

2016 National Metal and Nonmetal Mine Rescue Contest

JUDGES' PACKET
Field Competition
Day 2



July 27, 2016
Reno, Nevada

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Introduction

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

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

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

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

Mine Information Sheet

Sparks Mining Co. – Daylight Mine

Mine Design & Openings:

The Sparks Mining Co.'s Daylight Mine is a single-level underground development opened by three 18-foot diameter shafts approximately 1,700 feet deep. The downcast Service and Intake Shafts are equipped with hoists used to transport people and to convey supplies. The Service Shaft serves as the primary escapeway for personnel in the 1 South and 2 South production panels. The Intake Shaft serves as the primary escapeway for personnel in the 1 West and 3 South production panels and the Shop. The upcast Production Shaft is equipped with production skips, as well as an escape compartment which can be used to hoist a maximum of six persons to the surface.

Ventilation:

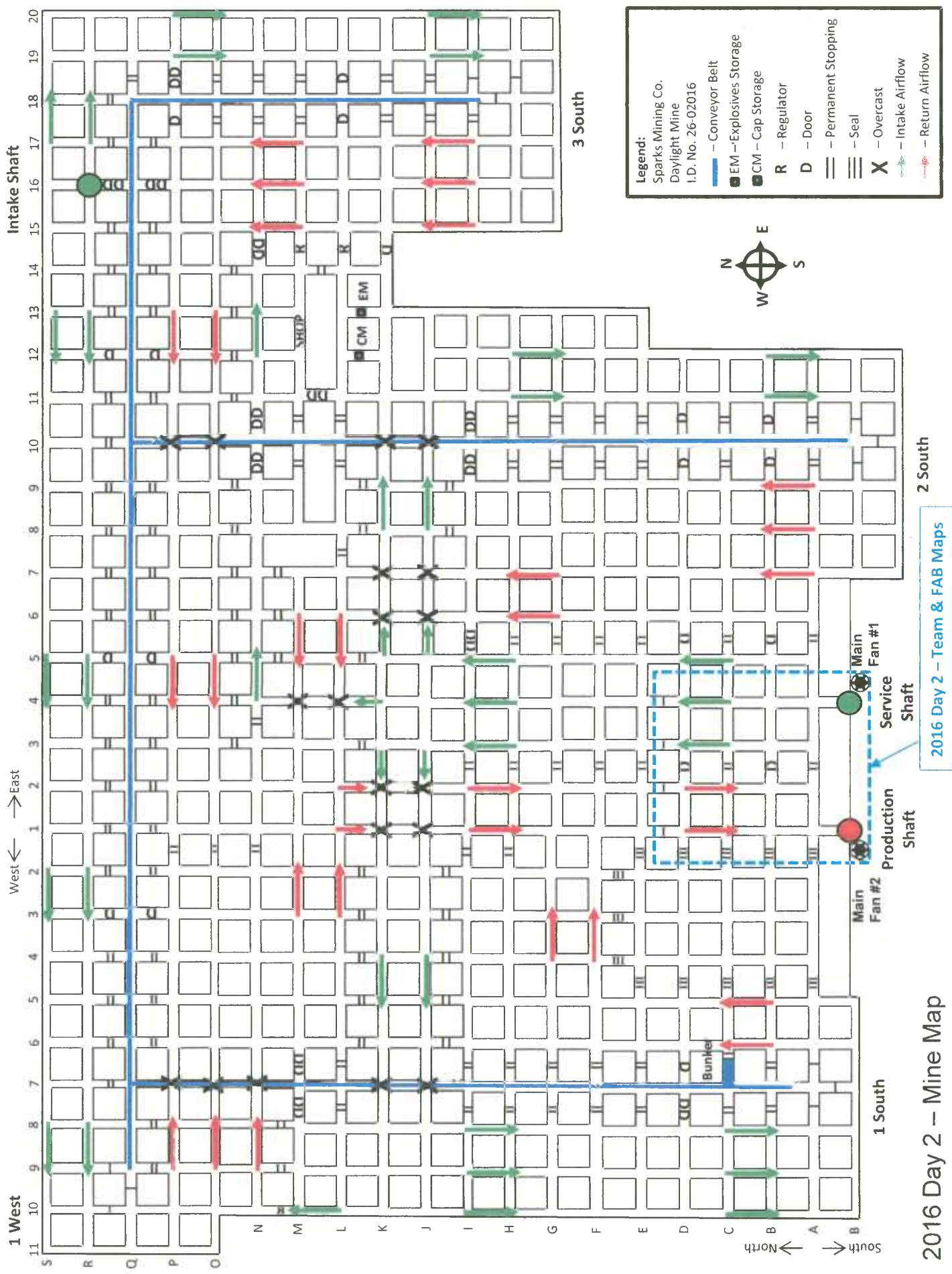
The mine uses a push/pull ventilation system utilizing two main fans. Main Fan #1 is located on the surface at the downcast Service Shaft and pushes about 200,000 cfm of fresh air into the mine. The fan operates in the stable portion of its performance curve and can be reversed if necessary. Main Fan #2 is located on the surface at the upcast Production Shaft and pulls about 350,000 cfm from the mine. The fan operates in the stable portion of its performance curve and cannot be reversed. There is no fan at the downcast Intake Shaft; however, fresh air is drawn into the mine through this opening due to exhaust pressures created by the Main Fan #2. Air circulates through the mine as shown on the 2016 Day 2 - Mine Map. Separation of intake and exhaust airways is achieved utilizing concrete block stoppings, overcasts, and brattice curtains. Air is directed to the faces using these permanent and temporary ventilation controls. Currently, the Main Fan #1 is operating and the Main Fan #2 is not. Main Fan #2 can be restarted, if the team decides it is safe to do so.

Mine Classification:

In accordance with Title 30 CFR Part 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. Both MSHA and Company's gas samples have indicated the presence of methane in trace amounts. Presently, MSHA is reviewing this classification due to several reported methane feeders and three minor ignitions in the face areas.

Mining & Equipment:

The mine uses a conventional room and pillar method to extract ore from faces in the four advancing production panels. The entries are initially driven 8 feet high and 10 feet wide. Typical pillar dimensions are 15 feet by 20 feet (W x L). On each panel, the broken ore is loaded by load-haul-dumps (LHDs) which transport it to a feeder breaker and onto a conveyor belt. All of the conveyors lead to the 1 South Panel belt which feeds a sublevel-storage bunker. From there, ore flows to a skip pocket and hoisted to the surface via skips in the Production Shaft. The mine operates three 8-hour shifts per day, six days per week with a single 10-hour maintenance shift on Sundays. All underground mobile equipment (including the LHDs, face drills, scalers, roof bolting machines, blasting vehicles and transport jeeps) is diesel-powered.



Legend:
 Sparks Mining Co.
 Daylight Mine
 I.D. No. 26-02016

- Conveyor Belt
- EM - Explosives Storage
- CM - Cap Storage
- R - Regulator
- D - Door
- Permanent Stopping
- Seal
- X - Overcast
- Intake Airflow
- Return Airflow



2016 Day 2 - Team & FAB Maps

2016 Day 2 - Mine Map

Mine Information Sheet (continued) Sparks Mining Co. – Daylight 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. On occasion, additional spot bolting is conducted using a stoper drill. Two years ago, a major collapse occurred in the drifts west of the Production Shaft resulting in water and gases entering the mine from the strata above. The area was eventually sealed with substantial permanent bulkheads. The seal locations are marked on the 2016 Day 2 - Mine Map.

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.

Electric Power:

The electrical power to the shafts and the surface pumping stations has been restored. Power to the Main Fan #2 and the underground installations has been de-energized, locked out, and guarded.

Explosives:

Explosives are used during the mining cycle and are stored underground. The location of the explosives and caps storage facilities is marked on the 2016 Day 2 - Mine Map. 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 blasters' trucks.

Mine Map:

The onsite Engineering Department updated the mine map on July 15, 2016.

Other Mines:

There are several known mines, active and abandoned, in Reno, Nevada. At this time, the Daylight Mine is not connected to any of these mines.

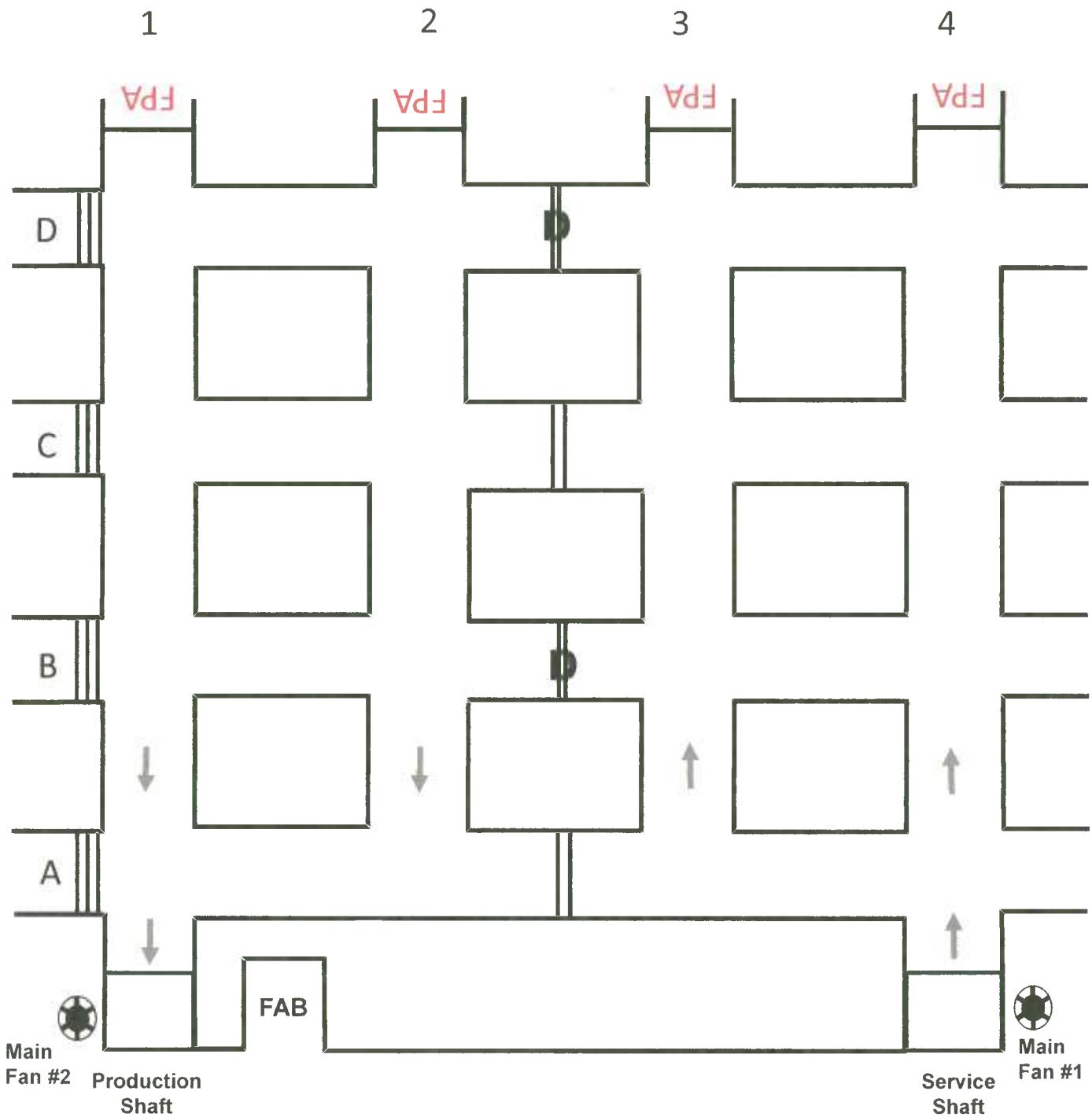
Materials:

Most available equipment and materials to work the problem are located in the mine and are identified with placards. If there is something else deemed necessary by the team, upon request, it can be delivered in a reasonable amount of time. **Note: The team will only be allowed to carry two sets of brattice material at any given time.**

Communications:

Pager phones are available in the mine for contact with the surface. The current phone locations are marked on the mine map. However, there has been no contact with the missing miners.

2016 Day 2 – Team Map



Team Briefing Statement

You are located at the fresh air base that has been established on the surface of the Sparks Mining Co.'s Daylight Mine. The mine is a single-level underground development opened by three 18-foot diameter shafts approximately 1,700 feet deep. The downcast Service and Intake Shafts are equipped with hoists used to transport people and to convey supplies. These shafts are used as the primary escapeways for personnel in the four production panels and the Shop. The upcast Production Shaft is equipped with production skips, as well as an escape compartment which can be used to hoist a maximum of six persons to the surface.

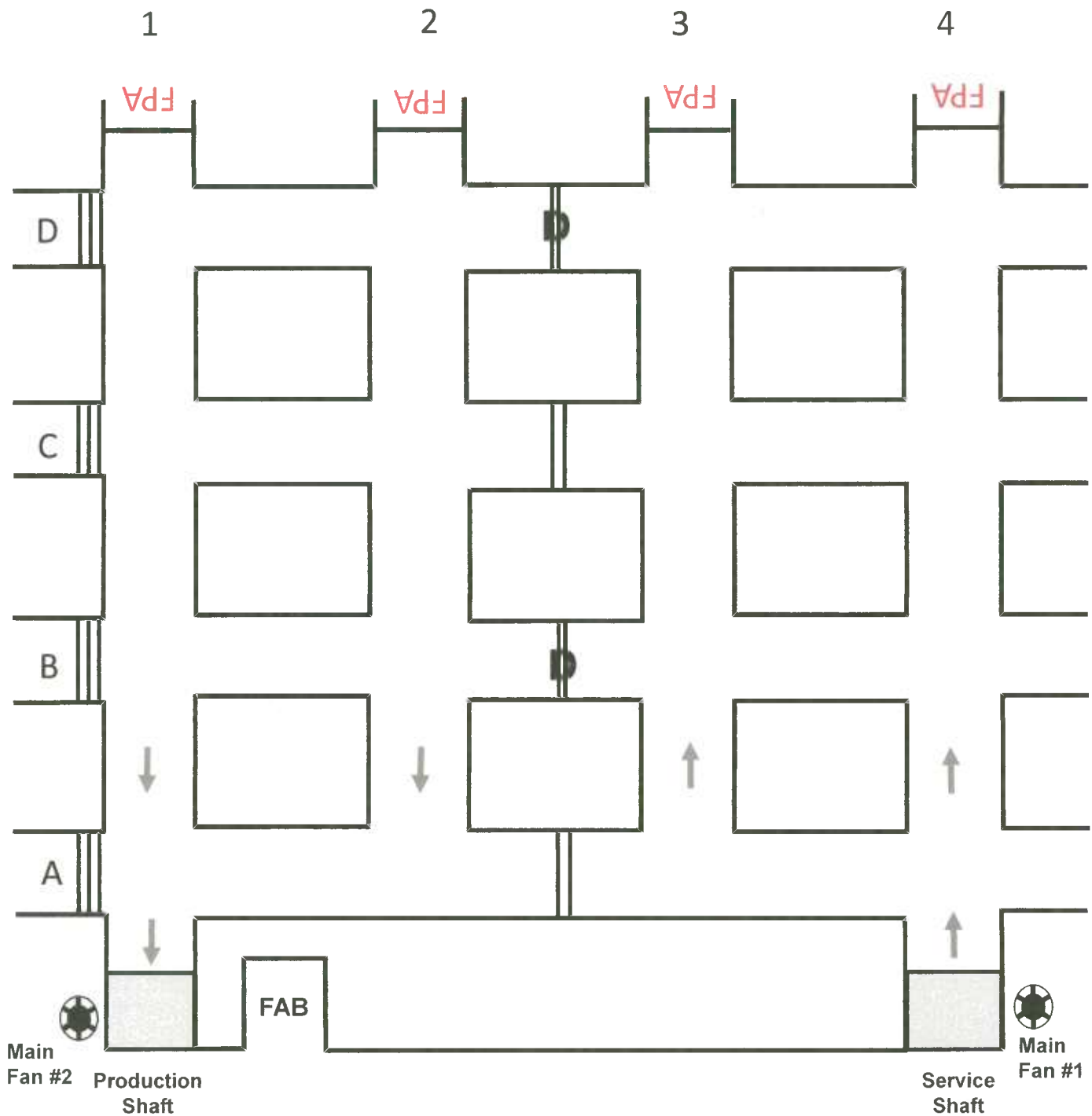
The mine uses a push/pull ventilation system utilizing two main fans. Main Fan #1 is located on the surface at the downcast Service Shaft and pushes about 200,000 cfm of fresh air into the mine. The fan can be reversed if necessary. Main Fan #2 is located on the surface at the upcast Production Shaft and pulls about 350,000 cfm from the mine. The fan cannot be reversed. There is no fan at the downcast Intake Shaft; however, fresh air is drawn into the mine through this opening due to exhaust pressures created by Main Fan #2. Separation of intake and exhaust airways is achieved utilizing concrete block stoppings, overcasts, and brattice curtains. Air is directed to the faces using these permanent and temporary ventilation controls. Currently, Main Fan #1 is operating and Main Fan #2 is not. Main Fan #2 can be restarted, if the team decides it is safe to do so.

