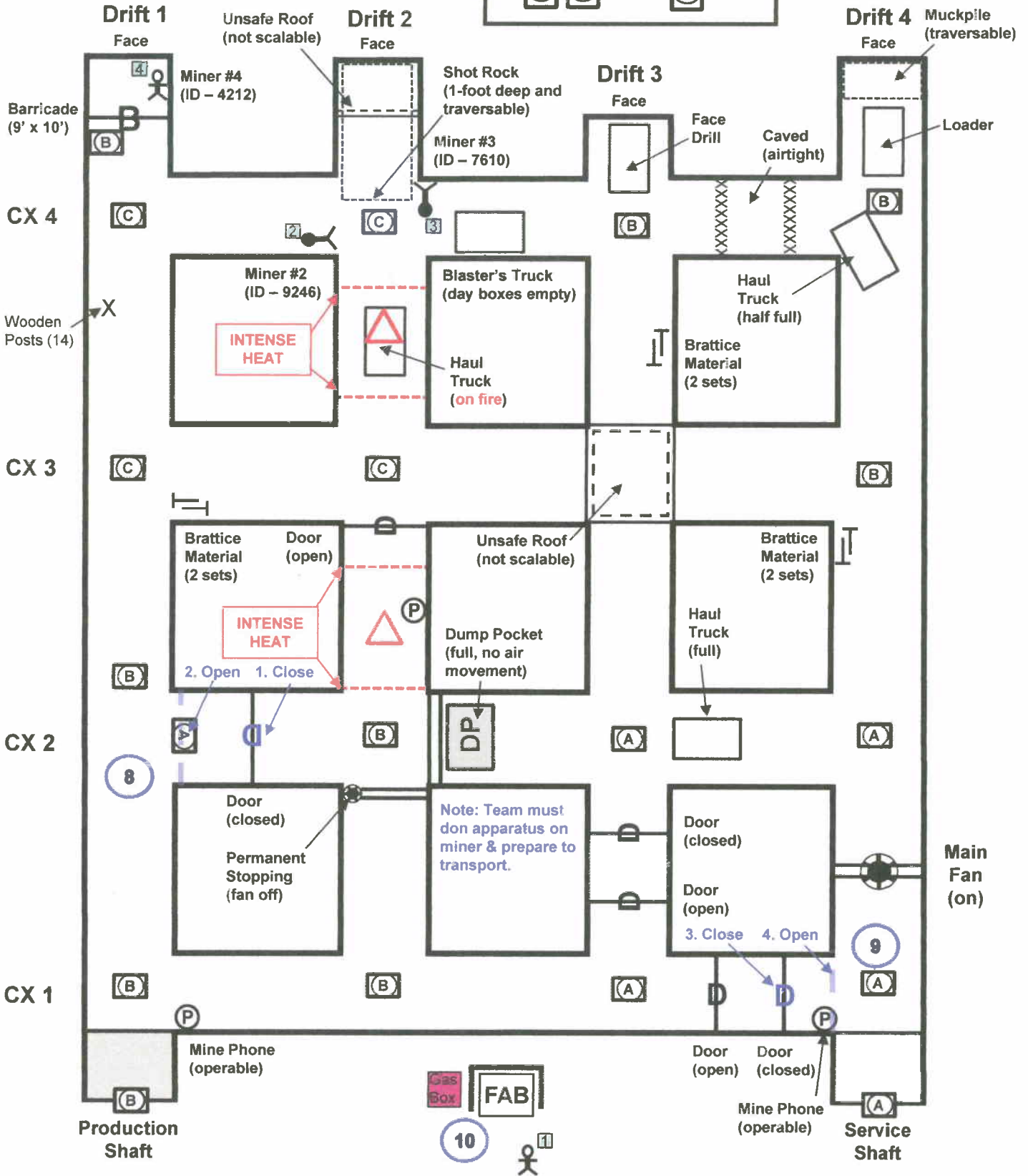
If the captain does not assess roof conditions directly over the miner, assess discounts (5 x each infraction) per Judge 1 – UG Rule #8(c).

Solution Map - 2

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Note: Team Stop Nos. 8 - 10 (see Solution Map 2)

Team Stop No. 8

After retreating westward in CX 2, the team must close the shop door behind them. Then, the team can tear down the temporary stopping that they had previously erected and return to Drift 1. The team can take the stopping material with them for future use.

Team Stop No. 9

The team can now travel toward the Service Shaft. When the team reaches the airlock doors in CX 1 between Drift 3 and Drift 4, they must close the door behind them. Then, the team can tear down the temporary stopping that they had previously erected and return to Drift 4. The team can take the stopping material with them for future use.

Once at the Service Shaft Station, the team can enter the conveyance, close the shaft gate and signal the hoist engineer.

Team Stop No. 10

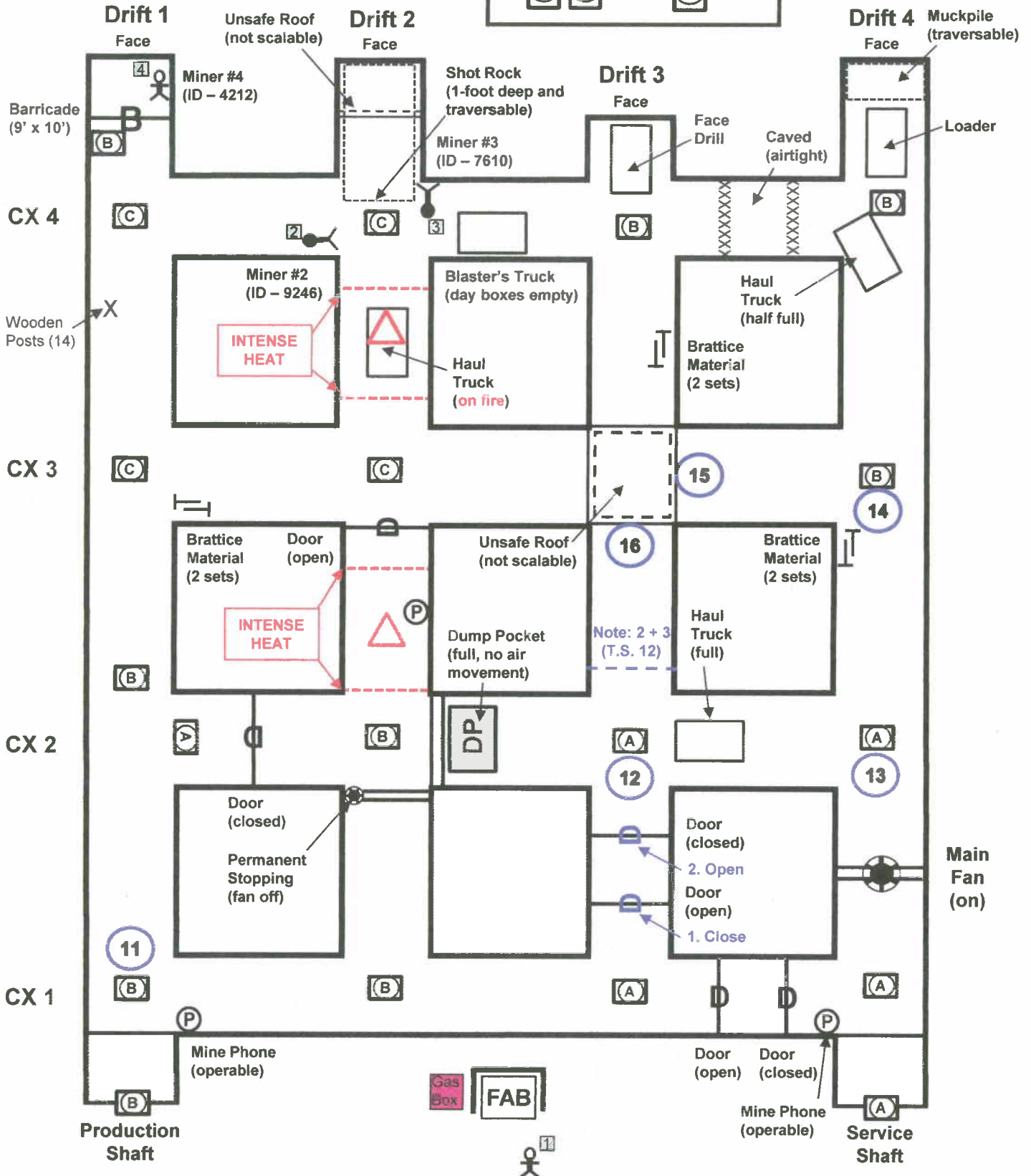
Once the team has been hoisted to the surface, they can carry Miner #1 to the fresh air base. At that time, the team can arrange for any follow-up medical treatment.

Solution Map - 3

1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



Note: Team Stop Nos. 11 - 16 (see Solution Map 3)

Team Stop No. 11

Now, without undue delay, the team must return underground and find all other approaches to the fire in the shop. However, this does not preclude the team's obligation to systematically explore the mine. **If the team does not make every effort to locate, seal, if possible, without undue delay, assess discounts (50 x each infraction) per Judge 1 – UG Rule #13.**

The team will travel to the Production Shaft, enter the conveyance, close the shaft gate and signal the hoist engineer. Afterward, they will descend to the Production Shaft station in CX 1.

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. 12

The team can travel eastward in CX 1 to Drift 3. Then, they can travel northward through the open airlock door. In order to prevent an unintentional ventilation change, the team must close the door behind them. Then, they can open the northernmost airlock door and travel through to CX 2. At the intersection, the captain performs roof or back checks and the team will conduct necessary gas checks. They will find a placard indicating "clear air." To the east, the team will find a fully loaded haul truck partially blocking access to CX 2. The team can stretch westward to the permanent stopping. They will find the dump pocket is "full, with no air movement." After making roof or back checks and taking 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 have not tied-in the entries behind them.

Team Stop No. 13

The team can advance eastward past the haul truck in CX 2 toward Drift 4. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find a placard indicating "clear air." They will also find that the drift is open to the north. The team can stretch southward to the permanent stopping and the Main Fan to tie-in. There they will find the stopping is intact and the Main Fan is "on." 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.

