

2016 National Metal and Nonmetal Mine Rescue Contest

JUDGES' PACKET
Field Competition
Day 2



July 27, 2016
Reno, Nevada

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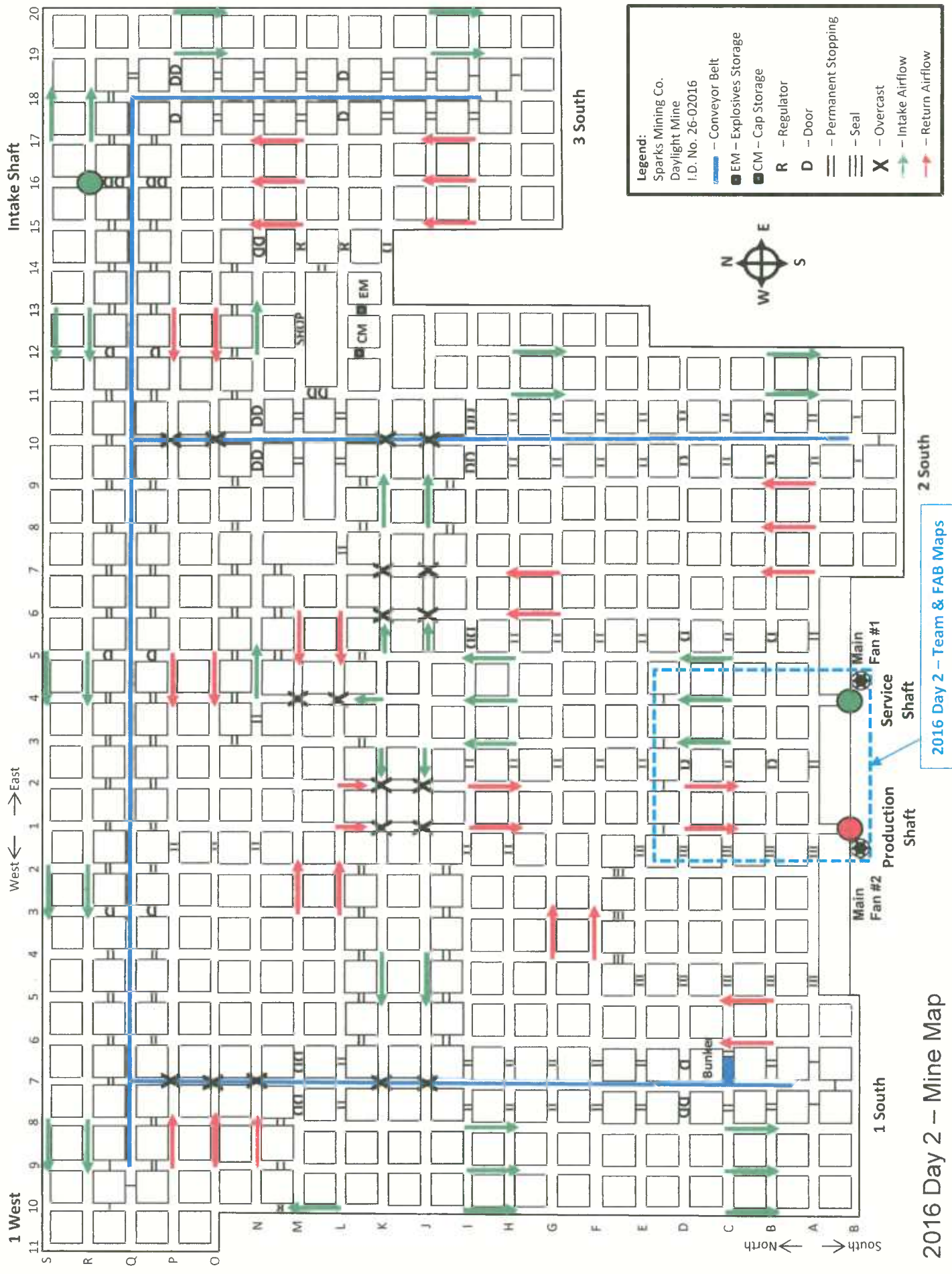
Introduction

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.