High grade ore is mined using a conventional "room and pillar" method with four production panels (1 South, 2 South, 3 South and 1 West). The entries were initially driven approximately eight feet high and ten feet wide. 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. Two years ago, a major collapse occurred in the drifts west of the Production Shaft resulting in water and gases entering the mine from the strata above. The area was eventually sealed with substantial permanent bulkheads. Since that time, the mine has had no water problems in the active workings.

The mine is classified as a Category IV mine based on the geological area in which the mine is located. Presently, MSHA is reviewing this classification due to several reported methane feeders and three minor ignitions in the face areas. At this time, the Daylight Mine is not connected to any other active or abandoned mine in the area.

Last night at 11:00 p.m., the production crews assembled on the surface to start their shift. By 11:30 p.m., a total of 40 persons went underground. An eight-person crew traveled to each production panel. Five laborers were assigned to cleanup in the belt conveyor drifts. Three persons were assigned to spot bolt areas around the Production and Service Shaft stations. At about 3:15 a.m., the Main Fan #2 shut down. The pressure gauge recorder showed a momentary peak just before the fan stopped. When the fan could not be restarted, the mine foreman activated the evacuation alarm.

2016 Day 2 – Team Map



The crews exiting the mine toward the Service Shaft reported that their gas instruments' low oxygen alarms sounded and they had to retreat. All persons evacuating the mine came out through the Intake Shaft. By 4:30 a.m., 37 persons had come to the surface.

At 6:00 a.m., the Company's mine rescue teams entered the mine at the Intake Shaft and explored all areas except for the last four crosscuts north of the Production and Service Shafts in Drifts 1, 2, 3, and 4. Their furthest point of advance (FPA) is shown on the 2016 Day 2 - Team and Fresh Air Base Maps. A separate Fresh Air Base (FAB) has been established on the surface near these shafts. The FAB location is also marked on these maps.

All power to the underground has been de-energized, locked out, and guarded. All three hoists are operational and the Main Fan #1 and surface pumps are operating. Continuous gas monitoring has been established at the three shafts. The latest readings show "clear air" at each location. We do not know the status of the communication system, because there has been no contact with the missing miners.

We have called all of the government agencies for help. Guards have been posted at the shafts and at the main fans. There is a fully equipped mine rescue team ready to serve as your team's backup. If your team is willing to help, we would like you to account for all missing miners; bring any live miners to the surface; extinguish or seal any fires; and explore and map all accessible areas of the mine. **Another team will be sent into the mine to replace you after 75 minutes.**

All available equipment and materials to work the problem are located in the mine and are identified with placards. 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 you will be located at the surface fresh air base. At that time, 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 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 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 affected area (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 affected area; and
- Bring any live miners to the surface fresh air base.

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 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. Questions will be answered only as required by the rules or to explain the meaning of a term.

When the team verifies that they understand the instructions, the captain immediately starts the official clock. He writes the month, day, year, and the team position number on the sign-in board (or sheet). **The captain's failure to perform any of these tasks will result in discounts (4 x each infraction) per Judge 1 – Surface Rule #8.**

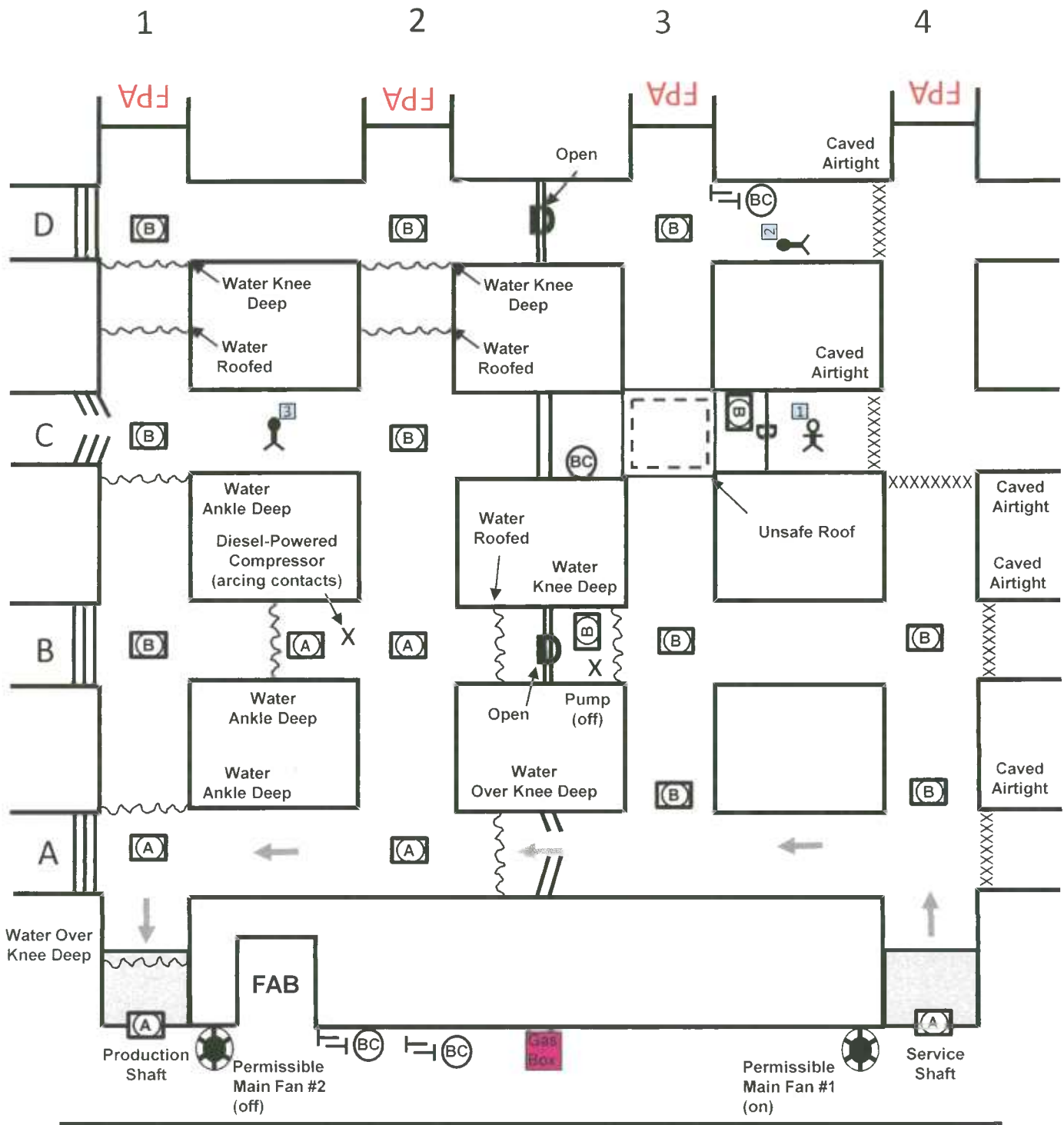
After receiving the information from the Mine Manager, the team may discuss the conditions presented by the problem and the map. The team is not required to check their equipment again. These equipment checks were conducted prior to reporting to the field and the team is fully equipped, physically fit, 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 (Class IV mine), 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).**

When ready, the team must examine the mine openings nearest the fresh air base. 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. These checks must be made to assure the conditions are safe to proceed. **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).**

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.

2016 Day 2 – Answer Map



Missing Miners:

- ① Miner #1 (ID - 2652)
- ② Miner #2 (ID - 8863)
- ③ Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Service Shaft checks reveal:

The team must conduct necessary gas tests. 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:

The team must conduct necessary gas tests. 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 wet. **Note: If the team attempts to measure the water level in the shaft, the No. 1 Judge will inform them that they cannot determine the depth of the water in the shaft.**

Note: As in the Day 1 field problem, the team will only be allowed to carry two sets of brattice material at any given time. This information was provided to the team on the Mine Information Sheet.

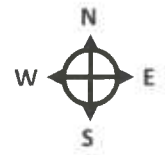
The team’s failure to take necessary gas tests where required (each gas and each infraction) assess discounts (1x each omission) per Judge 2 - UG Rule #1. All additional areas requiring gas testing by the team are shown on the Day 2 - Judge’s Map (with Team Stops) as “GT”.

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. All additional areas requiring a D&I by the team captain are shown on the Day 2 - Judge’s Map (with Team Stops) as “DI”.

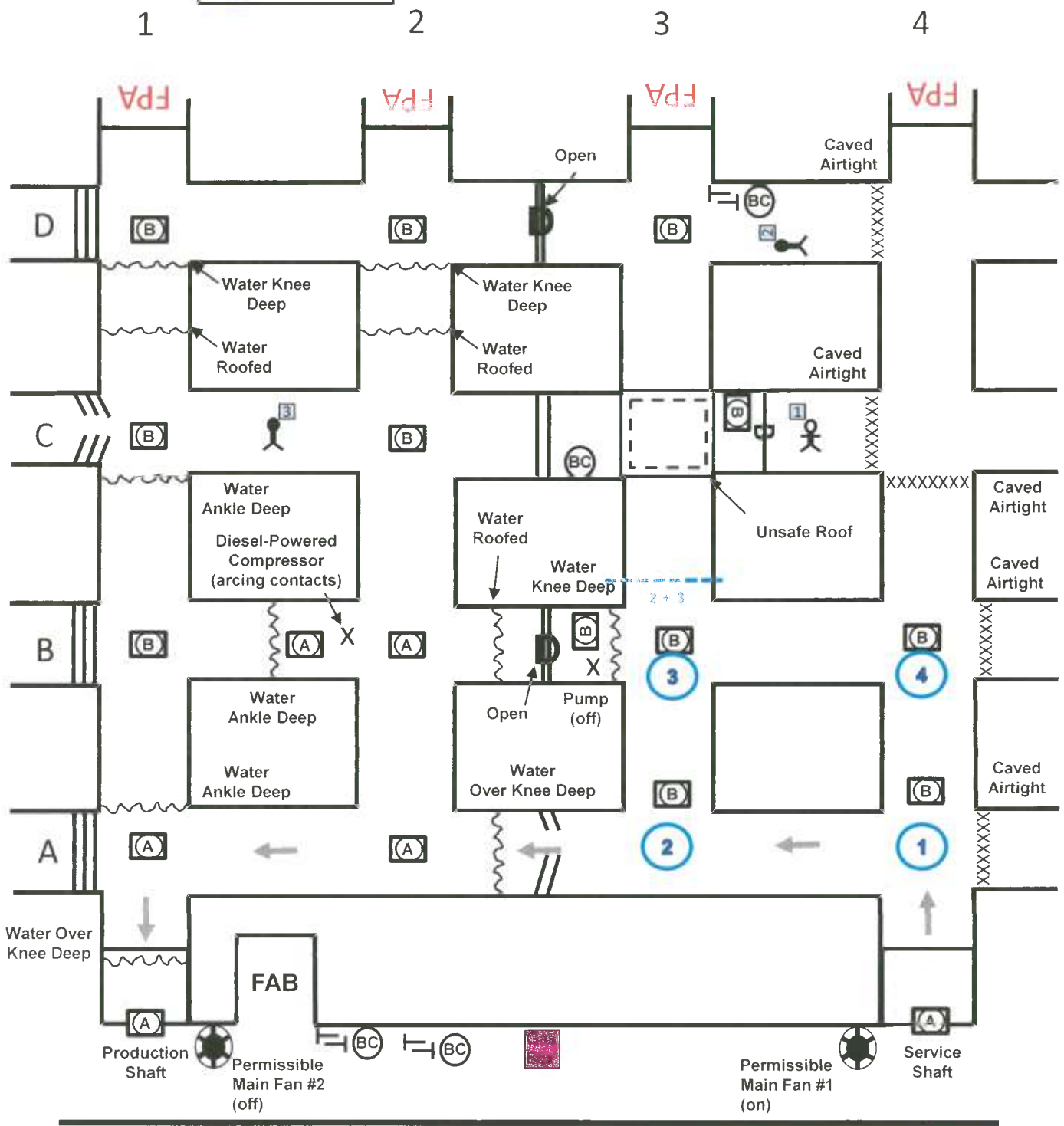
Gas Box Testing Station:

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 write down the team’s measurements and have the team member initial the documentation. Afterward, Judge No. 2 can compare the team’s measurements with the allowable tolerances for each gas and, if warranted, apply appropriate discounts (15 x each incorrect gas measurement) per Judge 2 – UG Rule #4.

2016 Day 2 – Solution Map 1



1 = Team Stop



Missing Miners:
 1 Miner #1 (ID - 2652)
 2 Miner #2 (ID - 8863)
 3 Miner #3 (ID - 0799)

Gas Placard Key:
 (A) = Clear Air
 (B) = 14 % O₂
 6.0 % CH₄
 20.0 ppm H₂S

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

Team Stop No. 1

Because the Production Shaft contains an undetermined amount of water at the bottom, the team must enter the mine through 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. Before exiting the cage the captain must check for loose roof in front of the cage. A gas test will show “clear air.”

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 – Surface 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).

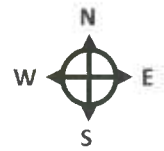
The team's failure to take necessary gas tests where required (each gas and each infraction) will result in discounts (1x each omission) per Judge 2 - UG Rule #1.

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 – Surface Rule #5.

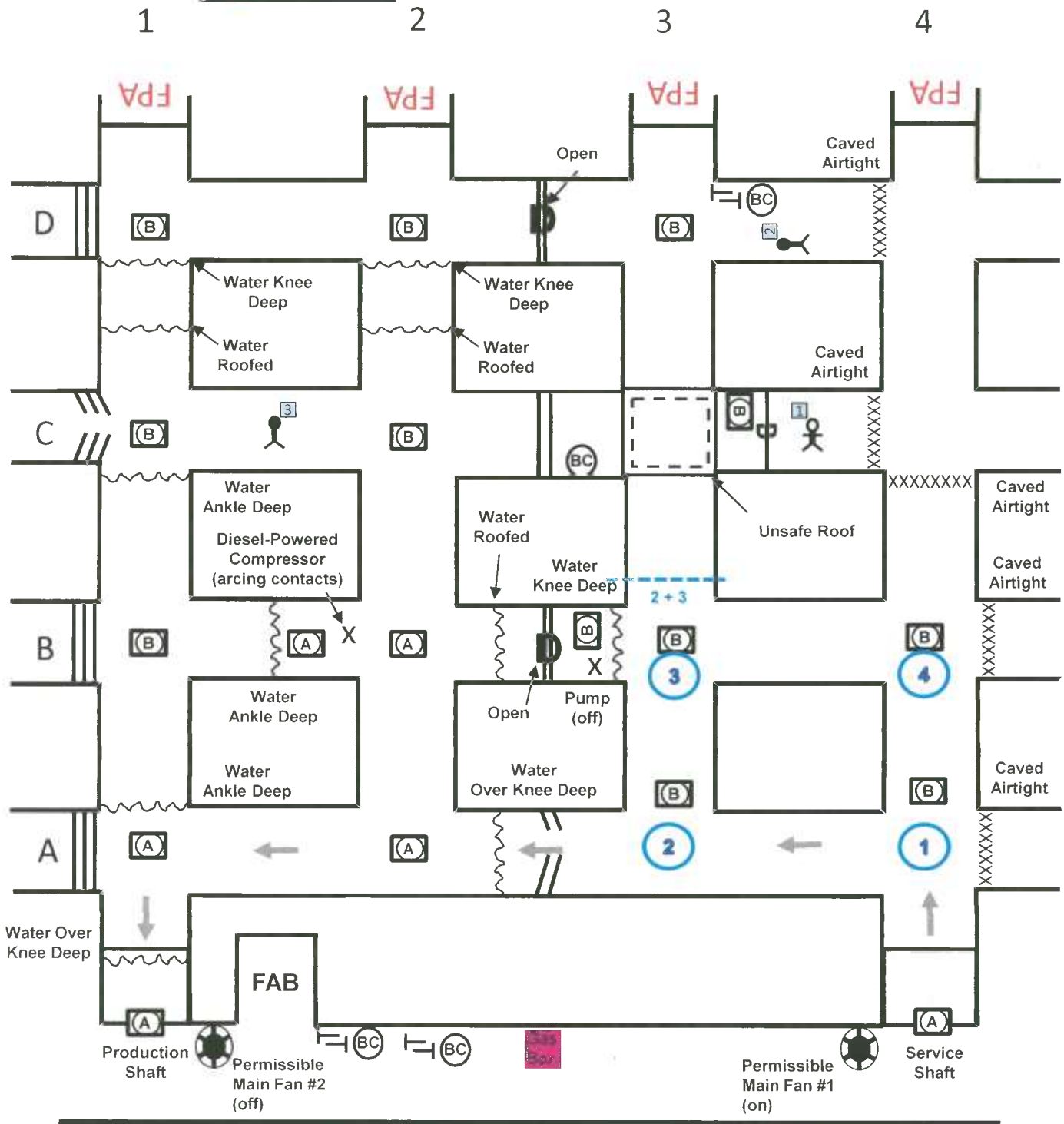
The team will advance northward to the A4 intersection where the captain performs roof or back checks and the team will conduct necessary gas checks. The team will find that the drift to the north and the crosscut to the west are open. A gas placard north of the intersection will indicate: 14% oxygen (O₂), 6.0% methane (CH₄), and 20 ppm hydrogen sulfide (H₂S). The team must notify the fresh air base that they found and air/gas mixture that reached its explosive range. To the east, the team will find a placard indicating Caved Airtight stretching rib-to-rib. After performing necessary roof or back checks, the captain will D&I the Caved Airtight as their furthest point of advance (FPA) in this direction. Note: the team's failure to notify the fresh air base of the explosive air/gas mixture will result in 10 discounts per Judge 1 – UG Rule #14.