Team Stop No. 14

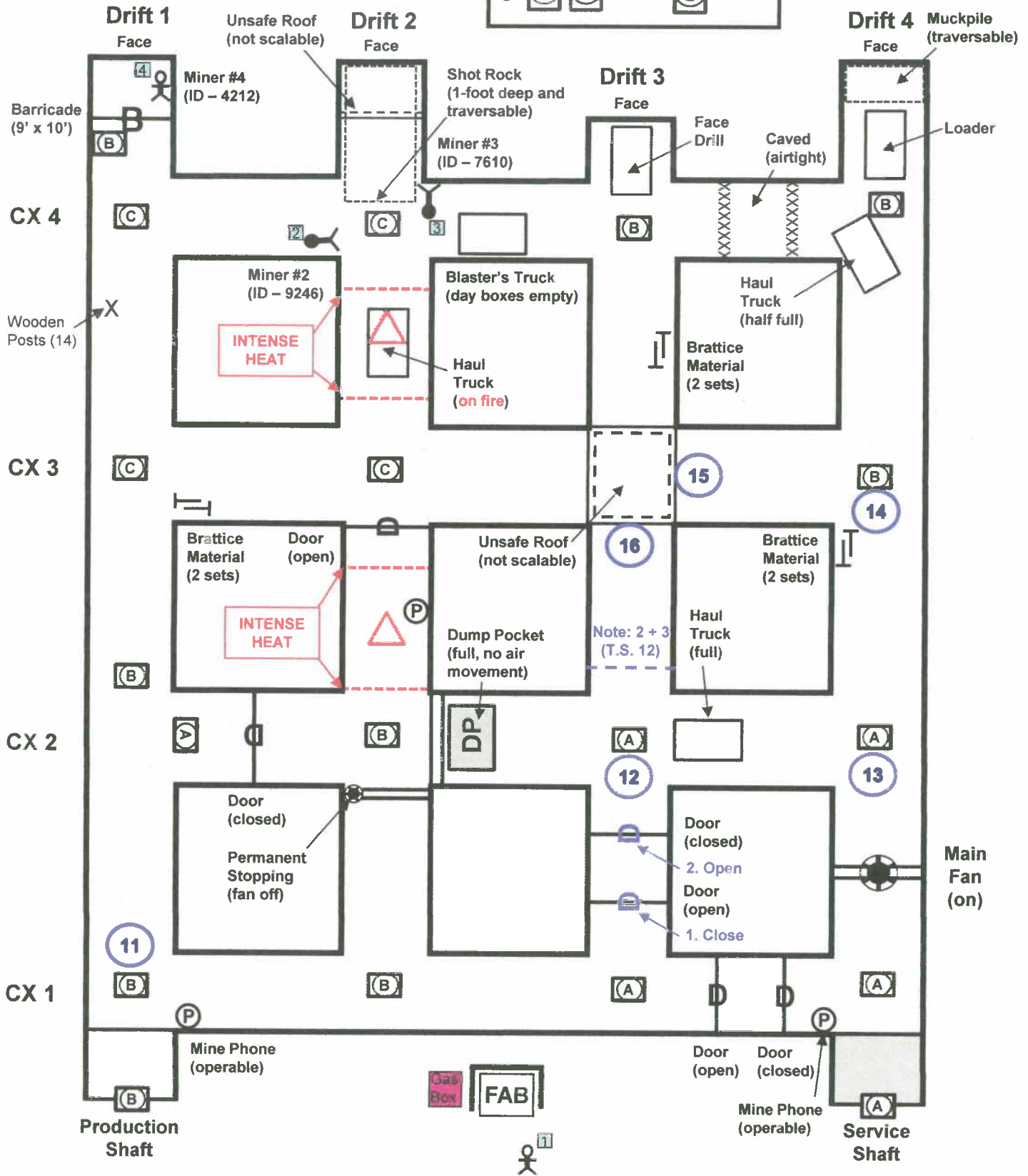
The team can advance northward in Drift 4 toward CX 3. As they travel, they will find two sets of brattice material lying along the western rib. At the intersection with CX 3, the captain performs roof or back checks and the team conducts necessary gas checks. They will find a placard indicating "17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke." They will find that Drift 4 and CX 3 are open.

Solution Map - 3

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



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. 15

The team can advance westward in CX 3 to find the eastern extent of an area of “unsafe roof (not scalable)” extending rib-to-rib. The captain must warn the rest of the team members to avoid this hazard. At this point, the team has not located any posts or cribbing materials to support it. **If the team asks the mine manager for posts, they will be told that all materials needed to work the problem can be found in the mine. Additional posts have been ordered and a shipment is expected to arrive on the surface by 7:00 p.m.** At the unsafe roof, the captain performs roof or back checks and the team will conduct necessary gas checks. The team will find that the gas concentrations have not changed from their previous location. The captain must D&I the unsafe roof as their furthest point of advance in this direction.

If the captain fails to indicate or warn the rest of the team members to avoid the unsafe roof conditions, assess discounts (5 x each infraction) per Judge 1 – UG Rule #8(a). The same applies for the rear captain’s failure, when retreating from the area.

Without undue delay, the team must continue their efforts to find and seal all other approaches to the fire in the Shop.

Team Stop No. 16

The team can retreat to the intersection of CX 2 and Drift 3. Then, they can advance northward in Drift 3 toward CX 3. At the intersection, they will find the southern extent of the area of “unsafe roof (not scalable)” extending rib-to-rib. The captain must warn the rest of the team members to avoid this hazard. At the unsafe roof, the captain performs roof or back checks and the team conducts necessary gas checks. The team will find that the gas concentrations have not changed from their previous location. The captain must D&I the unsafe roof as their furthest point of advance in this direction.

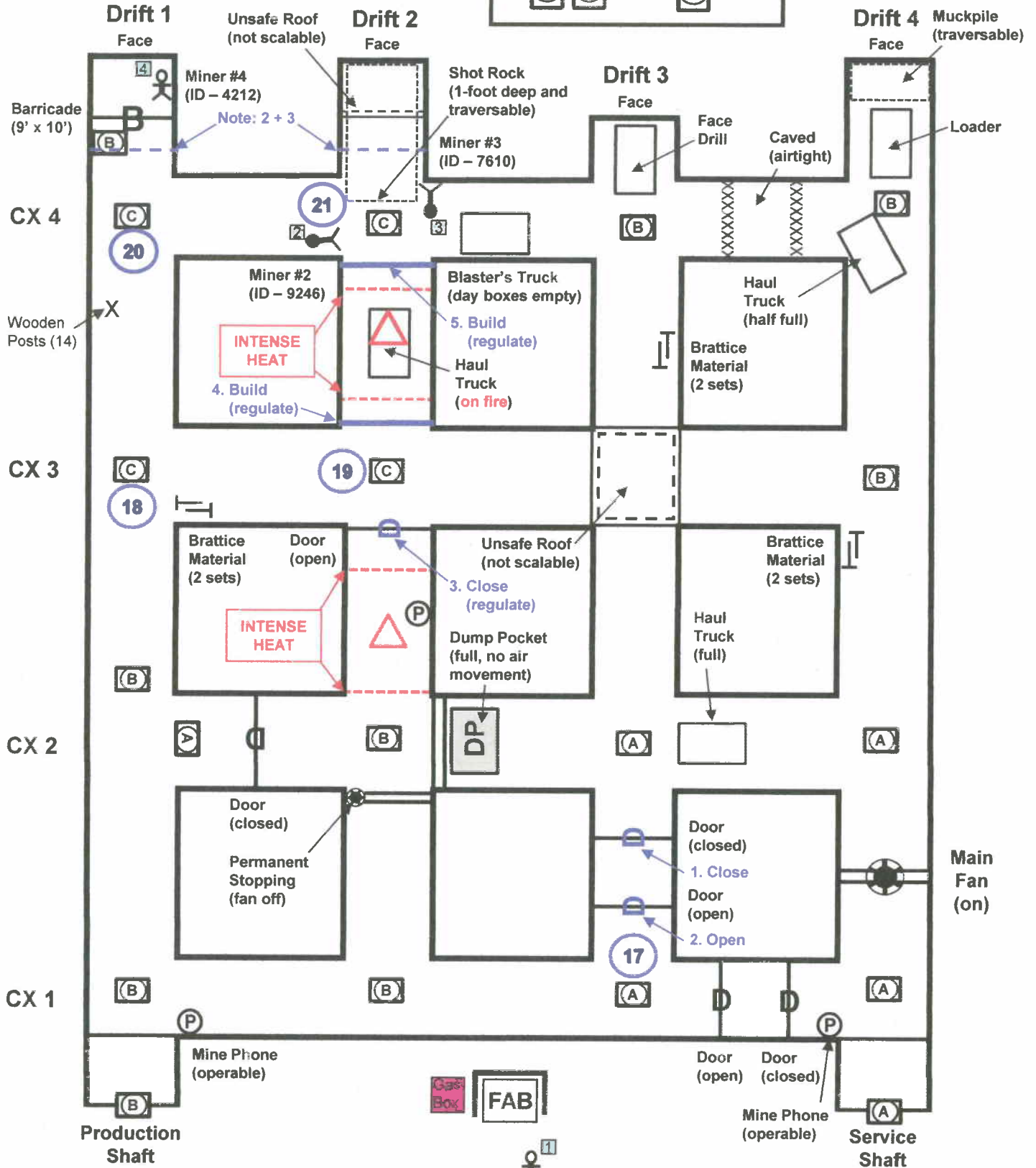
Since the team has not located posts or cribbing materials to support the unsafe roof and the shipment of new timbers will not arrive until 7:00 p.m., they must retreat from the area.

Solution Map - 4

1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



Note: Team Stop Nos. 17 - 21 (see Solution Map 4)

Team Stop No. 17

The team will travel southward in Drift 3 through the open northernmost door between CX 2 and CX 3. In order to prevent an unintentional ventilation change, the team must close the door behind them. Then, they can open the southernmost airlock door and travel through to CX 1.

Team Stop No. 18

Now, the team can advance to the intersection of Drift 1 and CX 3. At the intersection with CX 3, the captain performs roof or back checks and the team will conduct necessary gas checks. They will find a placard indicating "16.5 % O₂, 1.0 % CH₄, 2,000 ppm CO, and 9.0 ppm NO₂ with heavy smoke." They will also find that the drift to the north and the crosscut to the east are open.

Note: The team must perform an apparatus and personnel check before entering smoke near the intersection of CX 1 and Drift 2. They must also be attached to their lifeline.