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 50 feet apparatus check, the team is required to conduct apparatus examinations not exceeding 20-minute intervals while working the problem. Apparatus removed in order to enter a confined area or apparatus that has sustained possible damage from impact must be checked before continuing.

2016 Day 2 – Solution Map 1



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

The team's failure to conduct a 50 foot check will result in discounts (10 discounts) per Judge 1 - UG Rule #3. Also, the team's failure to conduct apparatus examinations or examinations exceeding 20-minute intervals will result in discounts (5x each occurrence) per Judge 1 - UG Rule #5.

Team Stop No. 2

The team must advance westward in crosscut A. As they travel, they will find placards (directional arrows) indicating that the airflow in the crosscut is flowing from the Service Shaft toward the Production Shaft. At the A3 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. The team will find that the drift to the north is open. A gas placard north of the intersection will indicate: 14% O₂, 6.0% CH₄, and 20 ppm H₂S. The team can stretch westward in crosscut A to find that the Permanent Stopping between Drifts 2 and 3 has been destroyed. As the team stretches further, the captain must verbally indicate he/she is checking the roof or back upon passing through. They will find Water over Knee Deep stretching rib-to-rib. The team must stop. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the water as their FPA in this direction. Any team member passing the water placard will result in individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(2).

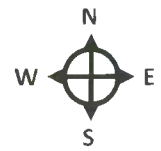
The captain's failure to verbally indicate he/she is checking the roof or back upon passing through any barricade stopping, bulkead, air lock, door, check curtain, or similar barrier, will result in discounts (5x each occurrence) per Judge 1 - UG Rule #8(b)(4).

Team Stop No. 3

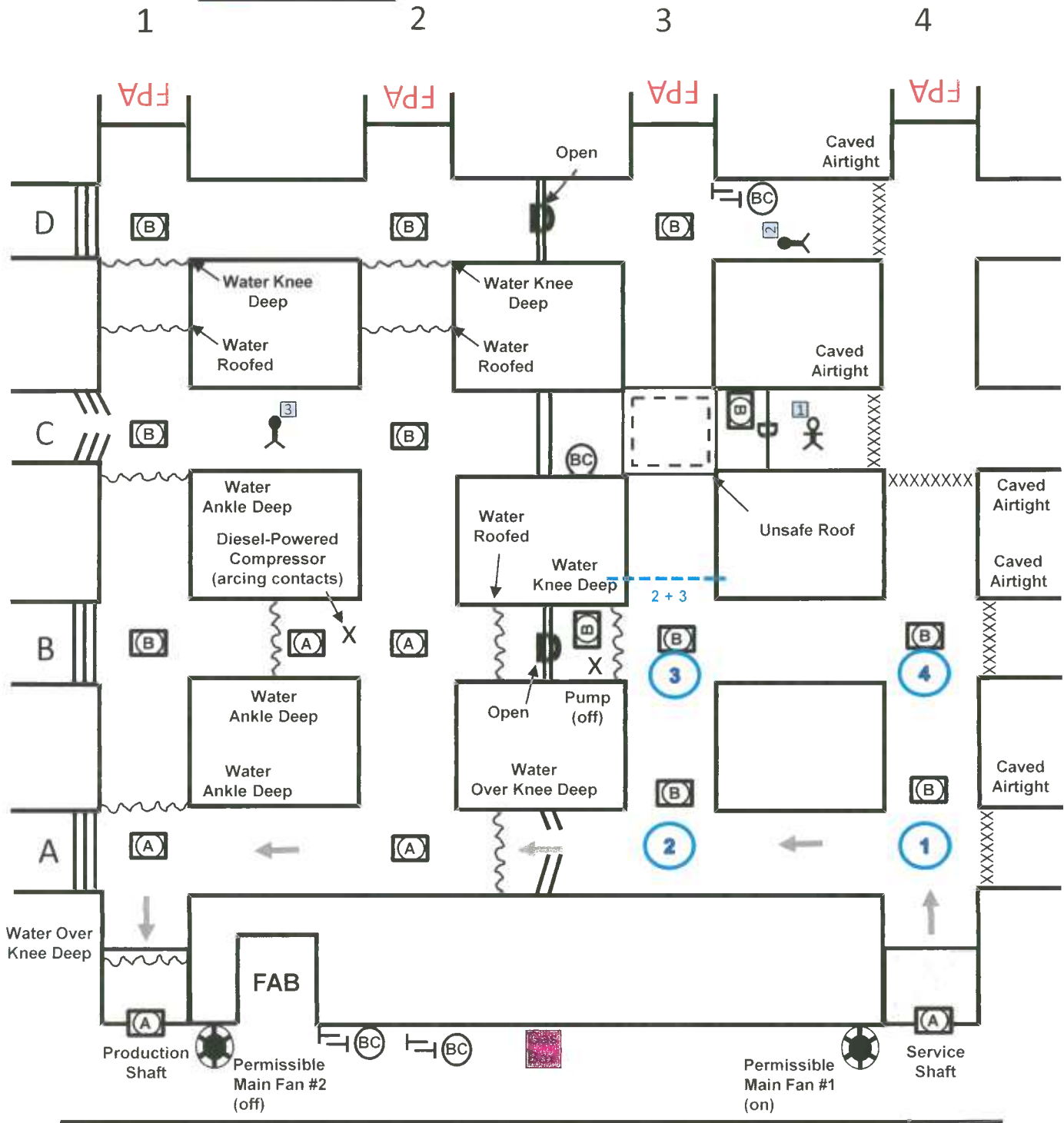
The team can retreat to A3 and advance northward. At the B3 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. A gas placard in the intersection will indicate: 14% oxygen (O₂), 6.0% methane (CH₄), and 20 ppm hydrogen sulfide (H₂S). The team will also find that the drift to the north and the crosscut to the east are open. To the west, they will find the extent of an area with Water Knee Deep. The team can continue on. As they travel, the team will find a placard located along the southern rib indicating "Pump (off)." **The team cannot activate the pump due to the explosive air gas mixture in the immediate vicinity.** The team can stretch westward to the Permanent Stopping with Door and the door is open. They can stretch further westward. The captain must verbally indicate he/she is checking the roof or back upon passing through. They will find a placard indicating Water Roofed. The team must stop. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Water Roofed as their FPA in this direction. Any team member passing the Water Roofed placard will result in individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(2).

Note: The team cannot advance northward more than 3 feet beyond crosscut B, because they have not tied-in the entries behind them. – Judge 1 – UG Rule #11.

2016 Day 2 – Solution Map 1



1 = Team Stop



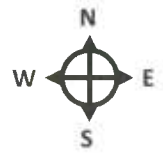
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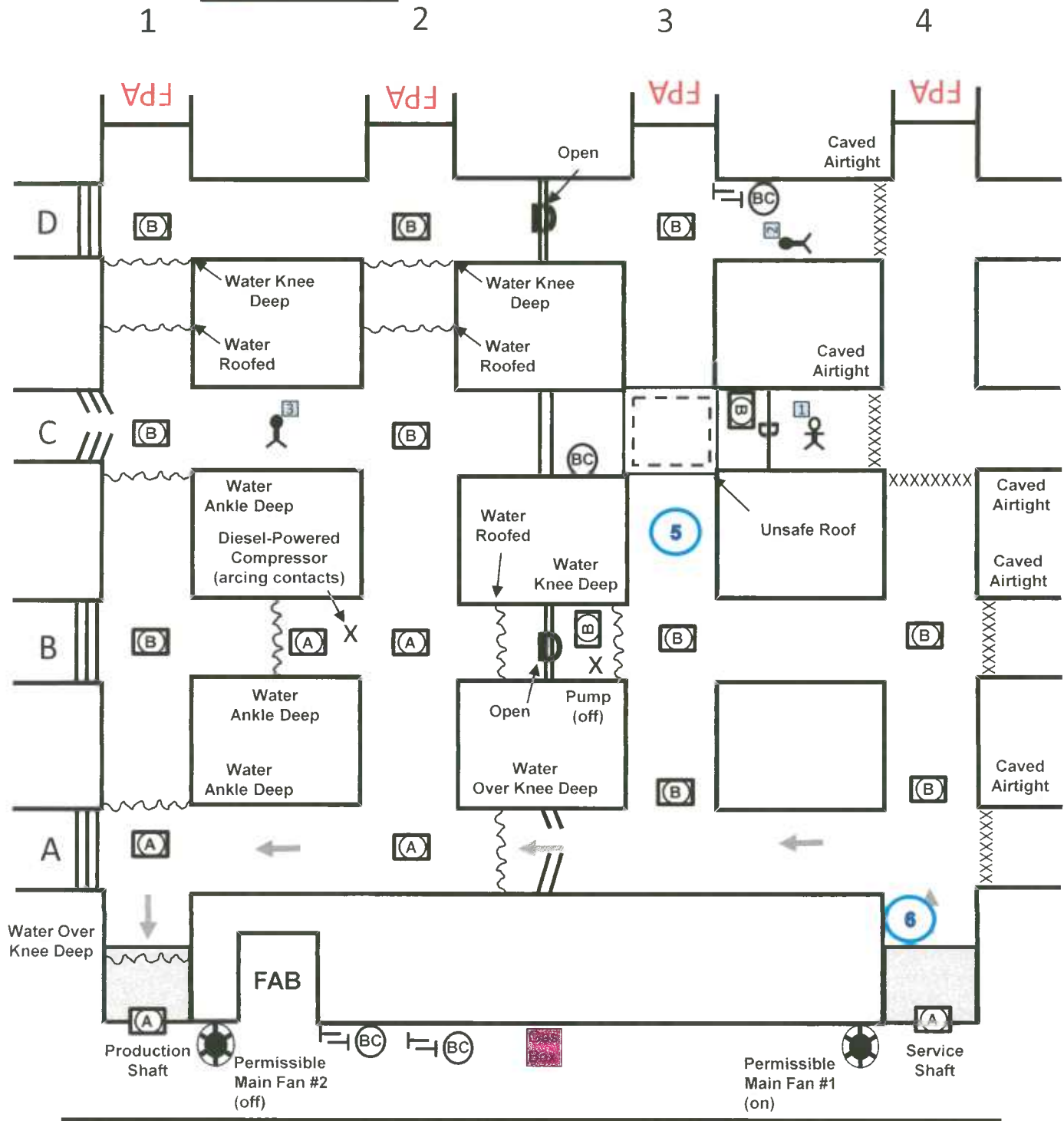
Team Stop No. 4

The team can advance eastward in crosscut B toward Drift 4. At the B4 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. A gas placard in the intersection indicates that the gas concentrations in the area have not changed from their previous location. They will find that the drift to the north is open. To the east, the team will find a placard indicating Caved Airtight stretching rib-to-rib. After performing necessary roof or back checks, the captain will D&I the Caved Airtight as their furthest point of advance (FPA) in this direction. As the team stretches northward, they will find a placard indicating Caved Airtight stretching rib-to-rib at the C4 intersection. After the captain performs roof or back checks and the team conducts necessary gas tests, the captain will D&I the Caved Airtight as their FPA in this direction.

2016 Day 2 – Solution Map 2



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Note: Team Stop Nos. 5 - 6 (see Solution Map 2)

Team Stop No. 5

Since the team cannot tie-in behind them back to the Production Shaft, they can retreat to B3 and continue systematic exploration. As they travel northward in Drift 3, they will find a placard indicating an area of Unsafe Roof stretching 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 to access the area of unsafe roof, they will be told that “Twelve wooden posts have just arrived at the fresh air base and they can be sent down the Service Shaft in about two (2) minutes.”**

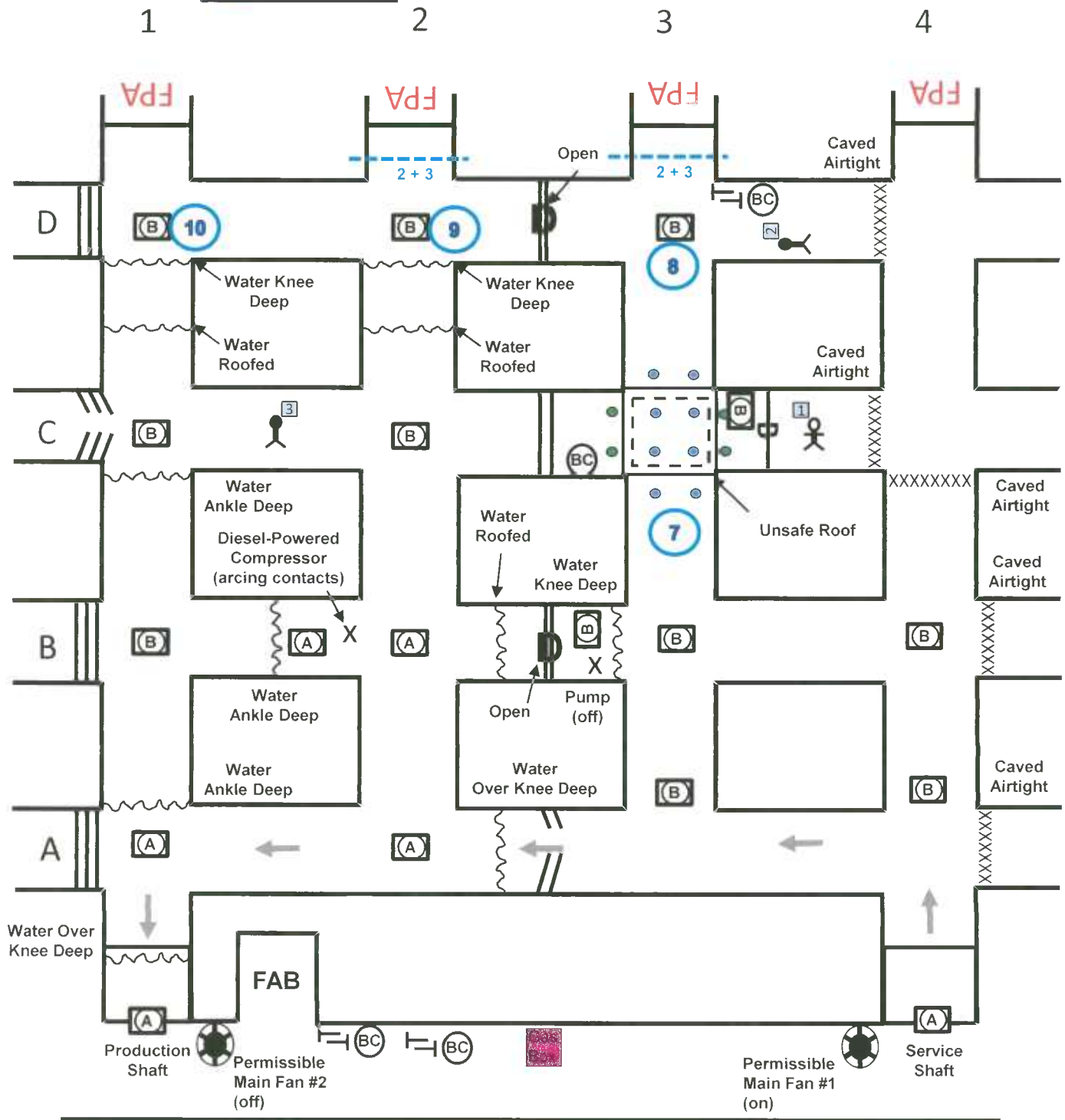
Team Stop No. 6

At this time, the team can retreat to the Service Shaft and retrieve the posts from the hoist.

2016 Day 2 – Solution Map 3



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

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

Team Stop No. 7

Now, the team can return to the C3 intersection and support the area of Unsafe Roof.

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).

Once the area has been supported, the team can stretch westward to the Permanent Stopping. As the team travels, they will find Brattice Material (for use as a wing curtain) along the southern rib. If they already have two sets of Brattice Material with Frames on their stretcher, they will need to leave the material in place. At the stopping, the captain will perform roof or back checks and the team will conduct necessary gas checks. The captain must D&I the permanent stopping as their FPA in this direction.

To the east, the team can stretch to find an 8-foot by 10-foot brattice cloth barricade stretching from rib-to-rib about 5 feet in by the C3 intersection. A gas placard near the Barricade indicates: 14% O₂, 6.0% CH₄, and 20 ppm H₂S. When the team captain calls out to anyone inside, there is no response.

Because of the low oxygen concentration in the area, the team cannot open the barricade. The team must continue systematic exploration until ventilation can be safely restored and the area in front of the Barricade can be cleared. The captain must D&I the Barricade as their FPA in this direction. If the team opens the Barricade, assess 50 discounts per Judge 1 - UG Rule #18(a).

Team Stop No. 8

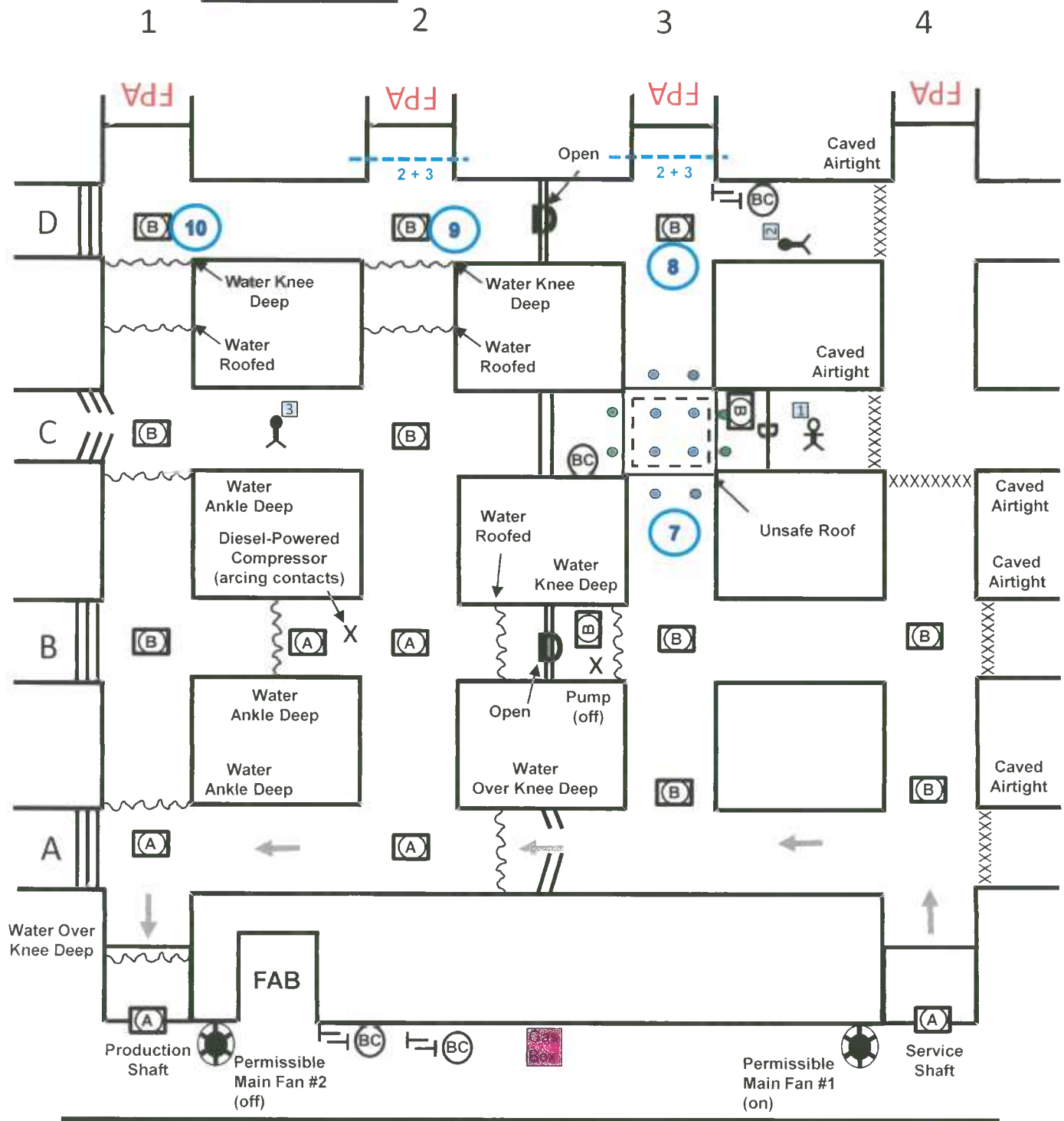
The team must continue systematic exploration of the mine. They can advance northward in Drift 3 to crosscut D. At the D3 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. A gas placard in the intersection indicates that the gas concentrations in the area have not changed from their previous location. They will find that the crosscut is open to the east and west. As the team stretches eastward, they will find Brattice Material with Frames along the northern rib. If they already have two sets with them, they will need to leave the material in place. They will then find the first missing miner (Miner #2, I.D. 8863) 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. Continuing eastward, the team will find a placard indicating Caved Airtight stretching rib-to-rib. After the captain performs roof or back checks and the team takes necessary gas tests, the captain will D&I the Caved Airtight as their furthest point of advance (FPA) in this direction.

Note: The team cannot advance northward more than 3 feet beyond crosscut D, because they have not tied-in the entries behind them. – Judge 1 – UG Rule #11.

2016 Day 2 – Solution Map 3



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Team Stop No. 9

The team can advance westward in the crosscut toward Drift 2. As they travel, they will find a Permanent Stopping with Door and the door is open. The captain must verbally indicate he/she is checking the roof or back upon passing through the open door. At the D2 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. A gas placard in the intersection indicates that the gas concentrations in the area have not changed from their previous location. They will find that the crosscut is open to west. To the south, they will find an area of Water Knee Deep stretching rib-to-rib. Stretching southward, they will find that the drift is blocked by Water Roofed. The team must stop. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Water Roofed as their FPA in this direction. **Any team member passing the Water Roofed placard will result in individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(2).**

Note: The team cannot advance northward more than 3 feet beyond crosscut D, because they have not tied-in the entries behind them. – Judge 1 – UG Rule #11.

Team Stop No. 10

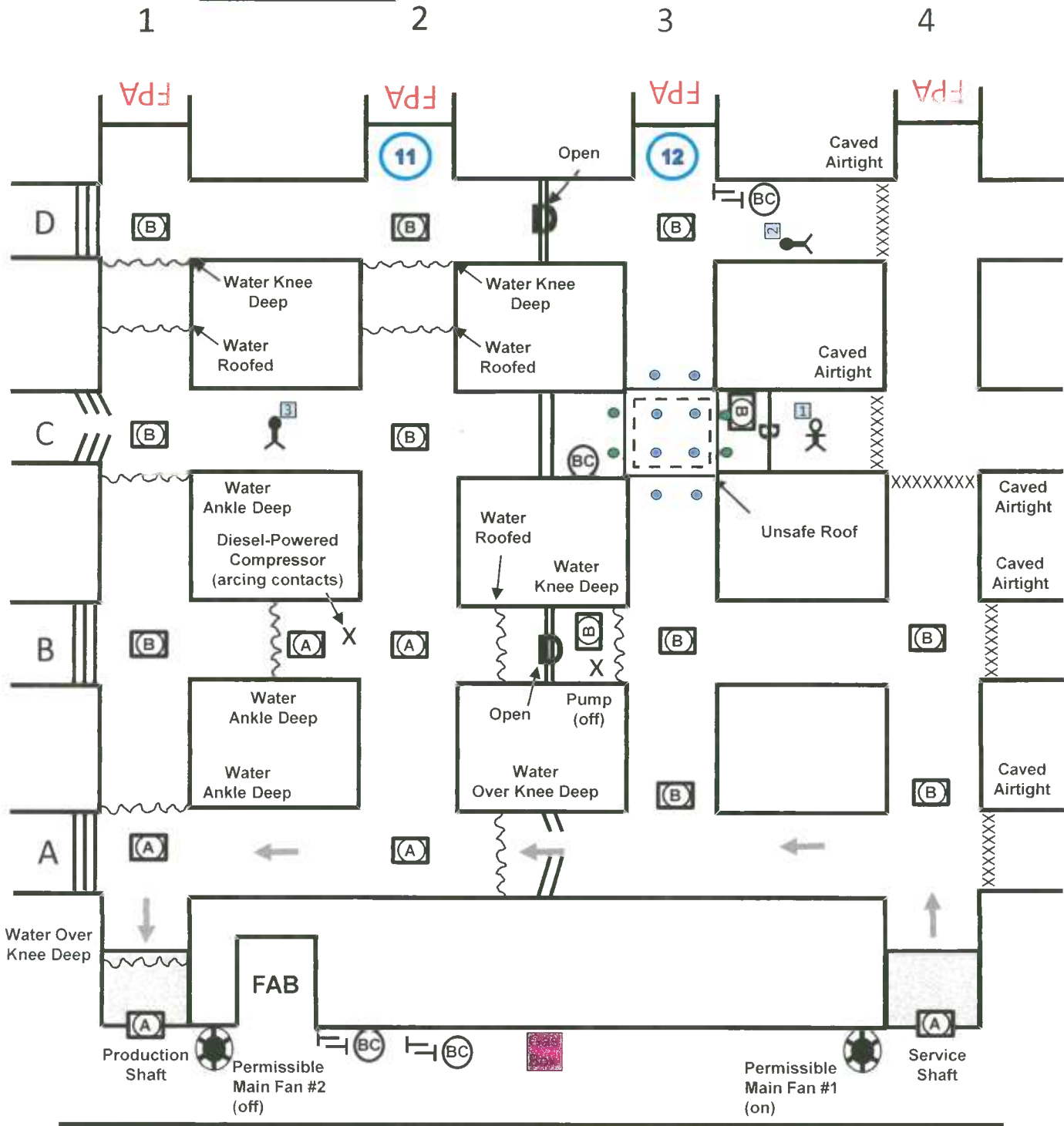
The team can advance westward in the crosscut toward Drift 1. At the D1 intersection, the captain performs roof or back checks as the team conducts necessary gas checks. A gas placard in the intersection indicates that the gas concentrations in the area have not changed from their previous location. To the west, the team will find a Seal. The Seal is intact and the captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Seal as their FPA in this direction. To the south, they will find an area of Water Knee Deep stretching rib-to-rib. Stretching southward, they will find that the drift is blocked by Water Roofed. The team must stop. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Water Roofed as their FPA in this direction. **Any team member passing the Water Roofed placard will result in individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10(a)(2).**

At this point, the team cannot tie-in behind. However, they can explore the area to the north. The team can stretch northward in Drift 1 to the Temporary Stopping that was erected by the previous mine rescue team. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Temporary Stopping as their FPA in this direction.

2016 Day 2 – Solution Map 4



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

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

Team Stop No. 11

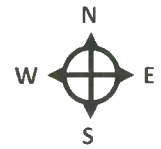
The team will retreat southward to D1 and advance eastward in the crosscut toward Drift 2. At the D2 intersection, the team can stretch northward in the drift to the Temporary Stopping that was erected by the previous mine rescue team. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Temporary Stopping as their FPA in this direction.

Team Stop No. 12

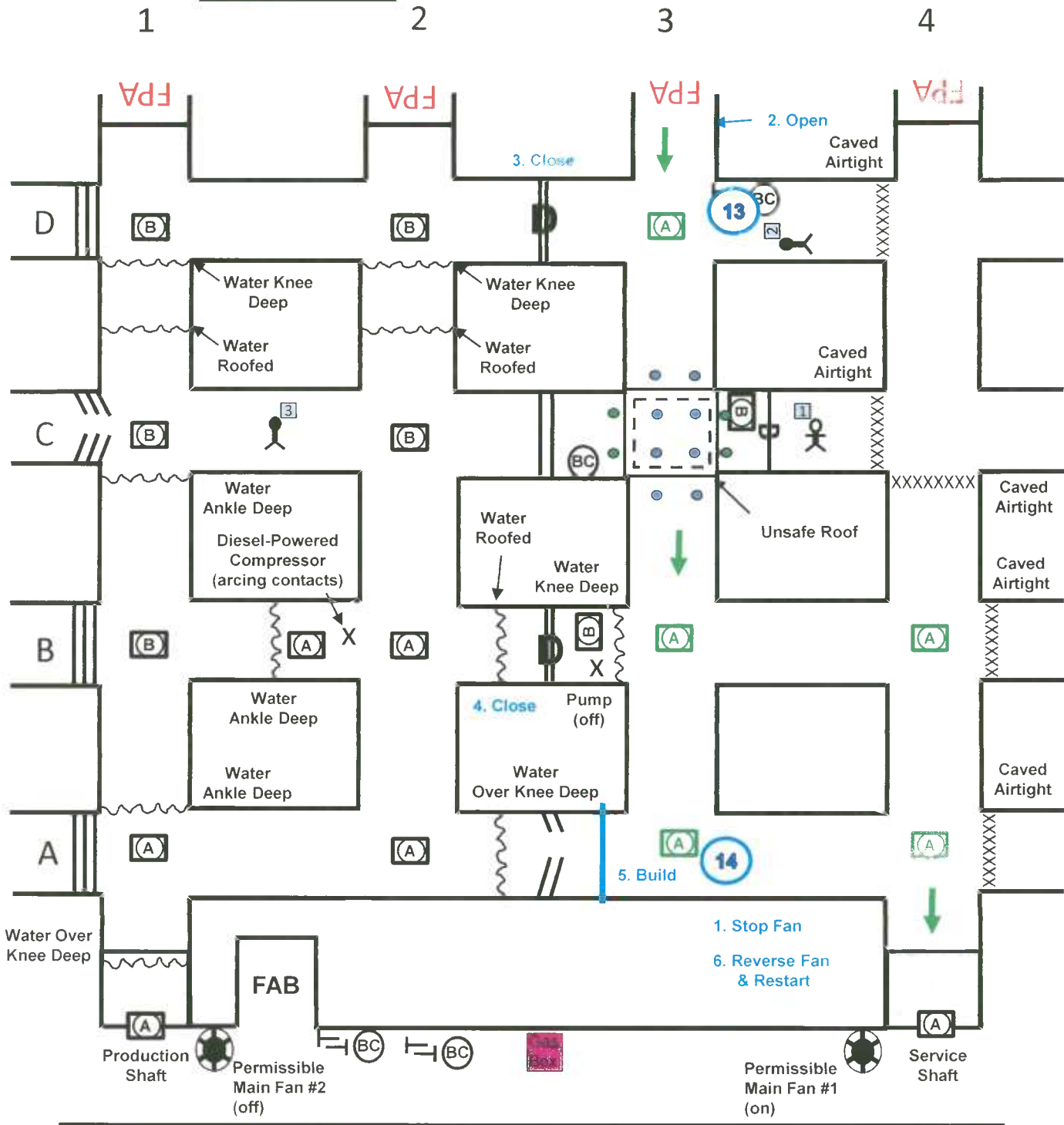
The will retreat southward to D2 and advance eastward in the crosscut toward Drift 3, At the D3 intersection, the team can stretch northward in the drift to the Temporary Stopping that was erected by the previous mine rescue team. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Temporary Stopping as their FPA in this direction.

Now, the team has explored all accessible areas of the affected area.

2016 Day 2 – Solution Map 5 (Ventilation)



1 = Team Stop



Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

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

Team Stop Nos. 13 - 14

In order to enter the Barricade in crosscut C between Drift 3 and Drift 4, the team must make a ventilation change in order to clear the area in front of the Barricade. The team must confer with the mine manager through their fresh air base coordinator by using the communication line, or by returning to the surface.

The team must explain the necessary ventilation changes prior to implementing them. For the purposes of this problem solution, the following steps will be discussed to accomplish re-ventilation:

- 1) Stop Main Fan #1;
- 2) Open the Temporary Stopping erected by the previous team in Drift 3;
- 3) Close the Door in crosscut D between Drift 2 and Drift 3 (**Note: this action is optional at this point in the problem but will be needed later**);
- 4) Close the Door in crosscut B between Drift 2 and Drift 3;
- 5) Build a temporary stopping in crosscut A between Drift 2 and Drift 3; and
- 6) Reverse Main Fan #1 and restart it.