Team Stop No. 19

The team can advance eastward in CX 3 toward Drift 2. As they travel, they will find two sets of brattice material lying along the southern rib. At the intersection with Drift 2, the captain performs roof or back checks and the team will conduct necessary gas checks. They will find that the gas concentrations have not changed from their previous location. To the north, they will find a placard indicating "intense heat" due to a haul truck "on fire." At this time, the team must use one set of brattice material to seal the fire (leaving a regulator because of the potential for an explosive air/gas mixture presented in the problem). 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, without undue delay, the team must find and seal all other approaches to the fire in the shop and the second fire to the north in Drift 2.**

To the south, the team will find that the shop door is "open." The team must stretch southward through the door to find a placard indicating "intense heat." The team can retreat to CX 3 and partially close the shop door in order to seal and regulate this final approach to the fire in the shop. Before leaving the crosscut, the team can stretch eastward to find the western extent of the area of "unsafe roof (not scalable)." The captain must warn the rest of the team members to avoid this hazard.

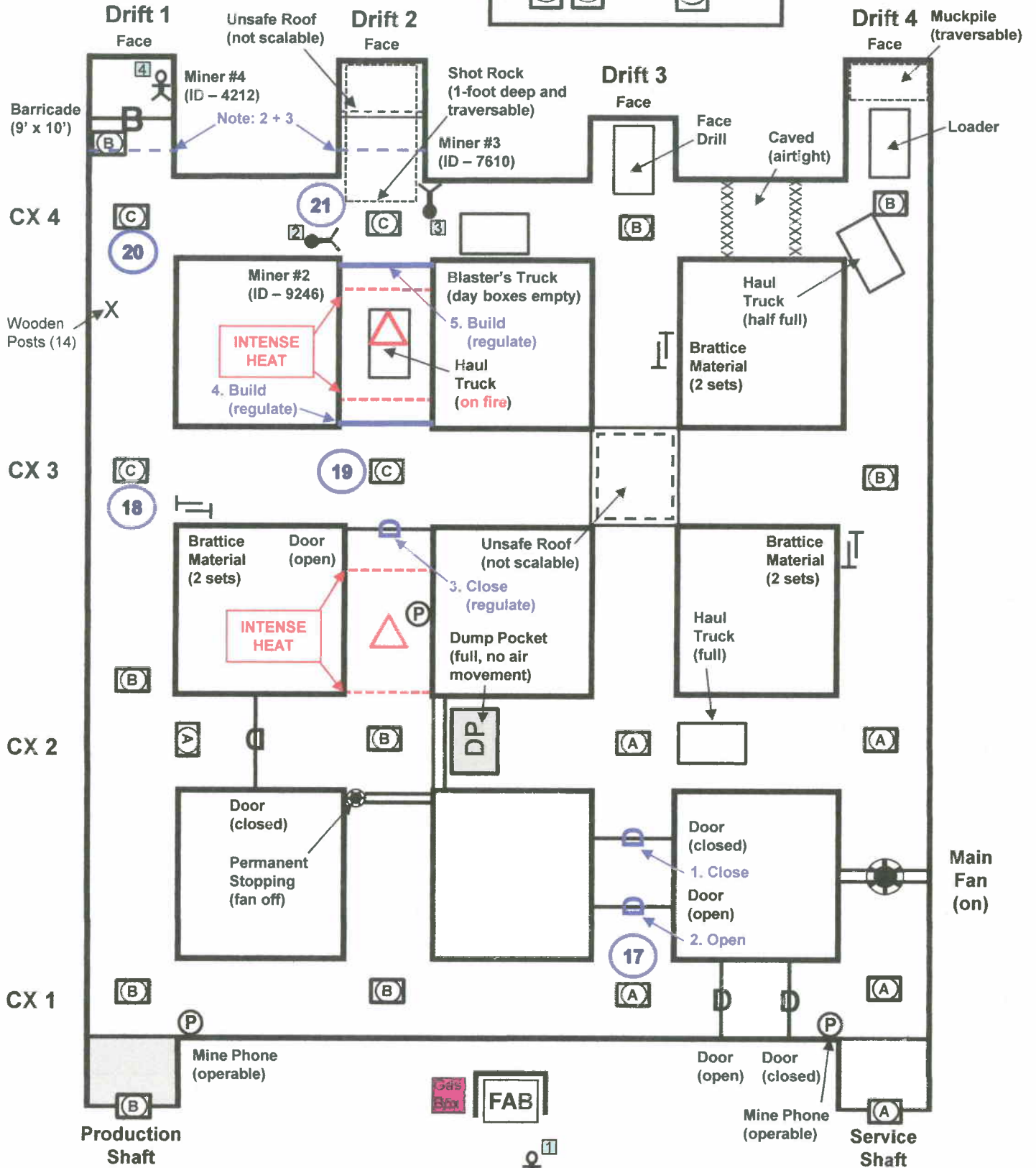
Since the team has not located posts or cribbing materials to support the unsafe roof and the shipment of new timbers will not arrive until 7:00 p.m., they must retreat from CX 3 to Drift 1. **Without undue delay, the team must find and seal all other approaches to the fire to the north in Drift 2.**

Solution Map - 4

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Team Stop No. 20

The team will retreat to Drift 1. As they travel, the team can retrieve one set of brattice material in CX 3 to replenish the supply on their stretcher (limit two sets). Then, they can advance northward to CX 4. As the team travels, they will locate 14 wooden posts located along the western rib. They can carry the posts with them for future use.

At the intersection with CX 4, the captain performs roof or back checks and the team conducts necessary gas checks. They will find a placard indicating "16.5 % O₂, 1.0 % CH₄, 2,000 ppm CO, and 9.0 ppm NO₂ with heavy smoke." They will also find that the drift to the north and the crosscut to the east are open.

Note: During this Team Stop, the team has found the means to support the area of "unsafe roof (not scalable)" located at the intersection of Drift 3 and CX 3. Therefore, it is no longer an inaccessible area and they cannot advance 3 feet past CX 4 until they have tied-in the entries behind them.

Team Stop No. 21

The team will advance eastward in the crosscut toward Drift 2. As they travel, the team will find the second missing miner (Miner #2, ID – 9246) laying along the southern rib and 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 is severely burned and exhibits no vital signs. The miner is dead.**" The captain must D&I the location of the body.

At the intersection with Drift 2, the captain performs roof or back checks and the team conducts necessary gas checks. They will find gas concentrations have not changed from their previous location. They will also find a placard indicating an area containing "shot rock (1-foot deep and traversable)" extending northward in Drift 2. To the west, they will find the third missing miner (Miner #3, ID – 7610) 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 is severely burned and exhibits no vital signs. The miner is dead.**" The captain must D&I the location of the body.

Afterward, the team must stretch southward in the drift where they will find a placard indicating "intense heat." At this time, the team must use one set of brattice material to seal the fire (leaving a regulator because of the potential for an explosive air/gas mixture presented in the problem). 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, both fires (in the Shop and in Drift 2) have been contained with seals allowing regulated airflow through each area.**

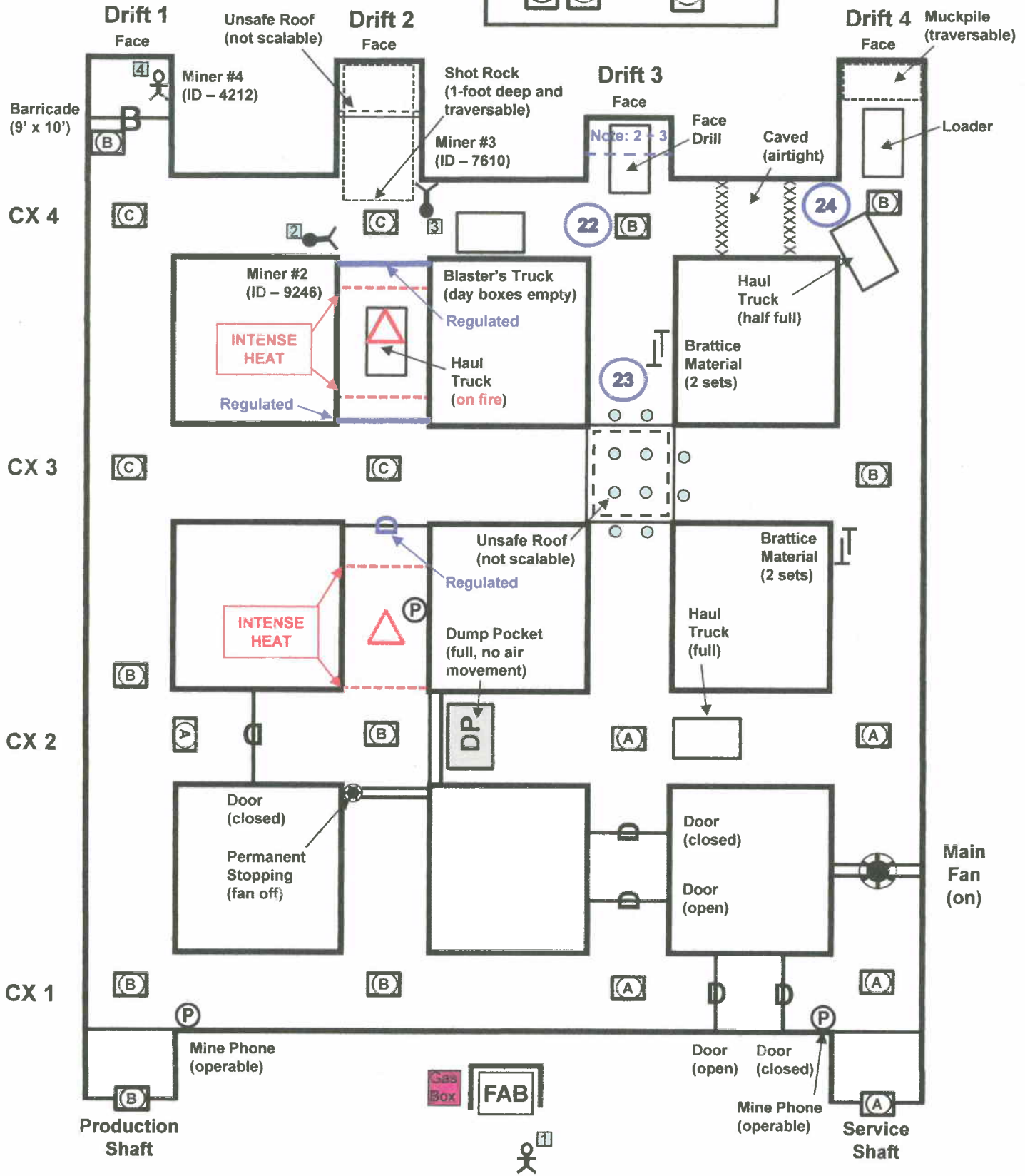
Note: The team cannot advance beyond 3 feet past CX 4 until they have tied-in the entries behind them.