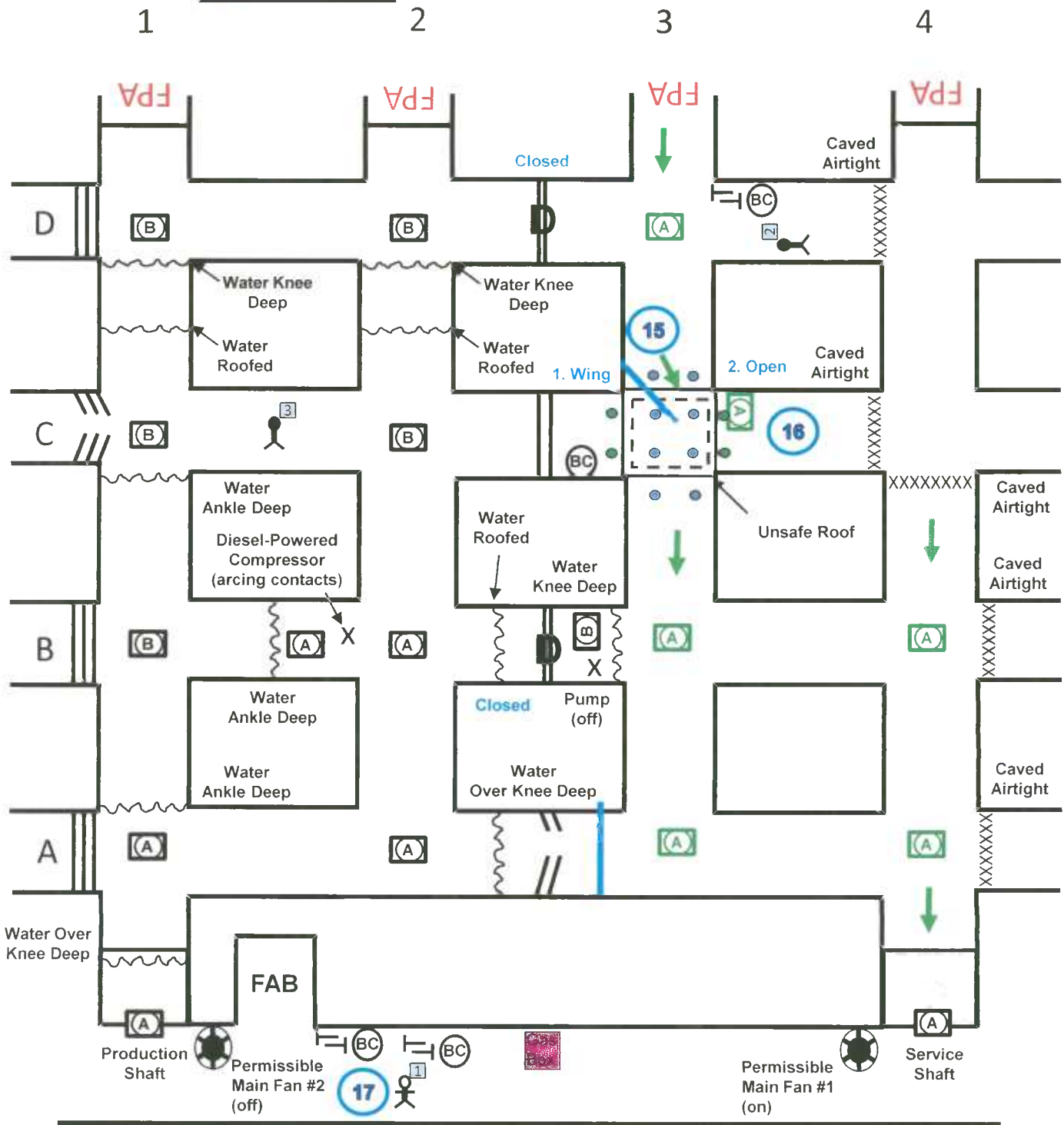
These six changes will allow the team to remain in the level while air flows from the mine north of the affected area to the Service Shaft. This will flush away the contaminants and increase the oxygen content.

Note: If the team implements these changes, the five gas placards in Drift 3 and Drift 4 will quickly revert to “clear air.”

2016 Day 2 – Solution Map 6



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Note: Team Stop Nos. 15 - 17 (see Solution Map 6)

Team Stop No. 15

Once the gas concentrations are swept from the drifts and the placards have been flipped to show “clear air,” the team can return to the Barricade in crosscut C between Drift 3 and Drift 4.

When the team returns to the location, they will find that the gas placard located immediately in front of Barricade has not changed (14% O₂, 6.0% CH₄, and 20 ppm H₂S). In order to flush this area, the team must erect a “wing” curtain in Drift 3 to direct airflow from the drift toward the crosscut and the Barricade (**as shown on Solution Map 6**). 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 50 discounts per Judge 1 – UG Rule #18(a).

Team Stop No. 16

Now the team can open the Barricade and go inside. Upon passing through the barricade, the captain must verbally indicate he/she is checking the roof or back and the team must conduct necessary gas tests. Then, they will find the second missing miner (Miner #1, I.D. 2652) 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 unconscious with no apparent injuries.”** The captain must D&I the location of the miner. **Since there are no injuries, the team must follow the prescribed treatment for prevention of shock (listed in Brady’s 9th Edition on pages 402 – 403).** At this time, the team 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.** 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).

The captain can continue to explore while team members are preparing Miner #1 for transport. Stretching eastward, the captain will find a placard indicating Caved Airtight stretching rib-to-rib. After performing roof or back checks and taking necessary gas tests, the captain will D&I the Caved Airtight as their furthest point of advance (FPA) in this direction. The team can now travel to the fresh air base.

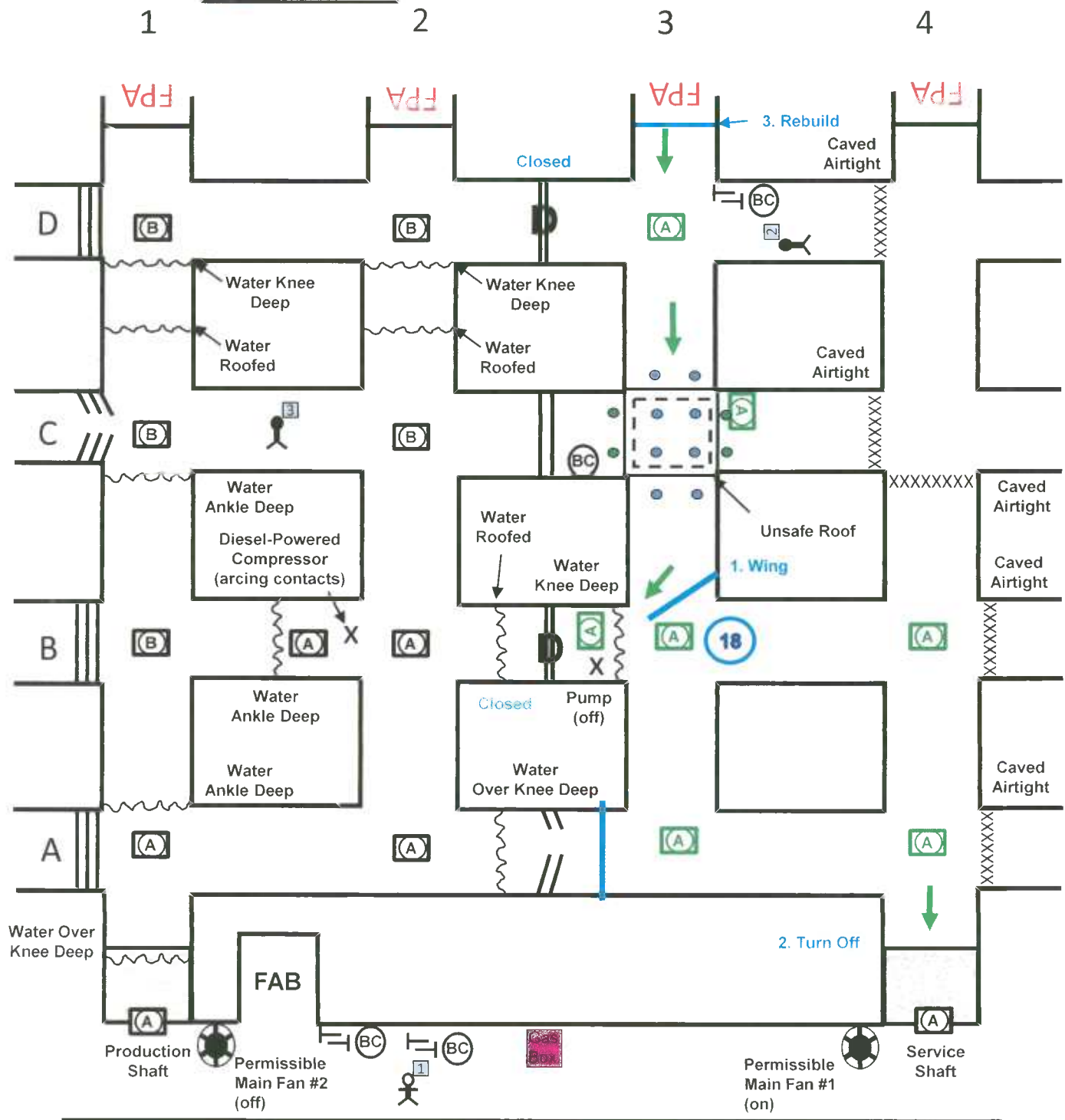
Team Stop No. 17

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

2016 Day 2 – Solution Map 7



1 = Team Stop



Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Note: Team Stop No. 18 (see Solution Map 7)

Team Stop No. 18

At this point, the team has found two of the three missing miners and brought one out alive to the fresh air base. In order to continue exploration of the affected area and find the last missing miner, the team needs to activate the pump (near the B3 intersection) to lower the water levels in Drift 1 and Drift 2. To do this, they must re-enter the mine through the Service Shaft. When they return to the pump, they will find that the gas placard in the crosscut has not changed (14% O₂, 6.0% CH₄, and 20 ppm H₂S). In order to flush this area, the team must erect a “wing” curtain in Drift 3 to direct airflow from the drift toward the crosscut and the pump (**as shown on Solution Map 7**). Once they do this, the placard will change to show “clear air.”

If the team does not utilize a “wing” curtain to flush the explosive air/gas mixture from in front of the pump before it is restarted, assess 75 discounts for team endangerment per Judge 1 – UG Rule #10(b)(3).

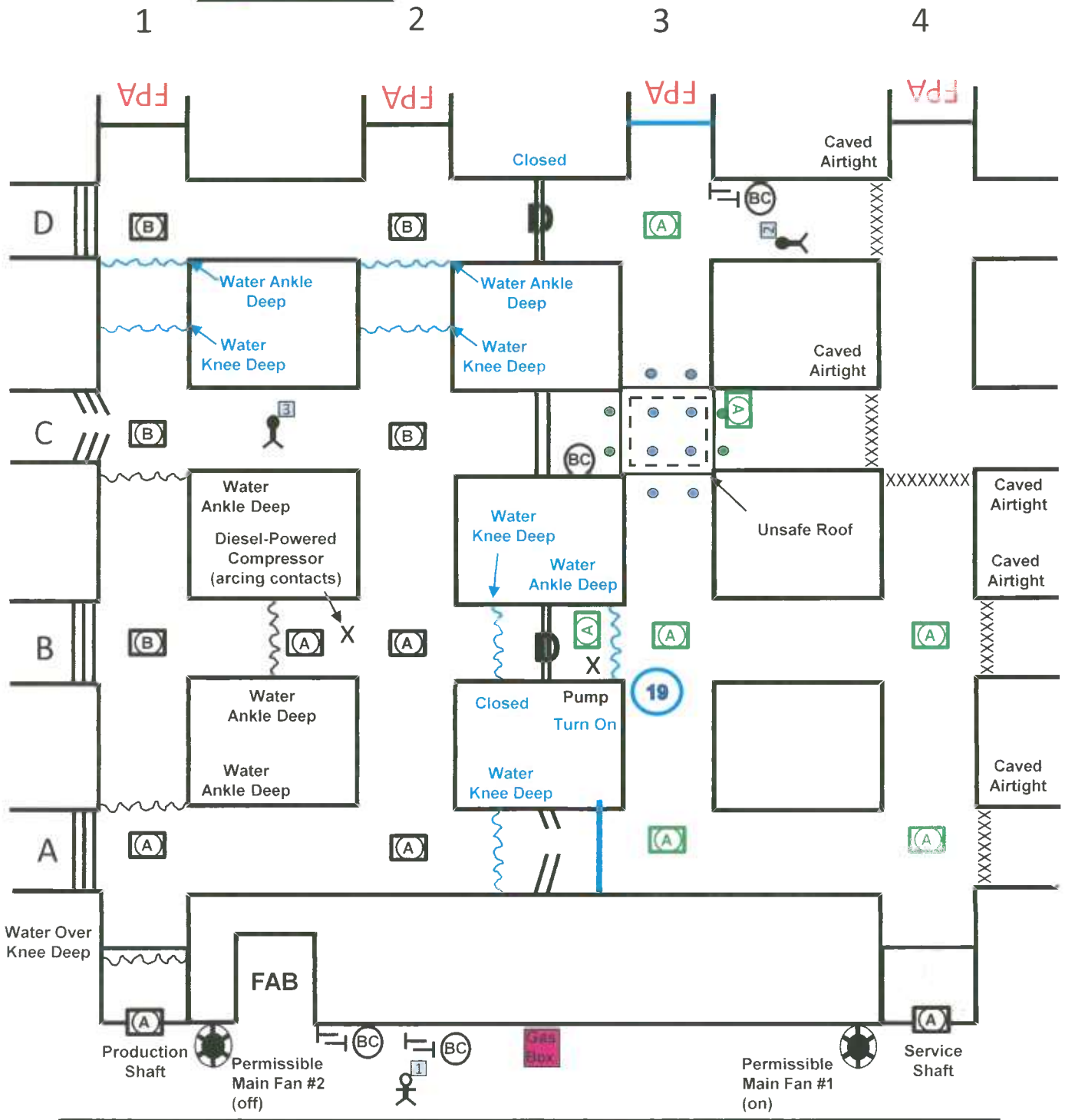
In addition, before the pump can be restarted, the team must ensure that pumping the water does not cause an air change in the mine which may affect Drift 1 and Drift 2 which have not been completely explored. The team must confer with the fresh air base before making any additional adjustments in the mine.

For the purposes of this problem solution, if the team had not closed the Door in crosscut D in between Drift 2 and Drift 3, they must close it now. By making this one change, the pump can be safely restarted to lower the water levels and there will be no resultant air change.

2016 Day 2 – Solution Map 8 (Pumping)



1 = Team Stop



Missing Miners:
 1 Miner #1 (ID - 2652)
 2 Miner #2 (ID - 8863)
 3 Miner #3 (ID - 0799)

Gas Placard Key:
 (A) = Clear Air
 (B) = 14 % O₂
 6.0 % CH₄
 20.0 ppm H₂S

Note: Team Stop No. 19 (see Solution Map 8 (Pumping))

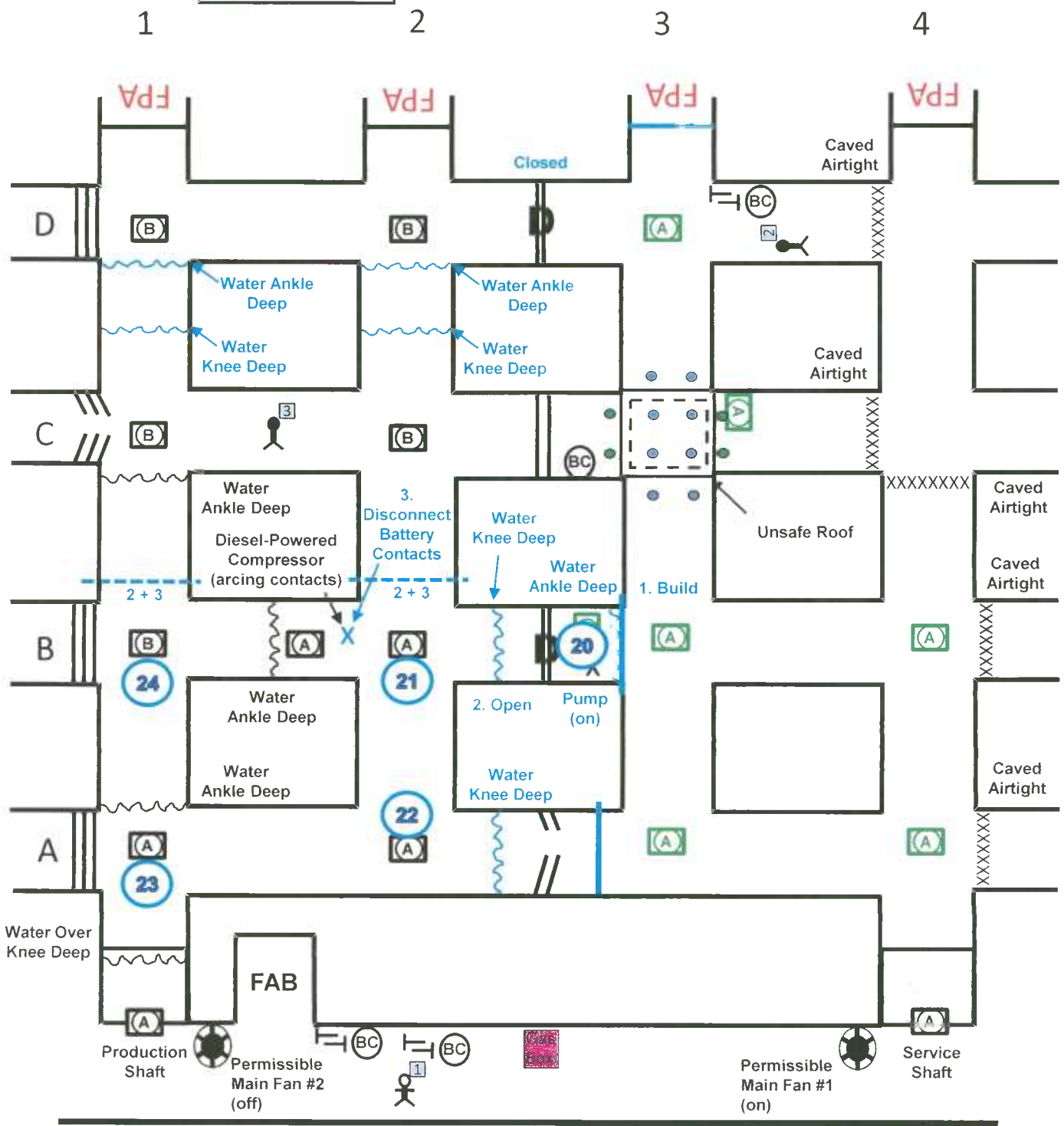
Team Stop No. 19

When the team activates the pump, the Judges will flip six water placards (20, 21, 28, 29, 35 and 40) to show water levels which do not prohibit travel. For example, the water placard located closest to the pump (to the immediate west of the B3 intersection) will change from Water Knee Deep to Water Ankle Deep.

2016 Day 2 – Solution Map 9



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Note: Team Stop Nos. 20 - 24 (see Solution Map 9)

Team Stop No. 20

Because the team has pumped the water, the resultant conditions in the area to the west of Drift 3 are unknown. Therefore, in order for the team to travel to the west in Crosscut B and avoid an unintentional air change, they must erect a temporary stopping in the crosscut before opening the Door in the Permanent Stopping.

Team Stop No. 21

Now the team can open the Door, the captain must verbally indicate he/she is checking the roof or back upon passing through the door. As they travel toward Drift 2, they will find that the water placard has changed to Water Knee Deep stretching rib-to-rib, so they can continue advancing. At the B2 intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find a gas placard indicating "clear air." They will also find that Drift 2 (to the north and south) is open and the crosscut to the west is open. Stretching westward, the team will find a placard indicating Diesel-Powered Compressor with "arcing contacts." **With methane (CH₄) present in the mine atmosphere, the team must disconnect the Compressor contacts to eliminate this potential ignition source.**

Note: The team cannot advance northward more than 3 feet beyond crosscut B, because they have not tied-in the entries behind them. – Judge 1 – UG Rule #11.

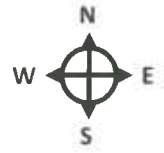
Team Stop No. 22

The team can advance southward in Drift 2 to tie-in. At the A2 intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find a gas placard indicating "clear air." They will also find that the crosscut to the west is open. They can stretch to the east to find that the water placard between Drift 2 and Drift 3 has changed to show Water Knee Deep. They can stretch further eastward to the temporary stopping that they had erected earlier. After the captain performs roof or back checks and the team conducts necessary gas tests, the captain must D&I the temporary stopping as their FPA in this direction.

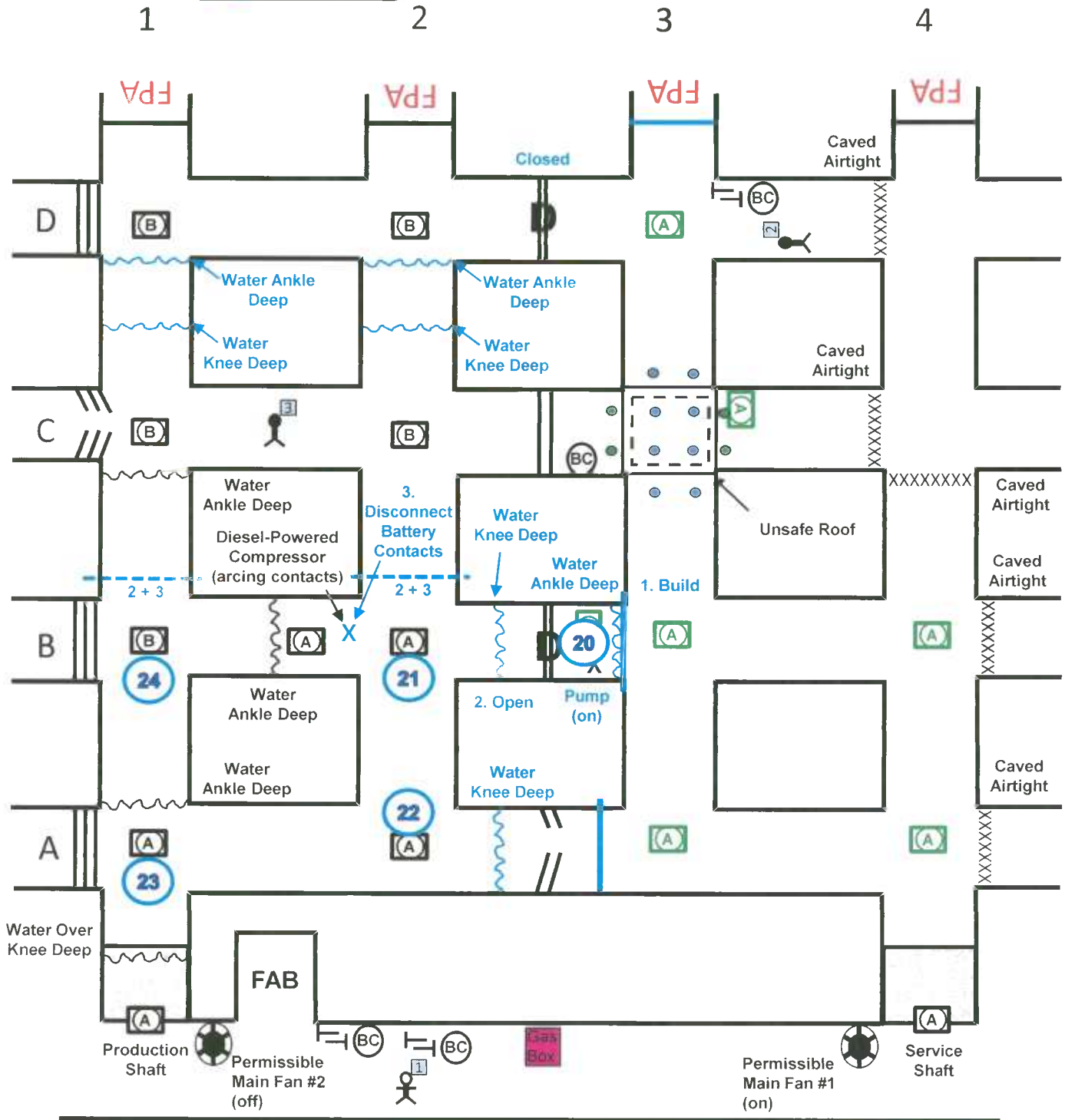
Team Stop No. 23

The team can advance westward in crosscut A to Drift 1. At the A1 intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find a gas placard indicating "clear air." To the north, the team will find a placard indicating Water Ankle Deep. To the west, the team will find a Seal. The Seal is intact and the captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Seal as their FPA in this direction. To the south, the team can stretch to the Production Shaft Station to find that a placard indicating Water Ankle Deep. Therefore, the shaft can be safely traveled.

2016 Day 2 – Solution Map 9



1 = Team Stop



Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Team Stop No. 24

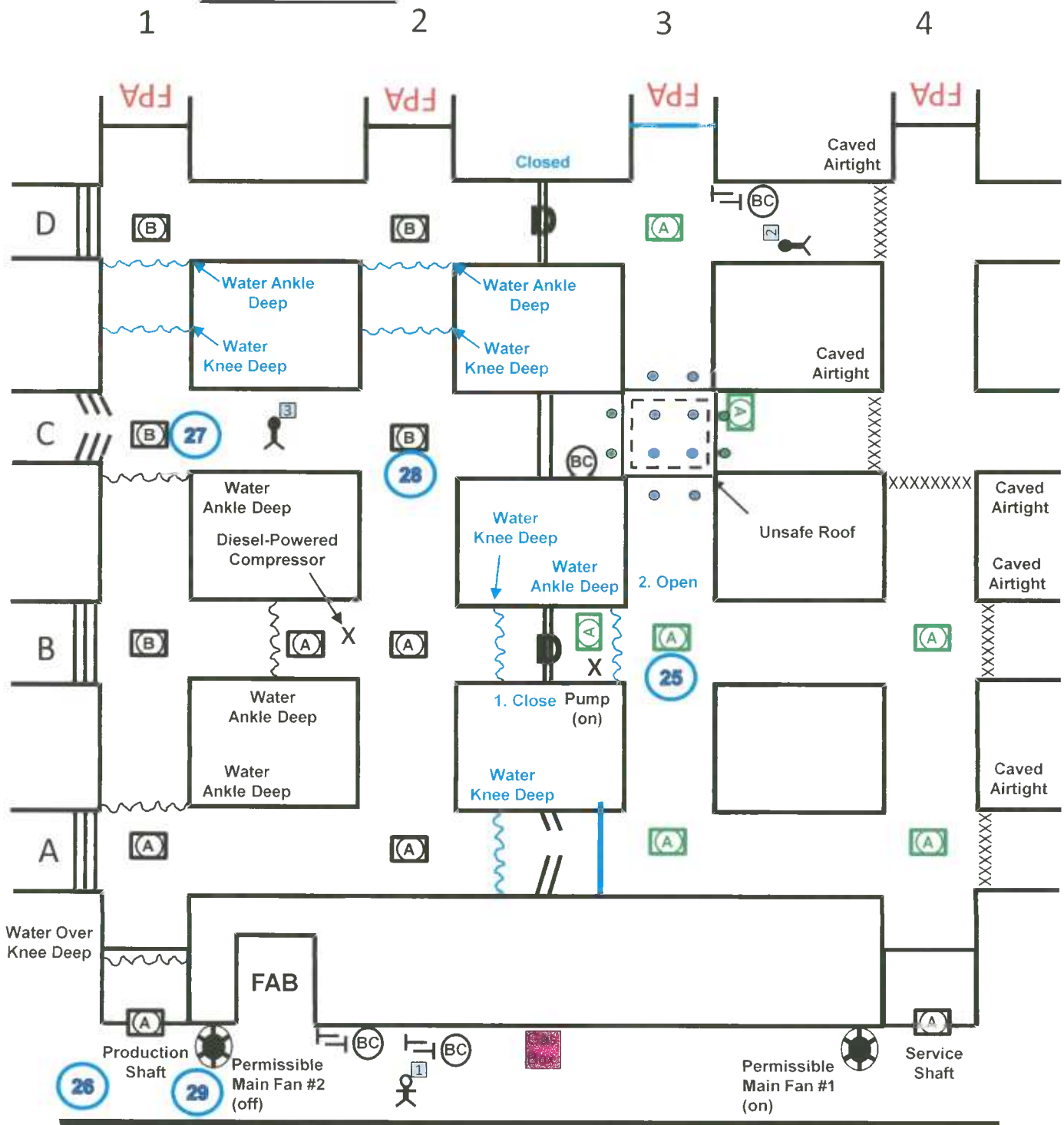
The team can advance northward in Drift 1 to crosscut B. At the B1 intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find a gas placard indicating: 14% O₂, 6.0% CH₄, and 20 ppm H₂S. They will also find that the drift to the north is open. To the west, the team will find a Seal. The Seal is intact and the captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Seal as their FPA in this direction. The team can stretch eastward in crosscut B to tie-in. As they travel, they will find a placard indicating an area of Water Ankle Deep stretching rib-to-rib. They will also find a gas placard indicating "clear air," just beyond the extent of the water.

Note: The team cannot advance northward more than 3 feet beyond crosscut B, because they have not tied-in the Production Shaft behind them. - Judge 1 - UG Rule #11.

2016 Day 2 – Solution Map 10



① = Team Stop



- Missing Miners:**
- ① Miner #1 (ID - 2652)
 - ② Miner #2 (ID - 8863)
 - ③ Miner #3 (ID - 0799)

Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Note: Team Stop Nos. 25 - 29 (see Solution Map 10)

Team Stop No. 25

Before the team can continue exploring northward, they must exit the mine and re-enter through the Production Shaft. In order for them to do this, the team must retreat to the B2 intersection and travel eastward through the open door in crosscut B. Once the team has passed through the door, they can close the door behind them and tear down the temporary stopping that they had previously erected.

Team Stop No. 26

Now, the team can advance to the Service Shaft Station and signal the hoist engineer. After riding the cage to the top of the shaft, they can exit and close the shaft gate behind them to release the cage. The team can travel to the Production Shaft, enter the cage, and signal the hoisting engineer to lower them to the Production Shaft station.

Team Stop No. 27

Once the team exits the cage, they can close the shaft gate behind them to release the cage. Now, they can advance northward in Drift 1 to crosscut C. Just south of the C1 intersection, they will find the extent of the Water Ankle Deep. At the intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find: 14% O₂, 6.0% CH₄, and 20 ppm H₂S. To the west, the team will find a placard indicating "Seal (blown out toward Drift 1)." The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Seal as their FPA in this direction. Stretching northward in the drift, they will find that the water placards have changed to passable levels (Water Knee Deep and Water Ankle Deep, respectively traveling northward).

Team Stop No. 28

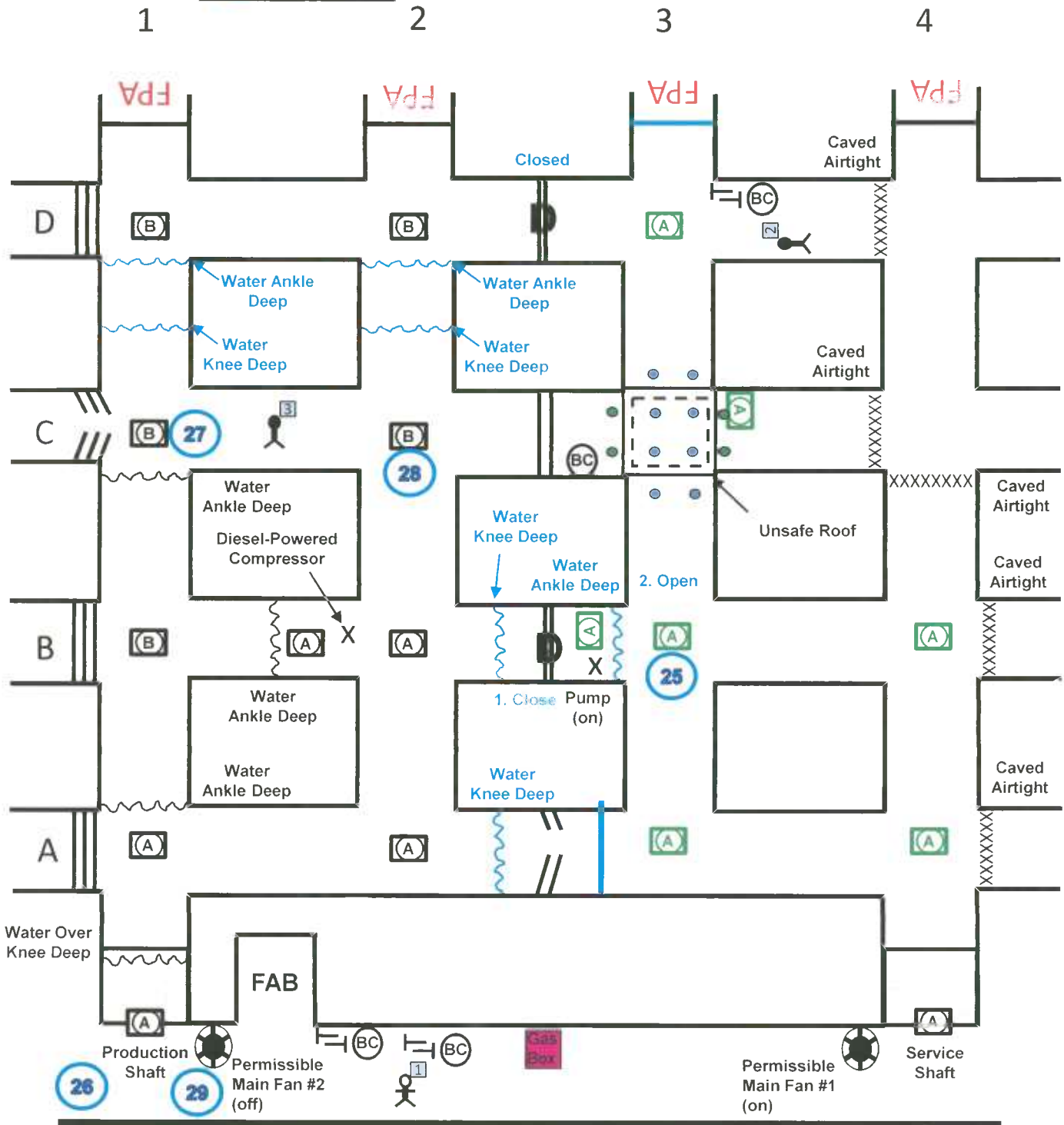
After retreating to the C1 intersection, the team can now advance eastward in crosscut C toward Drift 2. As they travel, they will find the third missing miner (Miner #3, I.D. 0799) who is unresponsive. The team captain must perform necessary roof or back checks over the miner. After a primary assessment, 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. Then, the team can continue exploring eastward.

At the C2 intersection, the captain performs roof or back checks and the team conducts necessary gas tests. They will find that the gas concentrations have not changed from their previous location. They can stretch eastward to the Permanent Stopping between Drift 2 and Drift 3. The captain must perform roof or back checks as the team conducts necessary gas tests. The captain must D&I the Permanent Stopping as their FPA in this direction. After retreating back to the C2 intersection, they can stretch northward in the drift. They will find that the water placards have changed to passable levels (Water Knee Deep and Water Ankle Deep, respectively traveling northward). Stretching southward in the drift, they can tie-in.