Solution Map - 5

1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
- (C) = 16.5 % O₂
1.0 % CH₄
2,000 ppm CO
9.0 ppm NO₂
Heavy Smoke



Note: Team Stop Nos. 22 - 24 (see Solution Map 5)

Team Stop No. 22

The team can advance eastward in CX 4 to Drift 3. At the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find a placard indicating “17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke.” They will also find that the drift to the north and to the south is open. However, the crosscut to the west is blocked by an airtight cave extending rib-to-rib. The team can stretch eastward to the cave. 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.

Note: The team cannot advance beyond 3 feet past CX 4 until they have tied-in the entries behind them.

Team Stop No. 23

The team can advance southward in Drift 3 toward CX 3. As they travel, they will find two sets of brattice material lying along the eastern rib. If they do not have any on their stretcher, they can take it with them for future use (limit two sets). At the intersection, the captain performs roof or back checks and the team will conduct necessary gas checks. They will find the northern extent of the area of “unsafe roof (not scalable).” The captain must warn the rest of the team members to avoid this hazard. Since they have found 14 wooden posts and have brought them on their stretcher, the team can safely support the intersection.

Note: The team should follow the example shown in Figure 3 on page 37 of the 2016 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).

Team Stop No. 24

After they post their way through the intersection, the team can advance eastward in CX 3 to Drift 4. Afterward, they can advance northward in Drift 4 toward CX 4. As they travel, the team will find a haul truck (half full) partially blocking access to the intersection. In the intersection, the captain performs roof or back checks and the team conducts necessary gas checks. They will find that gas concentrations have not changed from their previous location. The team can stretch westward in CX 4 to the eastern extend of the airtight cave. 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. Now that the team has fully tied-in all entries behind them, they can stretch northward toward the face. They will find a loader parked in the middle of the drift and a “muckpile (traversable)” extending from the face. After again checking the roof or back and taking necessary gas tests, the captain must D&I the face as their furthest point of advance in this direction.

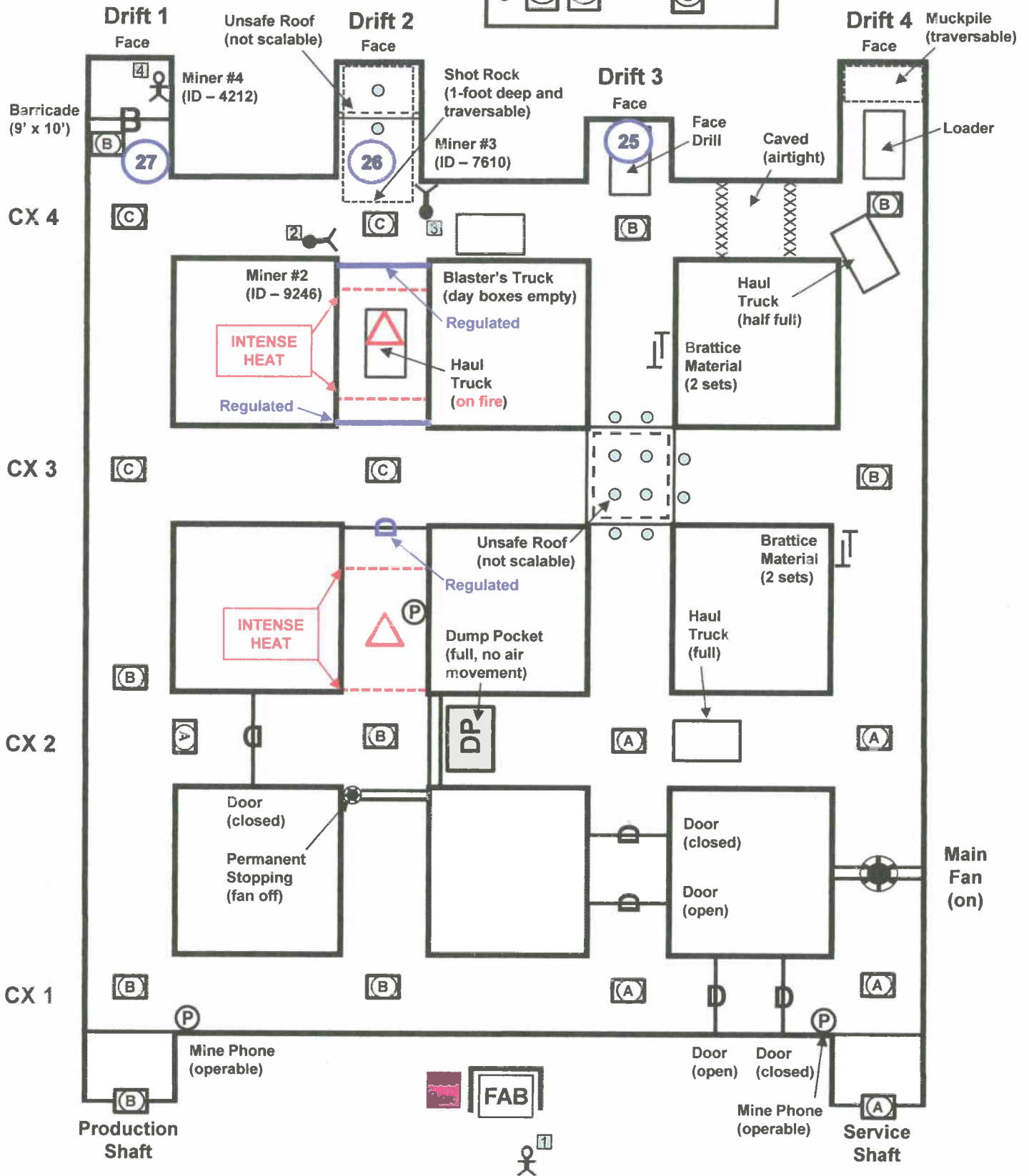
Solution Map - 6



① = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



Note: Team Stop Nos. 25 - 27 (see Solution Map 6)

Team Stop No. 25

Now that all entries have been tied-in behind, the team can travel to the face areas of Drifts 3, 2, and 1. Once the team advances to the intersection of Drift 3 and CX 4, they can stretch toward the face of the drift. They will find a “face drill” parked in the middle of the drift. After checking the roof or back and the team conducts necessary gas tests, the captain must D&I the face as their furthest point of advance in this direction.

Team Stop No. 26

The team can advance to the intersection of Drift 2 and CX 4. Then, they can travel on top of the “shot rock (1-foot deep and traversable)” and stretch toward the face of the drift. Along the way, the captain will find an area of “unsafe roof (not scalable)” stretching rib-to-rib. The captain must warn the rest of the team members to avoid this hazard. Since they have extra wooden posts and have brought them on their stretcher, the team can safely support the area to access the face. After checking the roof or back and the team takes necessary gas tests, the captain must D&I the face as their furthest point of advance in this direction.

Note: The team should follow the example shown in Figure 1 on page 35 of the 2016 Metal and Nonmetal Mine Rescue Contest Rules booklet.

Team Stop No. 27

The team can advance to the intersection of Drift 1 and CX 4. Afterward, they can stretch toward the face. About 5 feet inby, they will find a “barricade (9-feet by 10-feet)” stretching rib-to-rib. At the barricade, the captain must perform roof or back checks and the team will conduct necessary gas checks. They will find a placard indicating “17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke.” The team can converse with the missing miner inside. The No. 1 judge will hand the team a placard with the following statement:

“I am Miner #4 (ID – 4212). I was operating a face drill in Drift 3 when I heard a loud explosion and the mine filled with smoke. I tried to leave but ran into a cave in CX 4. When the smoke got thicker, I retreated and found a place to barricade. The air inside this barricade is O.K. and there is a solid face behind me. Please get me out of here.”

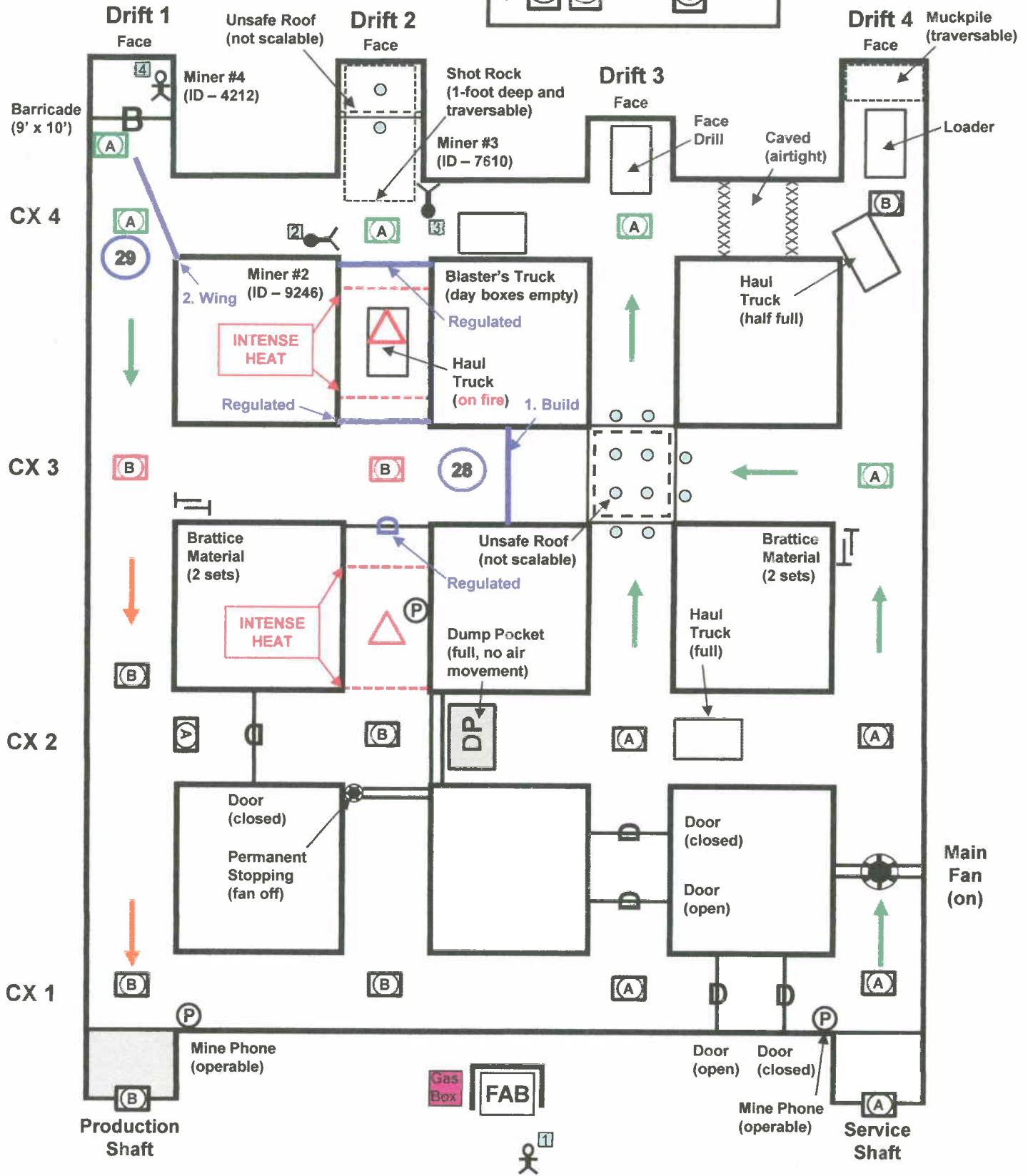
Because of the high concentrations of contaminants in the area, the team cannot open the barricade. The team can instruct the miner to stay inside the barricade until the area has been cleared of toxic and poisonous gases to allow a safe evacuation.

Solution Map - 7

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Note: Team Stop Nos. 28 - 29 (see Solution Map 7)

Team Stop No. 28

At this point, all accessible areas of the mine have been explored and the team has found four of the five missing miners. Now, a ventilation change is necessary to clear the area in front of the barricade. The team must inform the mine manager of their intentions to change ventilation, either through their fresh air base coordinator using the communication system, or by returning to the surface.

If the team does not inform the mine manager (official in charge) of their intentions to make a ventilation change prior to actually doing so, assess discounts (15 x each infraction) per Judge 2 – UG Rule #12.

In order to direct a significant amount of fresh air through CX 4 to clear the high concentrations of CO, low concentrations of O₂, and significant concentrations of CH₄ from the mine, the team must construct a temporary stopping in CX 3 between Drift 2 and Drift 3.

At this time, airflow will travel northward in Drift 3 and across CX 4. The gas placards along this route will quickly revert to “clear air” in CX 4. **However, gas concentrations will only slightly decrease outby in CX 3, as airflow passes through the regulated fire areas.**

Team Stop No. 29

When the team returns to the barricade, they will find that the gas placard located immediately in front of barricade has not changed (17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke). In order to flush this area, the team must erect a “wing” curtain to direct airflow from CX 4 toward the barricade. Once they do this, the placard will change to show “clear air.”

If the team does not utilize a “wing” curtain to flush the contaminants from in front of the barricade before opening and endangers Miner #4, assess discounts (50 x each person) per Judge 1 – UG Rule #18(a).

Solution Map - 8

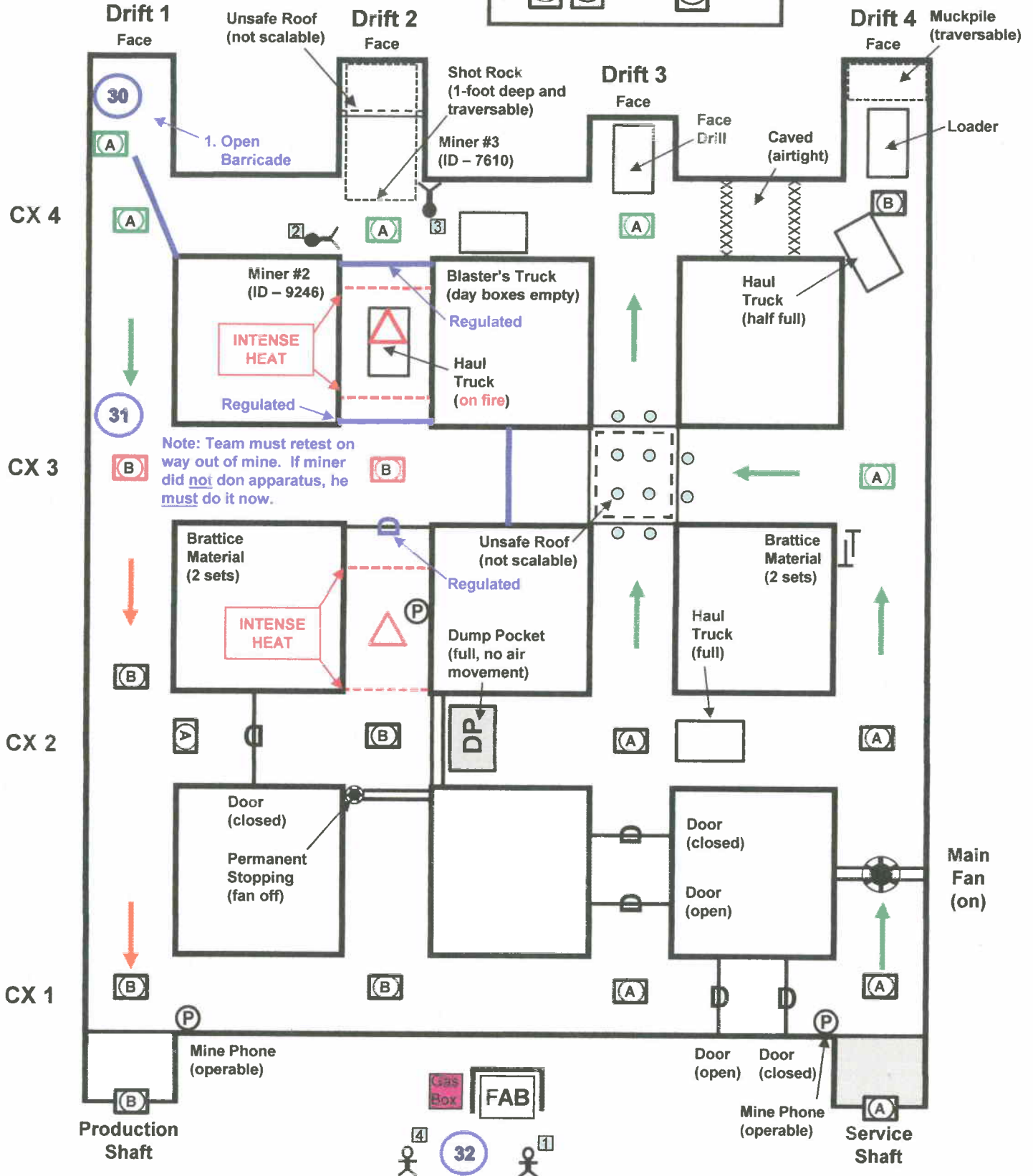


Note: Miner should don apparatus & prepare for travel.

1 = Team Stop

Gas Placard Key:

(A)	= Clear Air
(B)	= 17% O ₂ 0.5% CH ₄ 1,300 ppm CO 3.0 ppm NO ₂ Light Smoke
(C)	= 16.5% O ₂ 1.0% CH ₄ 2,000 ppm CO 9.0 ppm NO ₂ Heavy Smoke



Note: Team Stop Nos. 30 - 32 (see Solution Map 8)

Team Stop No. 30

With “clear air,” the team can open the barricade. Inside they will find Miner #4. 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 #4 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. 31

When the team reaches CX 3, they will find that the gas placard has changed from “16.5 % O₂, 1.0 % CH₄, 2,000 ppm CO, and 9.0 ppm NO₂ with heavy smoke” to show “17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with light smoke.” The team must acknowledge that the placard did not revert to “clear air.”

- **Scenario 1** - If Miner #4 had donned an apparatus or an approved one-hour oxygen-generating unit before leaving the face area, the team can continue toward the Production Shaft.
- **Scenario 2** - If not, they must stop and Miner #4 must don proper respiratory protection before continuing on. If none is available, they must retreat to fresh air in CX 4. At this time, the team can: 1) travel to the fresh air base for an apparatus and return for Miner #4; or 2) escort Miner #4 across CX 4 and follow fresh air back to the Service Shaft. Then, Miner #4 can be hoisted to the surface via the Service Shaft cage.

If the team brings the bare-faced Miner #4 past the placard, assess discounts (50 x each person) per Judge 1 – UG Rule #18(d). If the team elects to exit the mine via the Service Shaft and intentionally severs their lifeline, assess discounts (5 total) per Judge 2 – UG Rule #8.

Team Stop No. 32

In either Scenario 1 or 2, the team will return to the Production Shaft, enter the hoist and close the shaft gate, signal the hoist engineer, ride the escape hoist to the surface, and return to the fresh air base. Upon exiting the cage, the team must count off (this is the last time that the team exits the mine). Afterward, 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, contained the fire (sealed with regulation), located four of the five missing miners, and brought two of them out alive. The last missing miner may be located in either fire area (in the shop or in Drift 2) or under the airtight cave in CX 4.