2016 Day 2 – Solution Map 10



1 = Team Stop



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

Gas Placard Key:

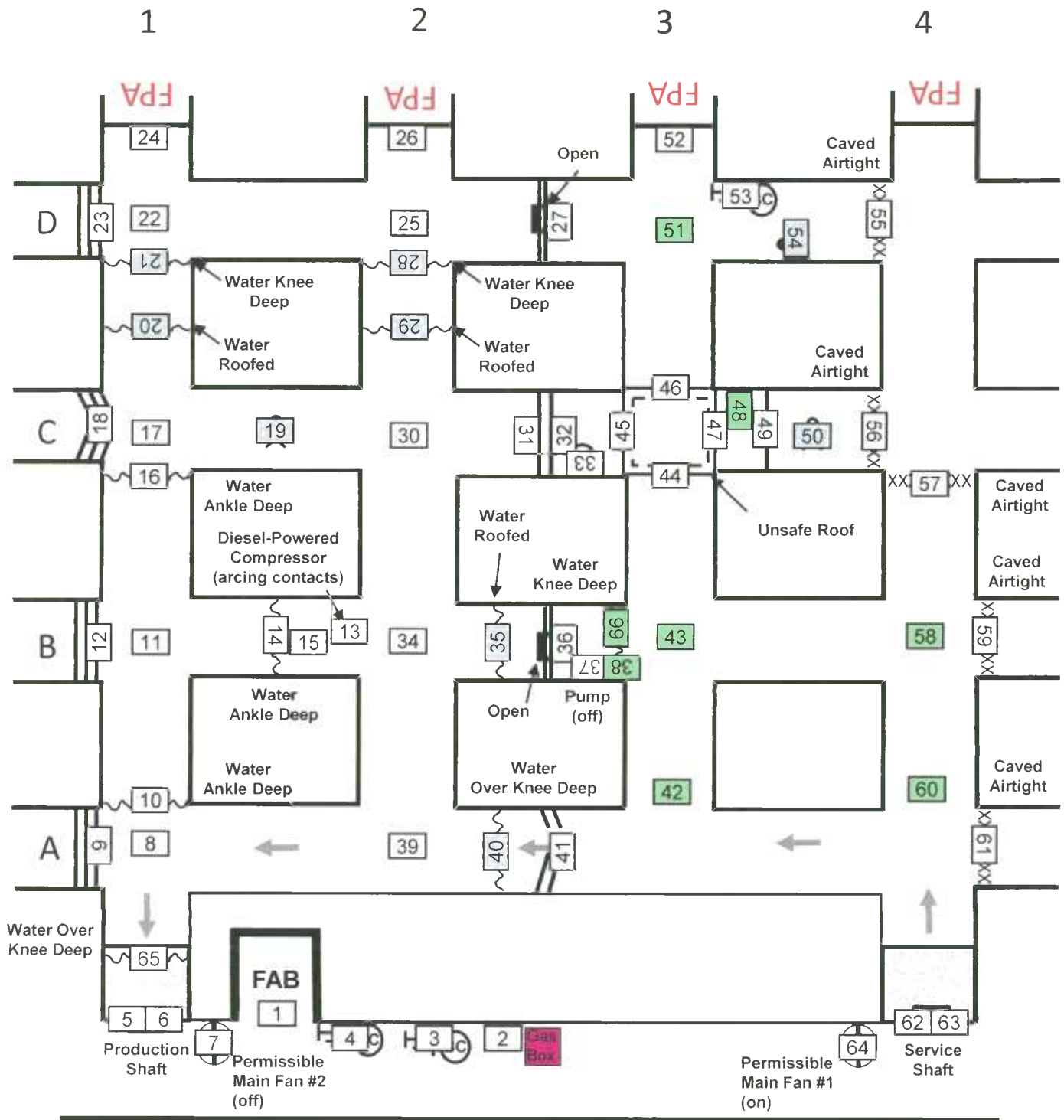
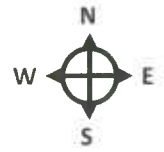
- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

Team Stop No. 29

Now that the entire affected area has been explored, the team can retreat to the Production Shaft Station and signal the hoist engineer. After riding the cage to the top of the shaft, they can exit and close the shaft gate behind them to release the cage. Afterward, the team will return to the fresh air base. The captain can report to the Mine Manager that the team has completed their mission. That is, they have explored all accessible areas of the mine, re-ventilated two of the drifts, pumped the water, located the three missing miners, and brought one of them out alive.

***** THE END ****

2016 Day 2 – Placard Map

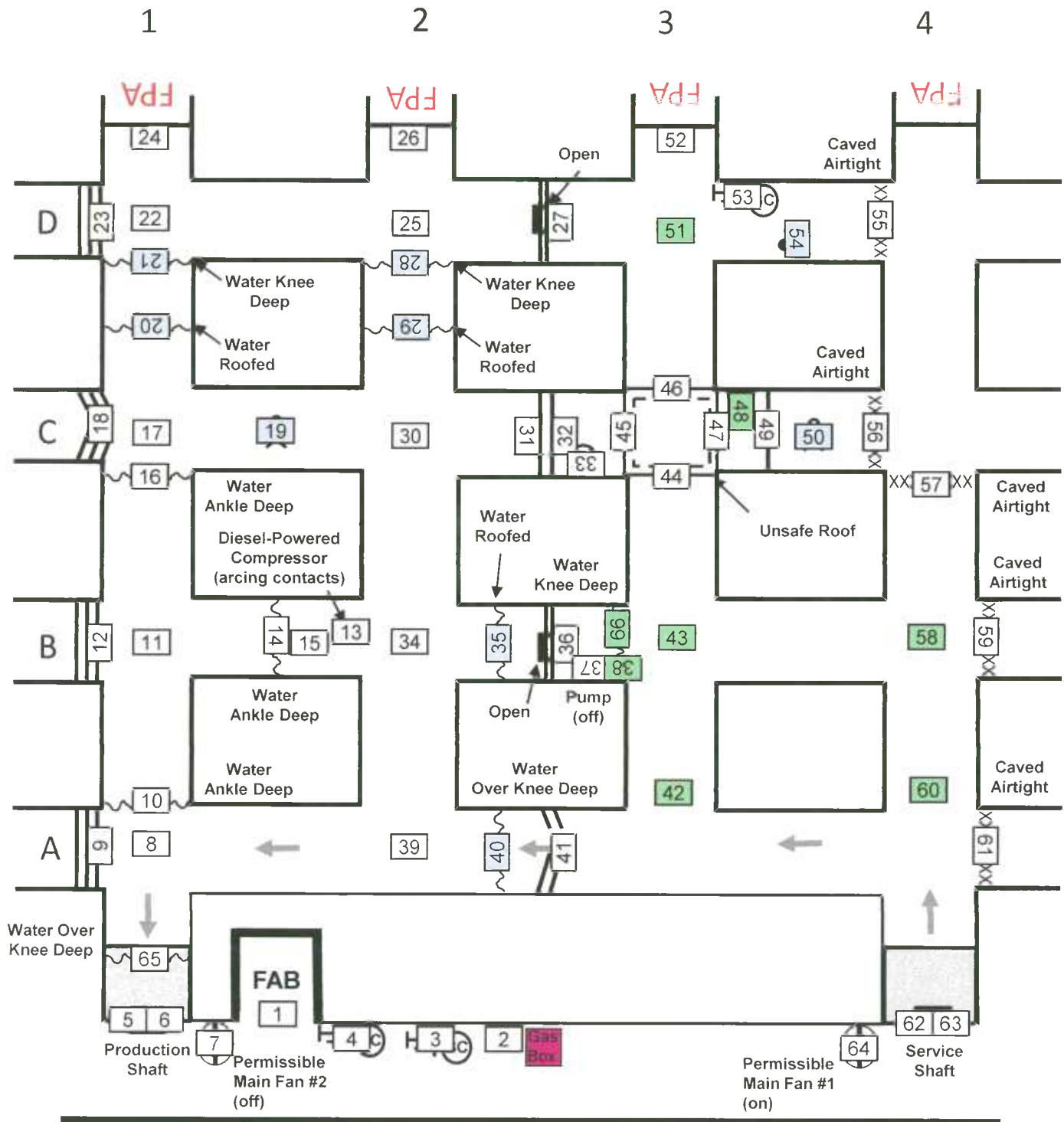


- 2 = Single-sided Placard
- 40 = Double-sided Gas Placard
- 2 = Double-sided Placard

Placard Key:

- | | |
|---|---|
| 1. Fresh Air Base | 22. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 2. Gas Box | 23. Seal |
| 3. Brattice Material & Frames | 24. Temporary Stopping |
| 4. Brattice Material & Frames | 25. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 5. Production Shaft | 26. Temporary Stopping |
| 6. Clear Air | 27. Permanent Stopping with
Door (open) |
| 7. Permissible Main Fan #2 (off) | 28. Water Knee Deep |
| 8. Clear Air | 29. Water Roofed |
| 9. Seal | 30. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 10. Water Ankle Deep | 31. Permanent Stopping |
| 11. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | 32. Permanent Stopping |
| 12. Seal | 33. Brattice Material |
| 13. Diesel-Powered Compressor
(arcing contacts) | 34. Clear Air |
| 14. Water Ankle Deep | 35. Water Roofed |
| 15. Clear Air | 36. Permanent Stopping with
Door (open) |
| 16. Water Ankle Deep | 37. Pump (off) |
| 17. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | 38. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 18. Seal (blown out toward Drift 1) | 39. Clear Air |
| 19. Person / Miner #3 (ID – 0799) | |
| 20. Water Roofed | |
| 21. Water Knee Deep | |

2016 Day 2 – Placard Map



Placard Key (continued):

- | | |
|---|---|
| 40. Water Over Knee Deep | 57. Caved Airtight |
| 41. Permanent Stopping (destroyed) | 58. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 42. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | 59. Caved Airtight |
| 43. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | 60. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S |
| 44. Unsafe Roof | 61. Caved Airtight |
| 45. Unsafe Roof | 62. Service Shaft |
| 46. Unsafe Roof | 63. Clear Air |
| 47. Unsafe Roof | 64. Permissible Main Fan #1 (on) |
| 48. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | 65. Water Over Knee Deep |
| 49. Barricade (8-feet by 10-feet) | 66. Water Knee Deep |
| 50. Person / Miner #1 (ID – 2652) | |
| 51. 14 % O ₂
6.0 % CH ₄
20.0 ppm H ₂ S | |
| 52. Temporary Stopping | |
| 53. Brattice Material & Frames | |
| 54. Person / Miner #2 (ID – 8863) | |
| 55. Caved Airtight | |
| 56. Caved Airtight | |

Note: Double-sided Placards

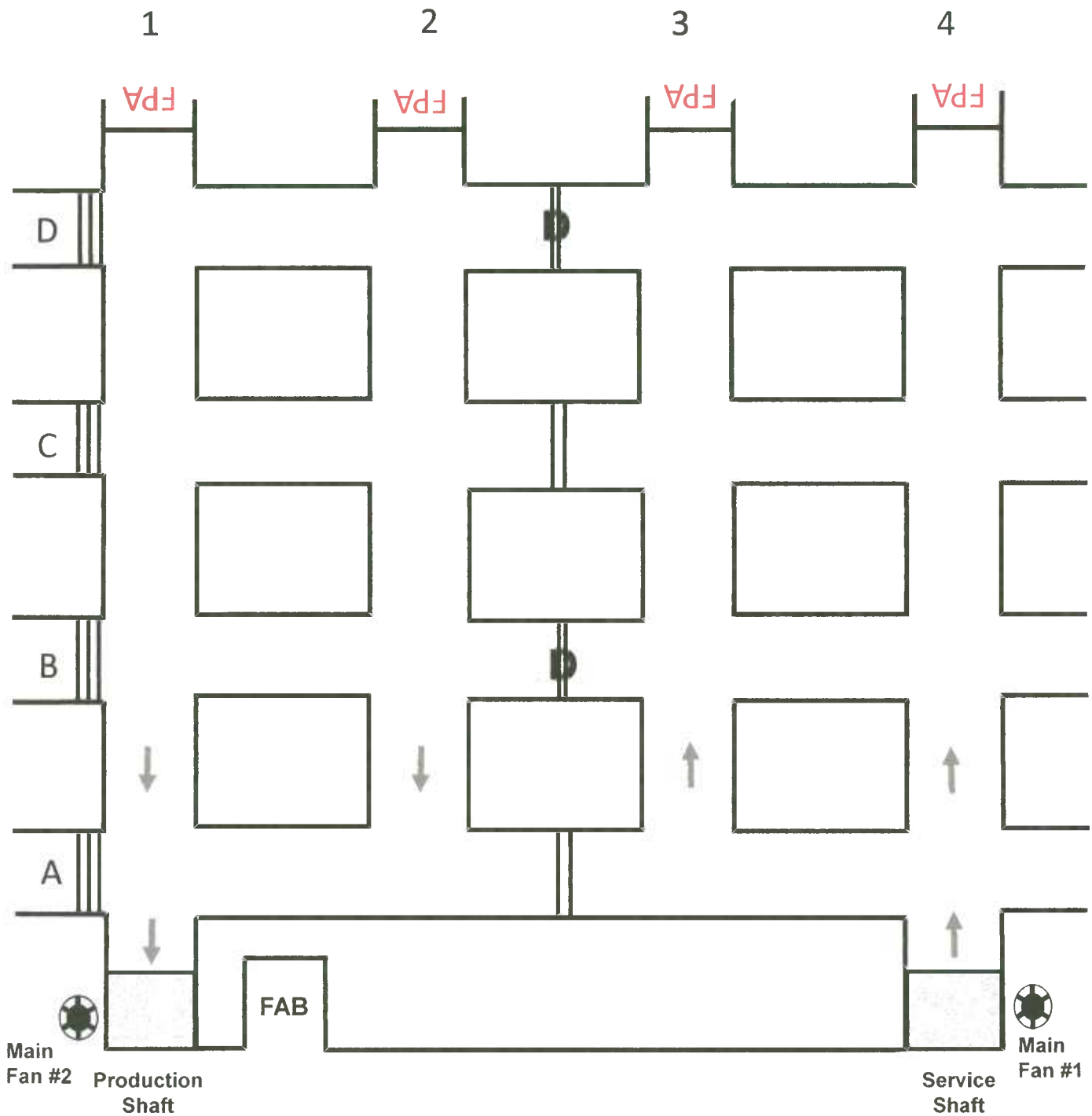
Five gas placards (42, 43, 51, 58 and 60) can be flipped when changes are made by the team to successfully ventilate these areas.

Two gas placards (38 and 48) can be flipped when the team erects “wing” curtains to successfully ventilate these areas.

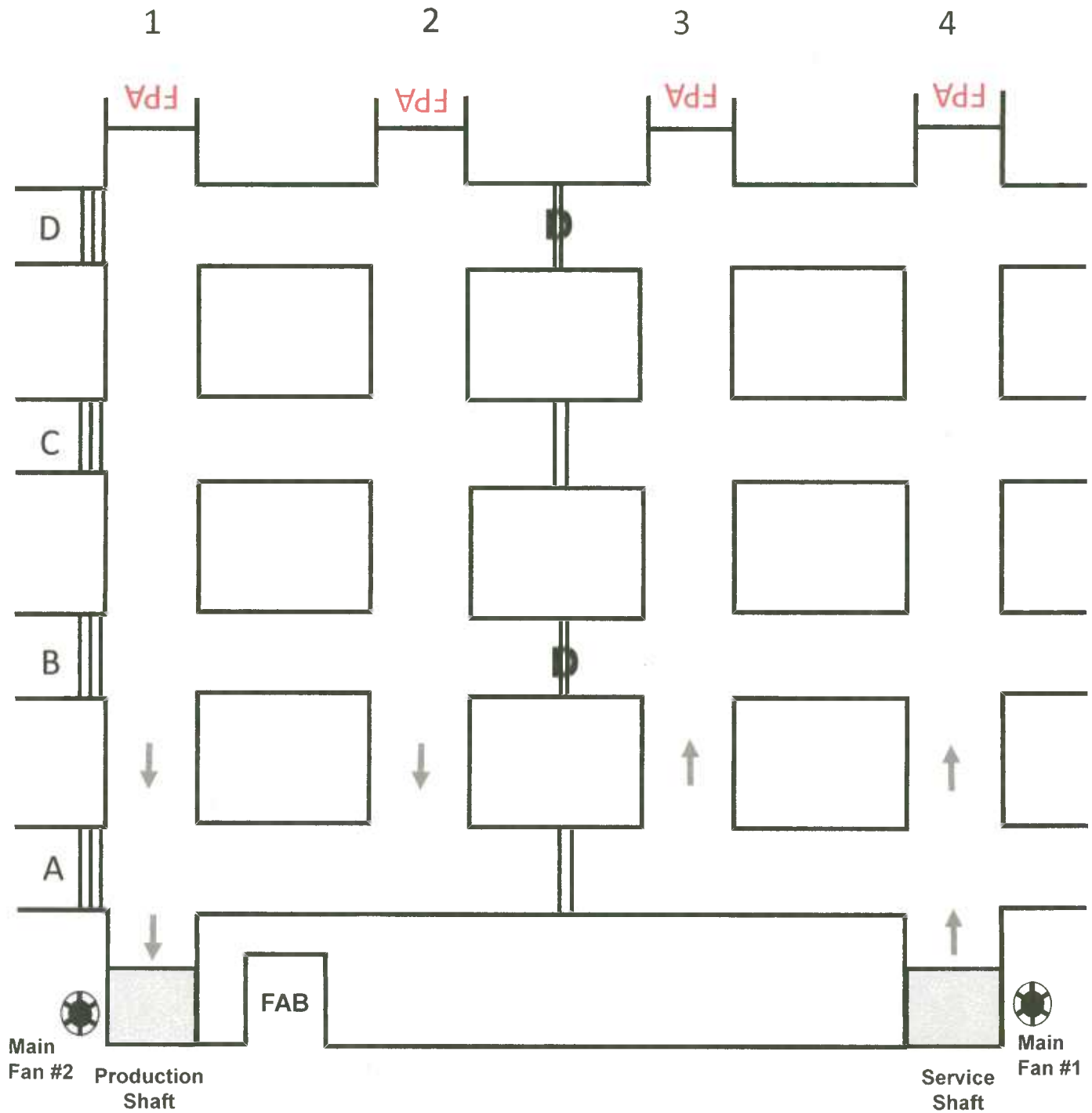
Six water placards (20, 21, 28, 29, 35 and 40) can be flipped when the team turns on the pump located west of the B3 intersection.