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

Solution Map - 8

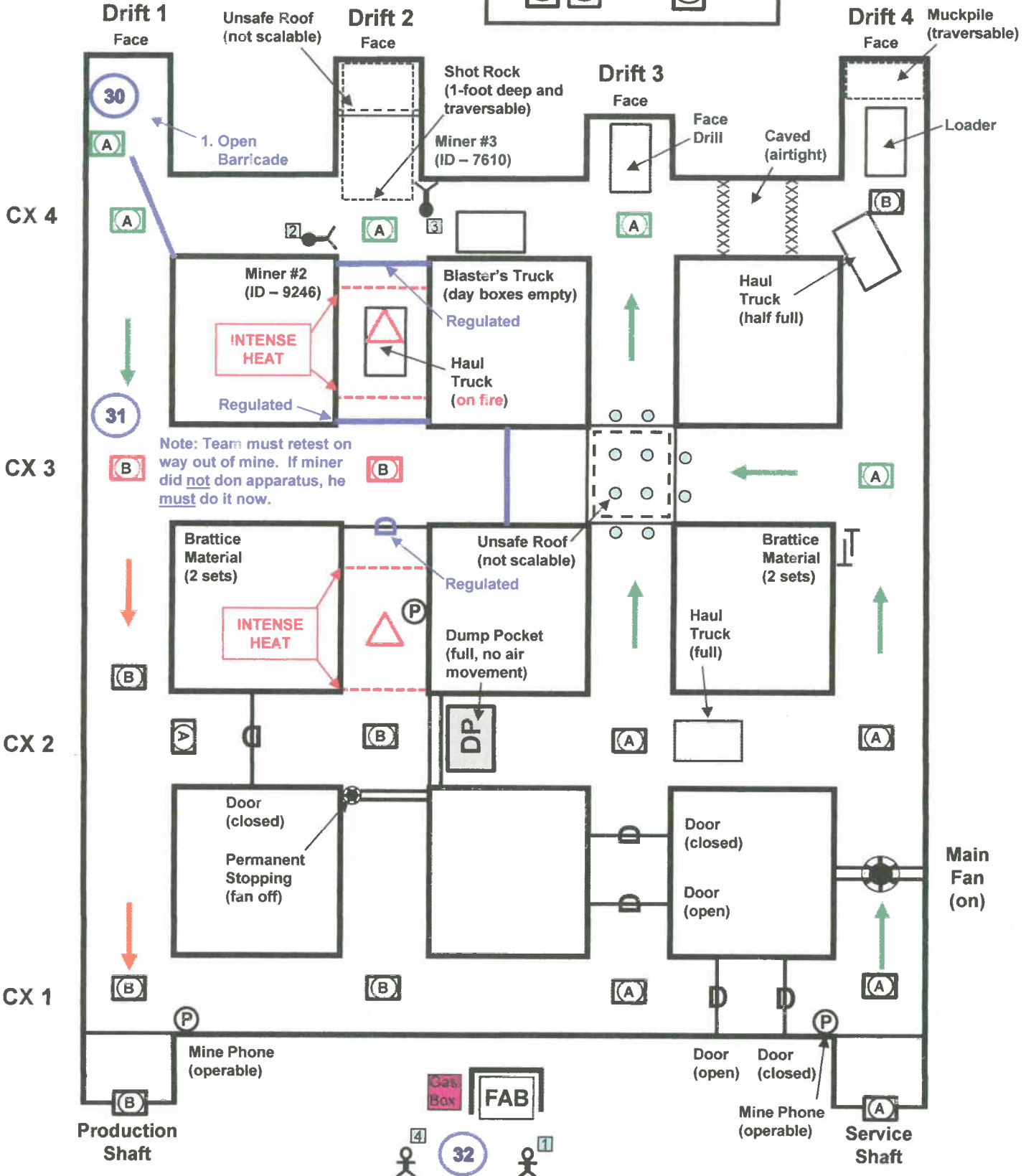


Note: Miner should don apparatus & prepare for travel.

1 = Team Stop

Gas Placard Key:

- (A) = Clear Air
- (B) = 17% O₂, 0.5% CH₄, 1,300 ppm CO, 3.0 ppm NO₂, Light Smoke
- (C) = 16.5% O₂, 1.0% CH₄, 2,000 ppm CO, 9.0 ppm NO₂, Heavy Smoke



Final Note:

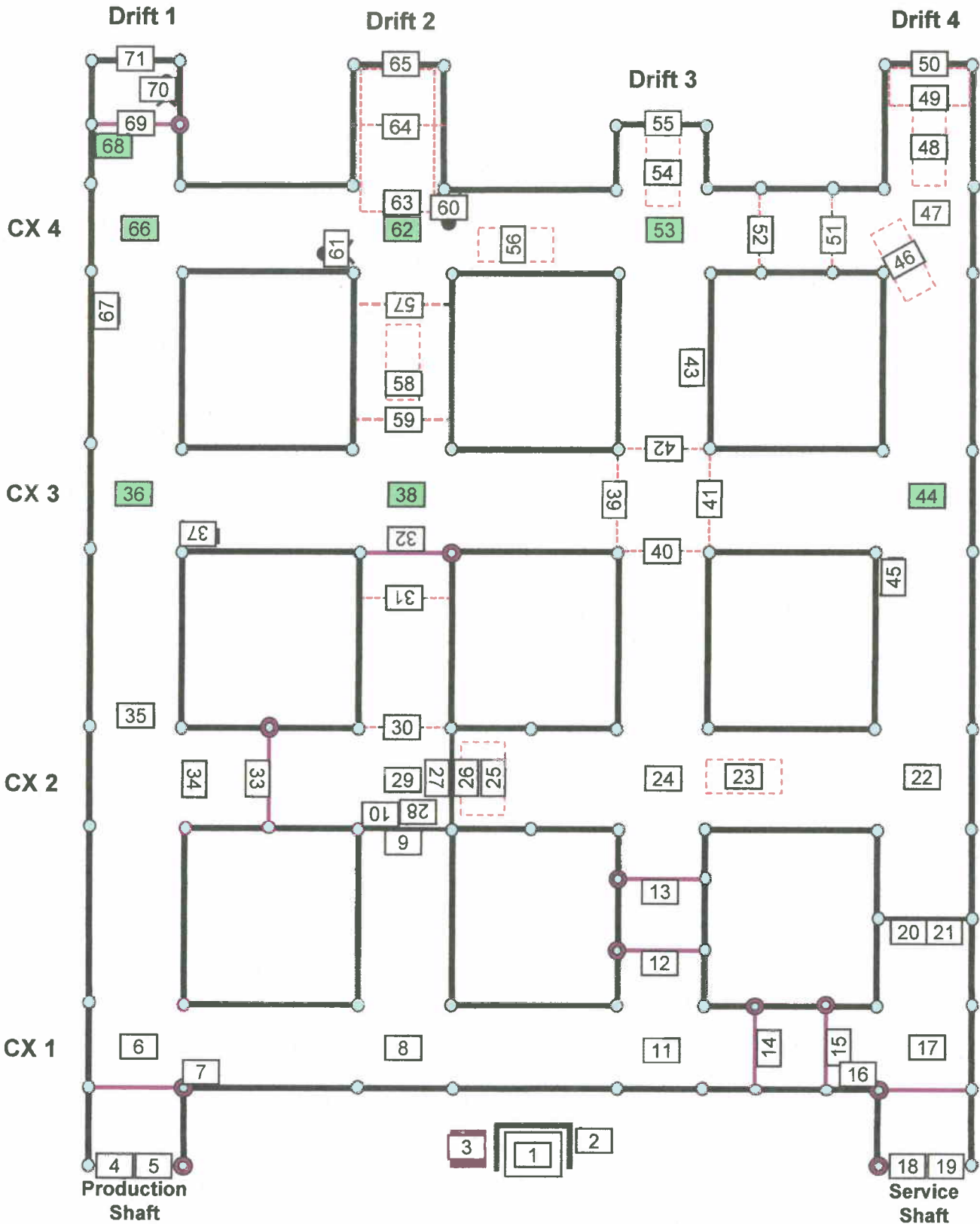
During **Team Stop No. 28**, if the team elects to close the regulators in the two fire seals (in Drift 2) and the northernmost Shop door, all placards will quickly revert to “clear air.”

After **Team Stop No. 30** has been completed, Miner #4 will not need respiratory protection to leave the mine. **Therefore, skip Team Stop No. 31**, since the team can escort Miner #4 to the Production Shaft and complete the actions outlined in **Team Stop No. 32**.

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

Placard Map

2	= Single-sided Placard
15	= Double-sided Placard

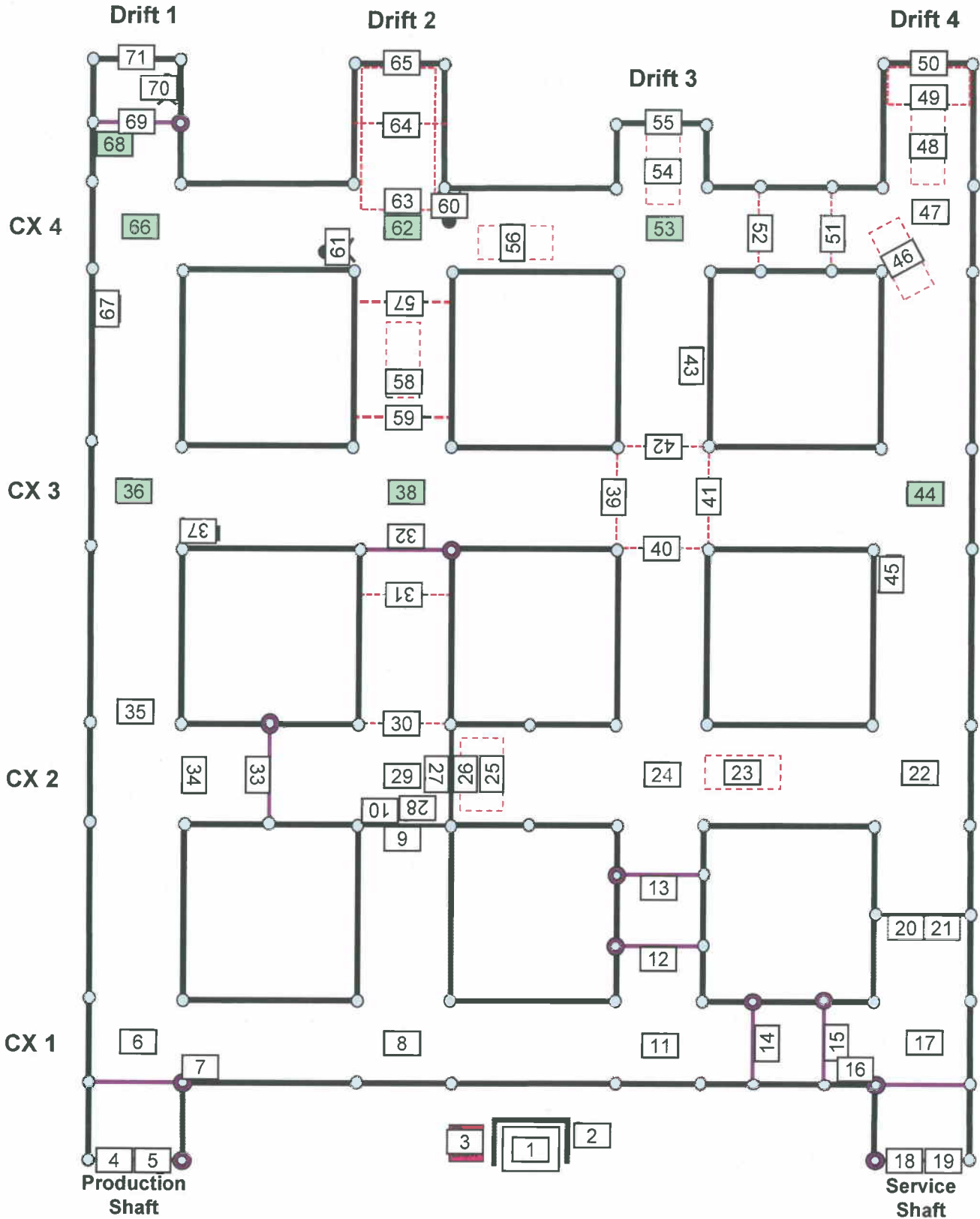


Placard Key:

1. Fresh Air Base
2. Brattice Material (two sets)
3. Gas Box Test Station
4. Production Shaft
5. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
6. 17 % O₂
0.2 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
7. Mine Phone (operable)
8. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
9. Permanent Stopping (fan off)
10. Permanent Stopping (fan off)
11. Clear Air
12. Airlock Door (open)
13. Airlock Door (closed)
14. Airlock Door (open)
15. Airlock Door (closed)
16. Mine Phone (operable)
17. Clear Air
18. Service Shaft
19. Clear Air
20. Permanent Stopping
21. Main Fan (on)
22. Clear Air
23. Haul Truck (full)
24. Clear Air
25. Dump Pocket
(full, no air movement)
26. Permanent Stopping
27. Permanent Stopping
28. Miner #1 (ID – 3527)
29. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
30. Intense Heat
31. Intense Heat
32. Door (open)
33. Door (closed)
34. Clear Air

Placard Map

2	= Single-sided Placard
15	= Double-sided Placard

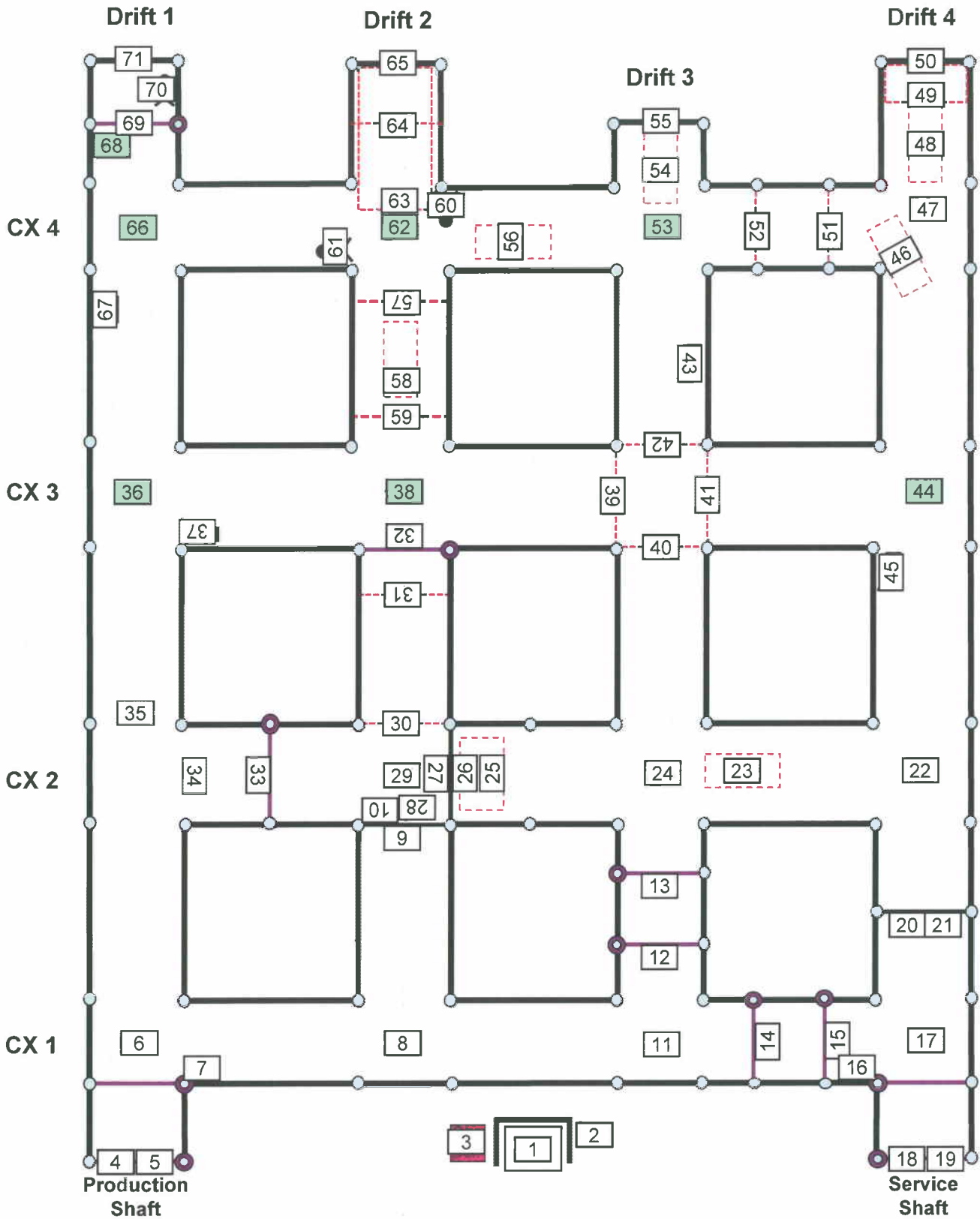


Placard Key (continued):

- 35. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
- 36. 16.5 % O₂
1.0 % CH₄
2,000 ppm CO
9.0 ppm NO₂
Heavy Smoke
- 37. Brattice Material (two sets)
- 38. 16.5 % O₂
1.0 % CH₄
2,000 ppm CO
9.0 ppm NO₂
Heavy Smoke
- 39. Unsafe Roof (not scalable)
- 40. Unsafe Roof (not scalable)
- 41. Unsafe Roof (not scalable)
- 42. Unsafe Roof (not scalable)
- 43. Brattice Material (two sets)
- 44. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
- 45. Brattice Material (two sets)
- 46. Haul Truck (half full)
- 47. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
- 48. Loader
- 49. Muckpile (traversable)
- 50. Face – Drift 4
- 51. Caved (airtight)
- 52. Caved (airtight)
- 53. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke
- 54. Face Drill
- 55. Face – Drift 3
- 56. Blaster's Truck (day boxes empty)
- 57. Intense Heat
- 58. Haul Truck (on fire)
- 59. Intense Heat
- 60. Miner #3 (ID – 7610)
- 61. Miner #2 (ID – 9246)
- 62. 16.5 % O₂
1.0 % CH₄
2,000 ppm CO
9.0 ppm NO₂
Heavy Smoke

Placard Map

2	= Single-sided Placard
15	= Double-sided Placard



Placard Key (continued):

- 63. Shot Rock
(1-foot deep and traversable)
- 64. Unsafe Roof (not scalable)
- 65. Face – Drift 2

- 66. 16.5 % O₂
1.0 % CH₄
2,000 ppm CO
9.0 ppm NO₂
Heavy Smoke
- 67. Wooden Posts (12)

- 68. 17 % O₂
0.5 % CH₄
1,300 ppm CO
3.0 ppm NO₂
Light Smoke

- 69. Barricade (9' x 10')

- 70. Miner #4 (ID – 4212)

- 71. Face – Drift 1

Note:








Seven gas placards (36, 38, 44, 53, 62, 66, and 68) are double-sided. The backside will indicate a change in gas concentrations when changes have been made by the team to successfully ventilate these areas.

The reverse side of five placards (44, 53, 62, 66, and 68) will show "Clear Air." **Note:** Placard 68 will not change until the team erects a "wing" curtain to direct fresh air toward the barricade in Drift 1.

The reverse side of two placards (36 and 38) will show: 17 % O₂, 0.5 % CH₄, 1,300 ppm CO, and 3.0 ppm NO₂ with Light Smoke.