Three placards (19, 50, and 54), one for each missing miner, can be flipped to show their respective identification number.

2016 Day 2 – Team Map

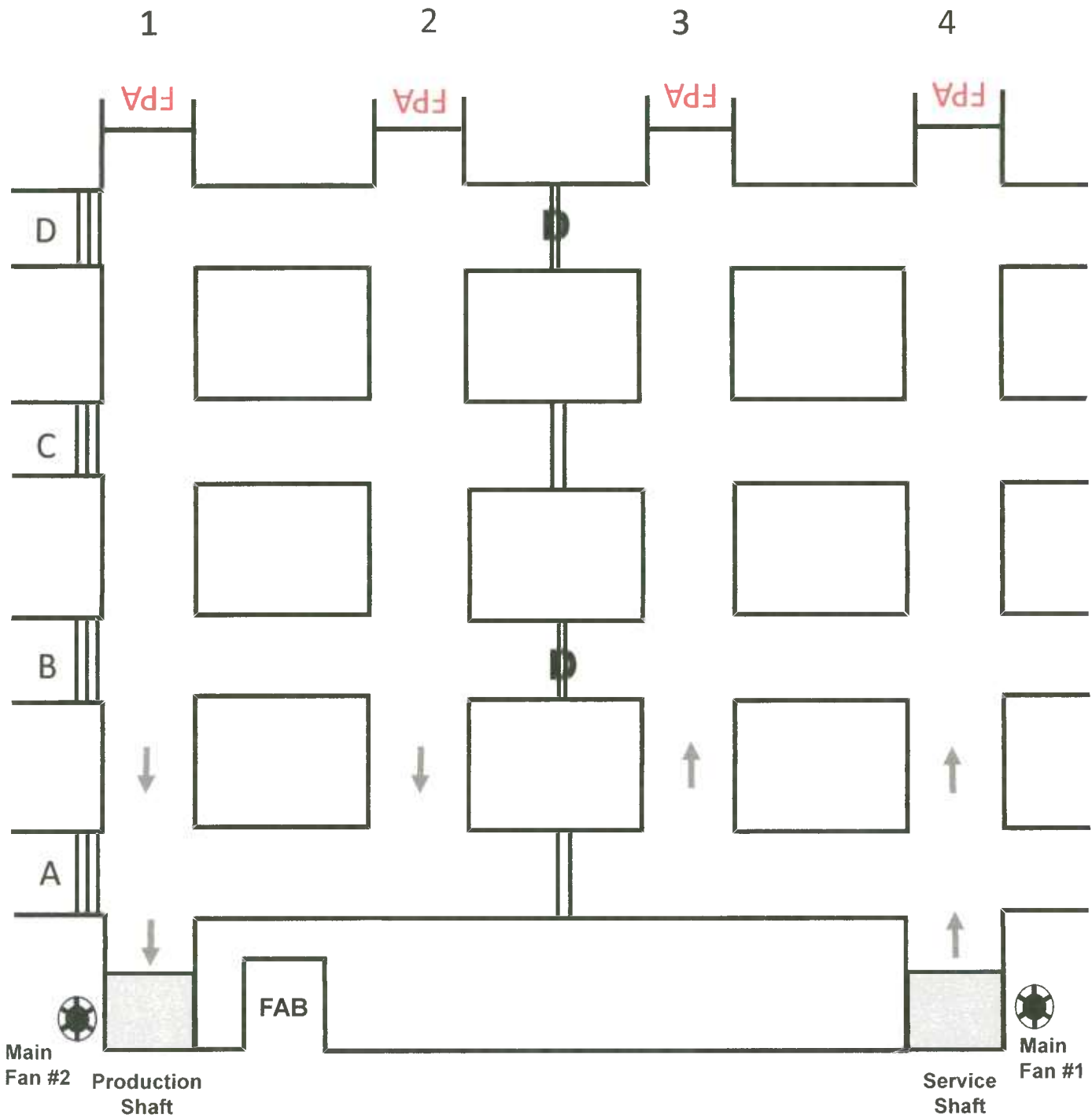


2016 Day 2 – Fresh Air Base Map

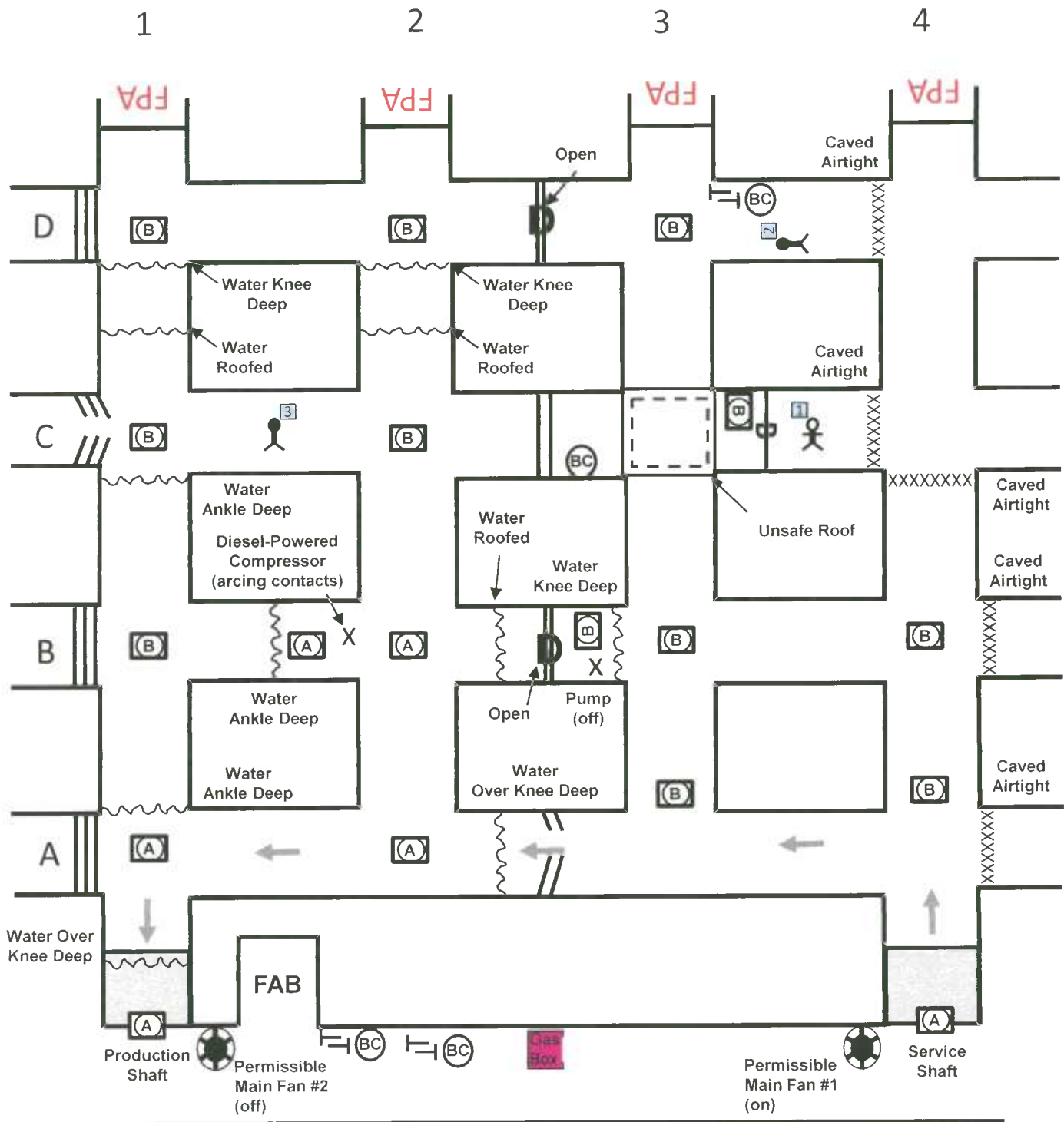
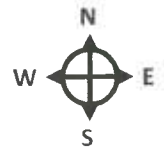


2016 Day 2 – FAB Alternate Map

Do Not Score



2016 Day 2 – Answer Map



Missing Miners:

- 1 Miner #1 (ID - 2652)
- 2 Miner #2 (ID - 8863)
- 3 Miner #3 (ID - 0799)

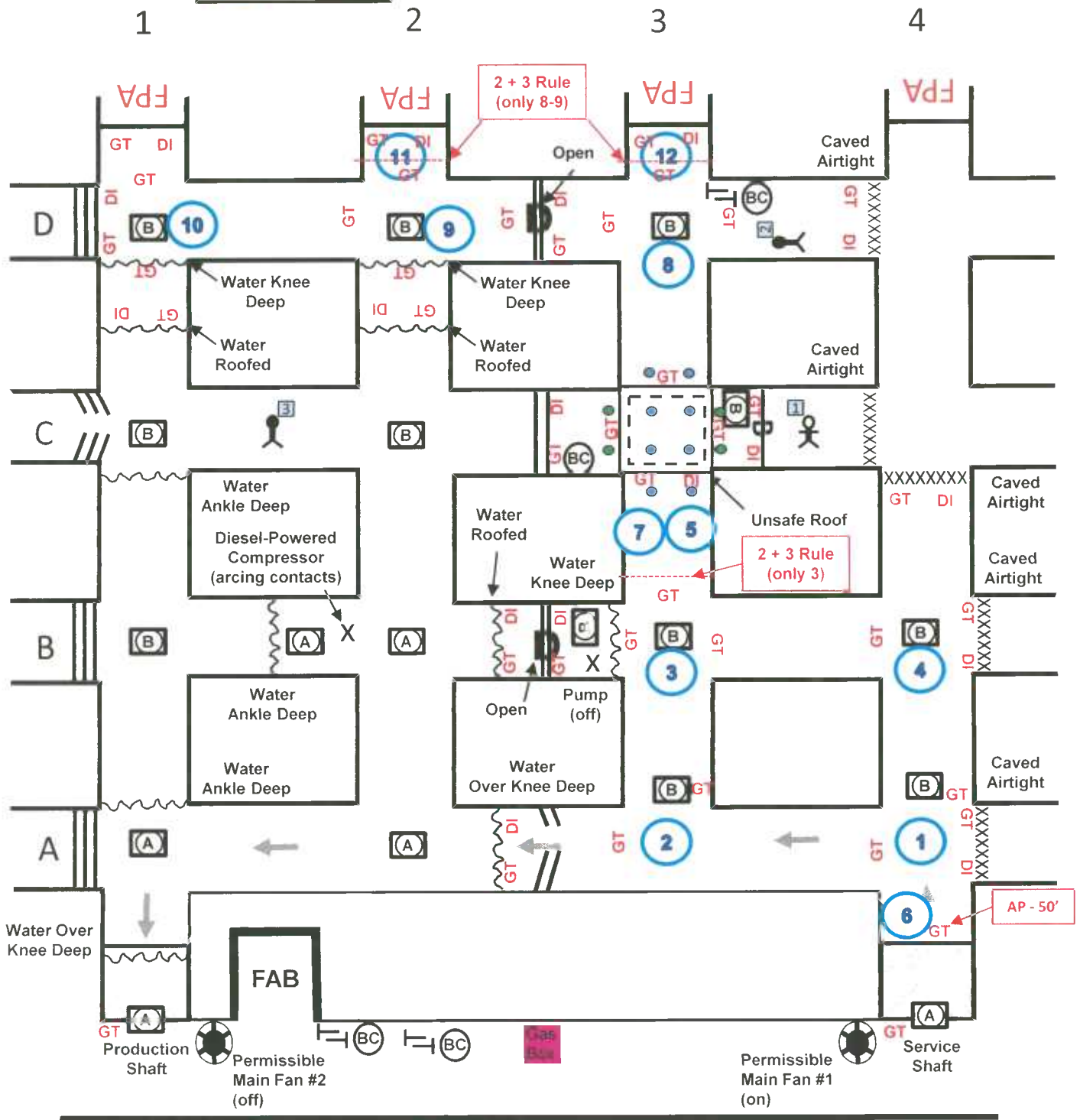
Gas Placard Key:

- (A) = Clear Air
- (B) = 14 % O₂
6.0 % CH₄
20.0 ppm H₂S

2016 Day 2 – Judge’s Map (with Team Stops – BV)



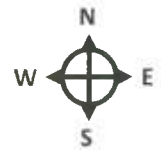
1 = Team Stop



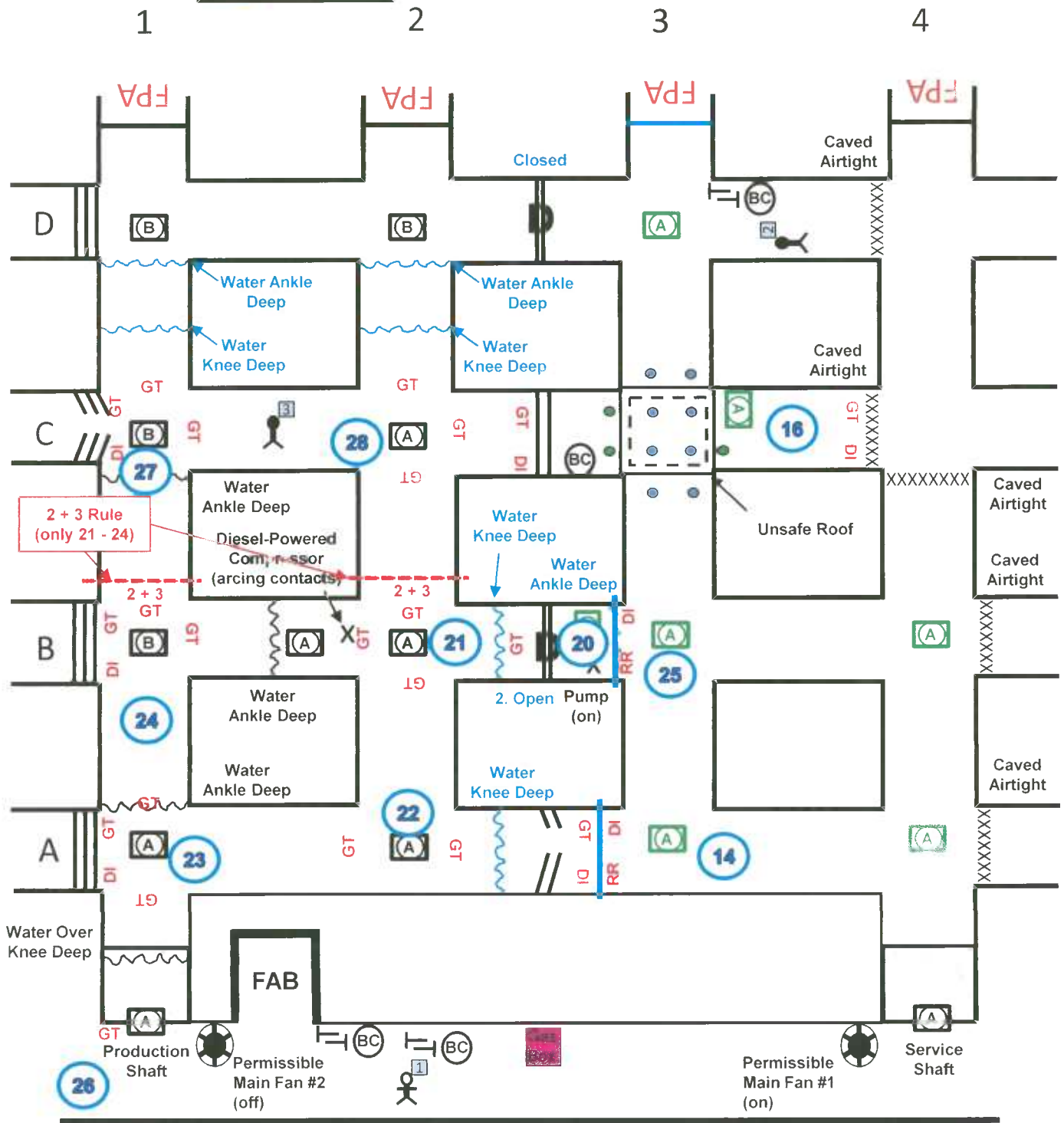
Judge Name - _____

Team No. - _____

2016 Day 2 – Judge’s Map (with Team Stops – AP)



1 = Team Stop



Team No. - _____

2016 Day 2 – Construction Map