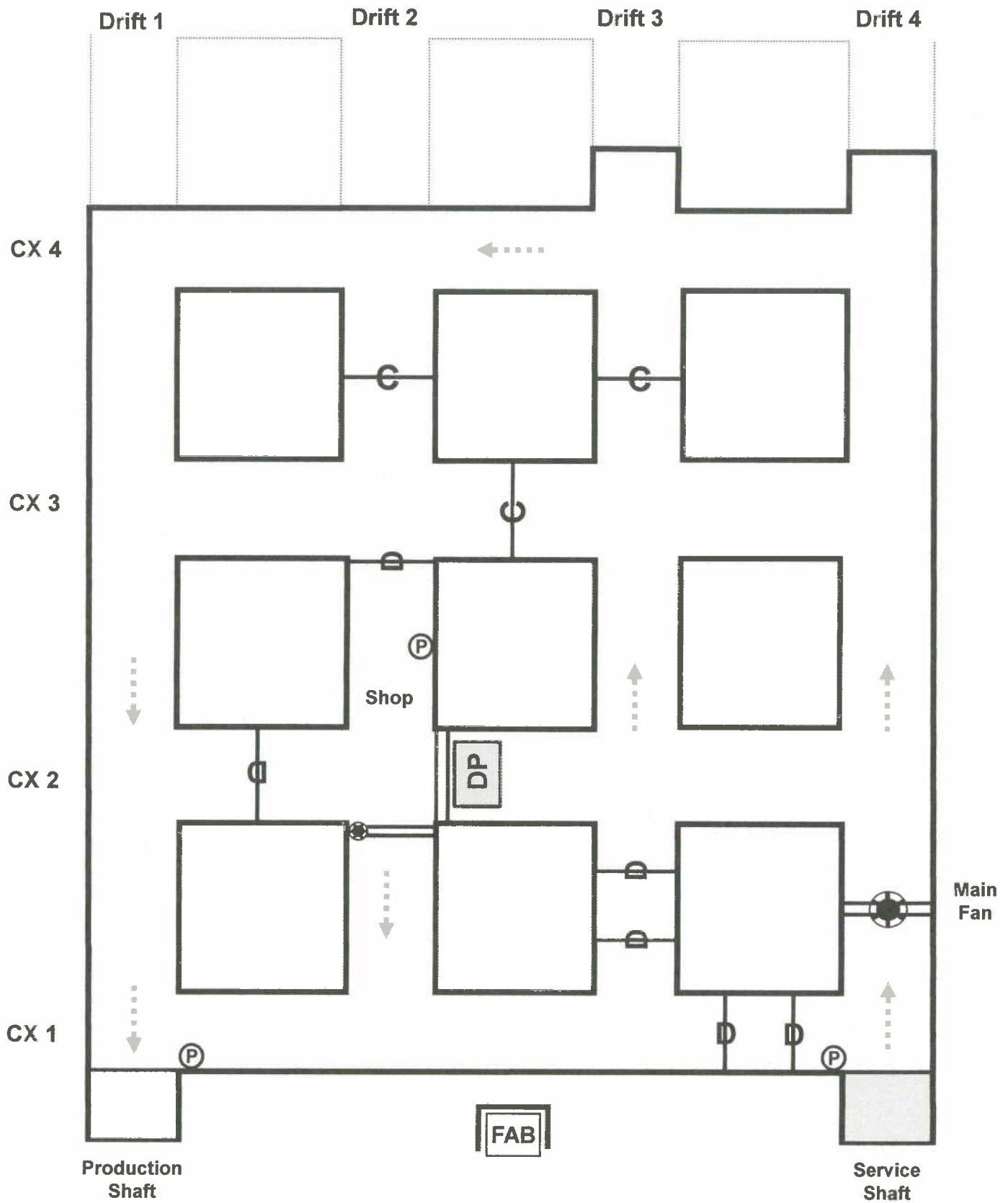
PNP Mining Company
Segway Mine
I.D. No. 30-02015
Clymer, New York

Map Legend:

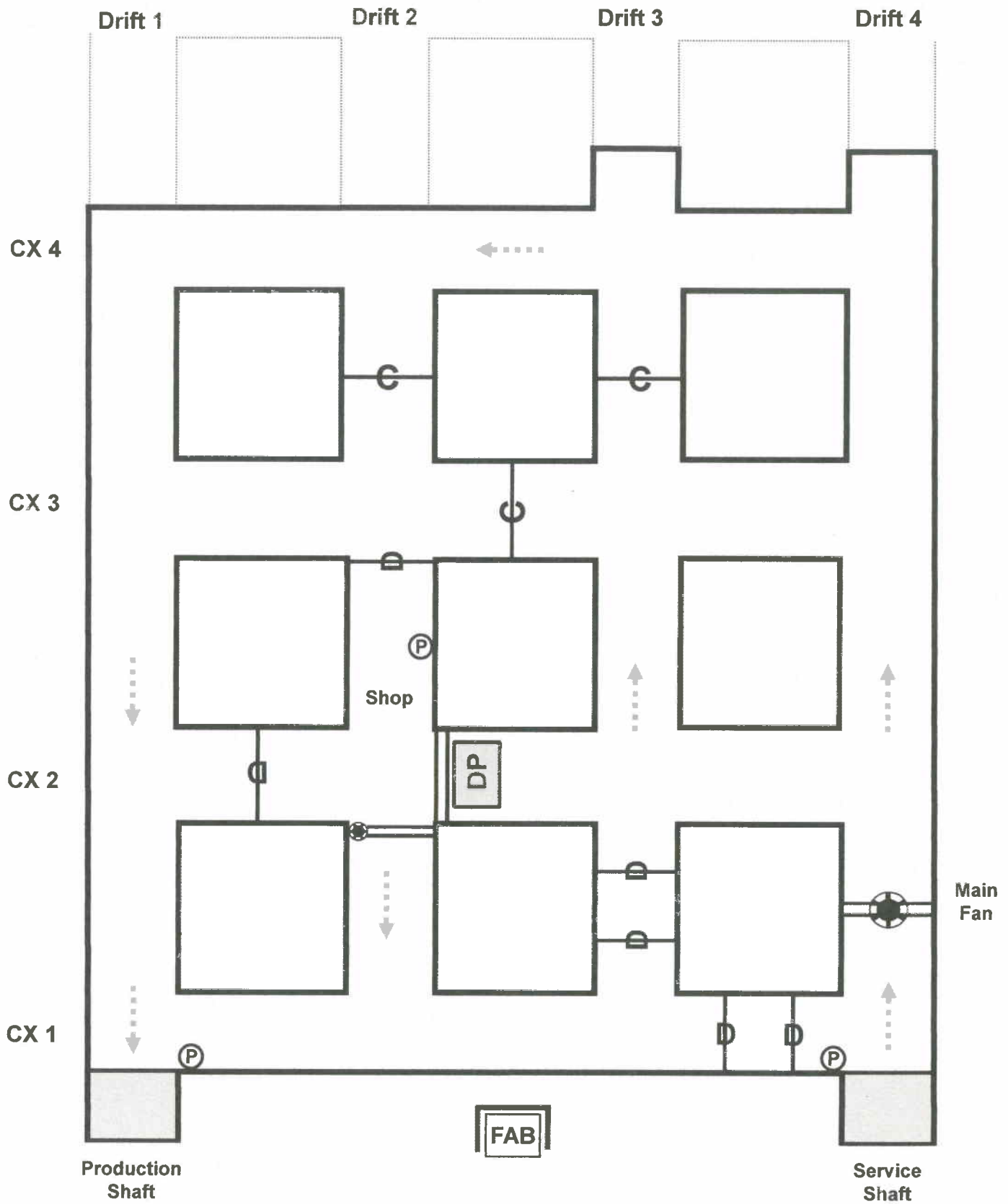
-  Shaft Dump Pocket
-  Pager Phone
-  Check Curtain
-  Permanent Stopping
-  Airlock
-  Door
-  Regulator
-  Ventilation Fan
-  Airflow & Direction
-  Projected Development

Updated July 20, 2015
Approx. Scale 1 in . = 10 ft.

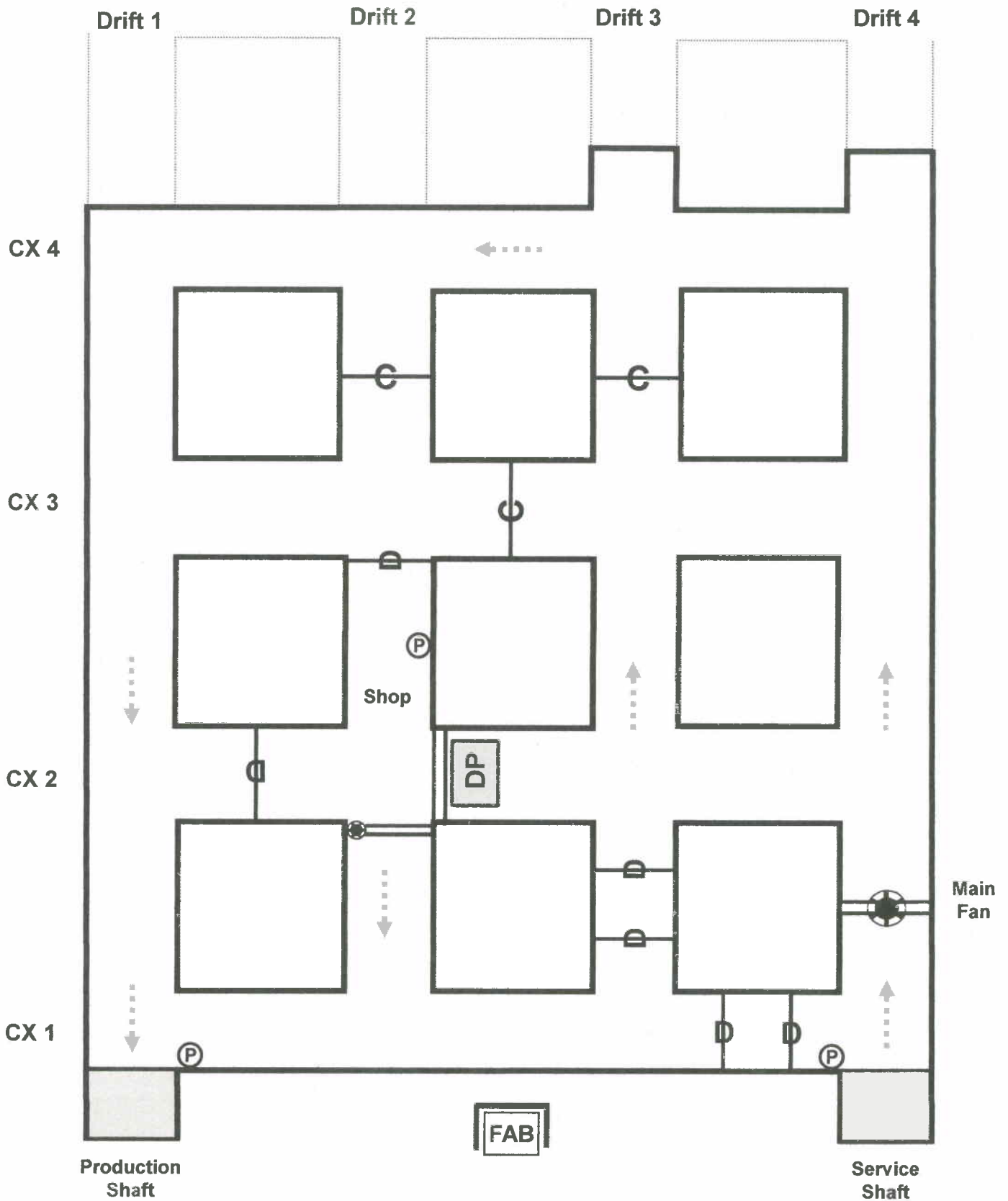
Team Map – Level 400



Fresh Air Base Map – Level 400



Fresh Air Base Map – Level 400 (Alternate – Do Not Score)



Construction Map