1 West

West ← → East

Intake Shaft

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3 South

2 South

1 South

North

South

Production Shaft

Service Shaft

Main Fan #1

Main Fan #2

Bunker

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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:

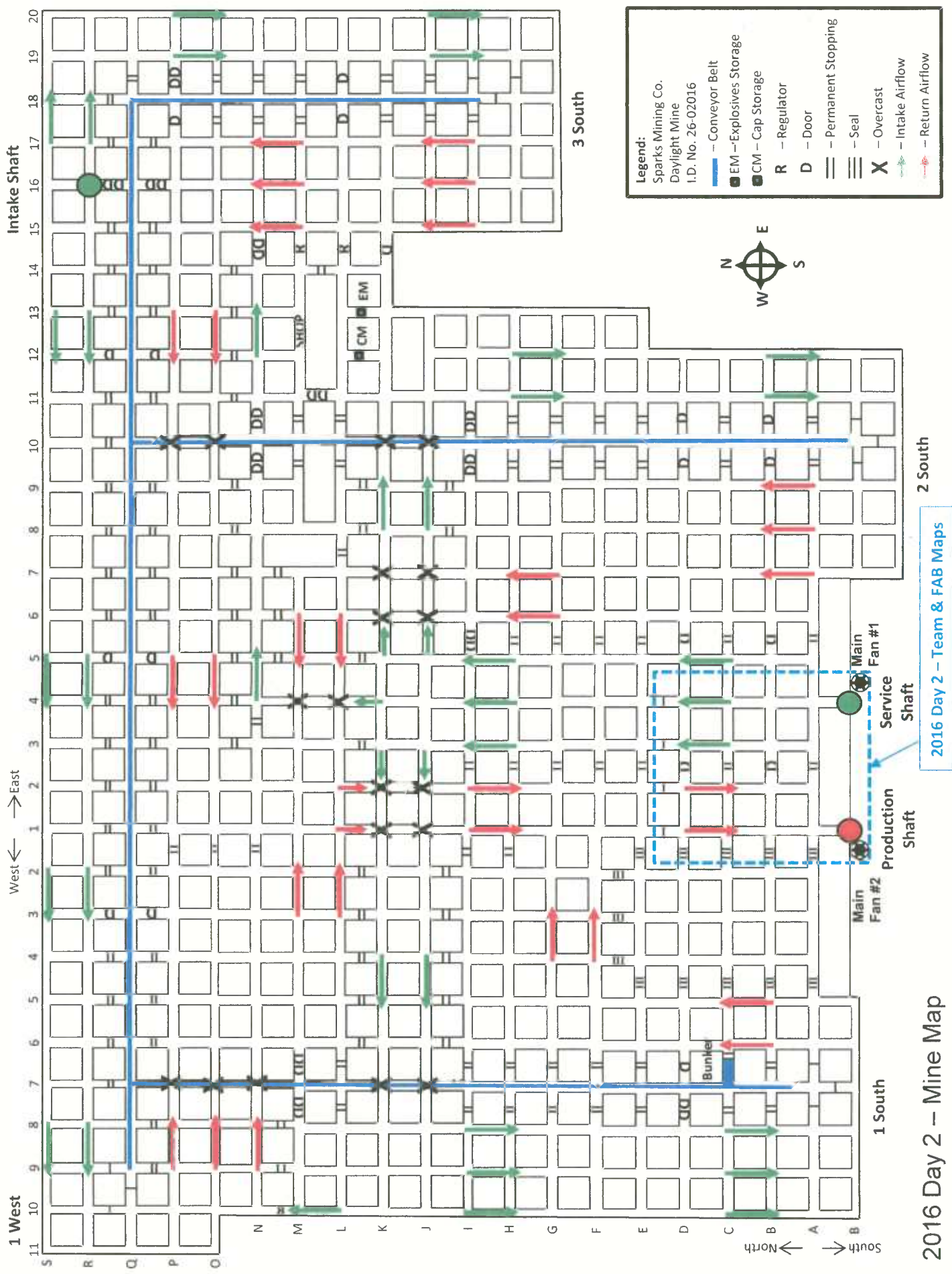
The mine uses a push/pull ventilation system utilizing two main fans. Main Fan #1 is located on the surface at the downcast Service Shaft and pushes about 200,000 cfm of fresh air into the mine. The fan operates in the stable portion of its performance curve and can be reversed if necessary. Main Fan #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.

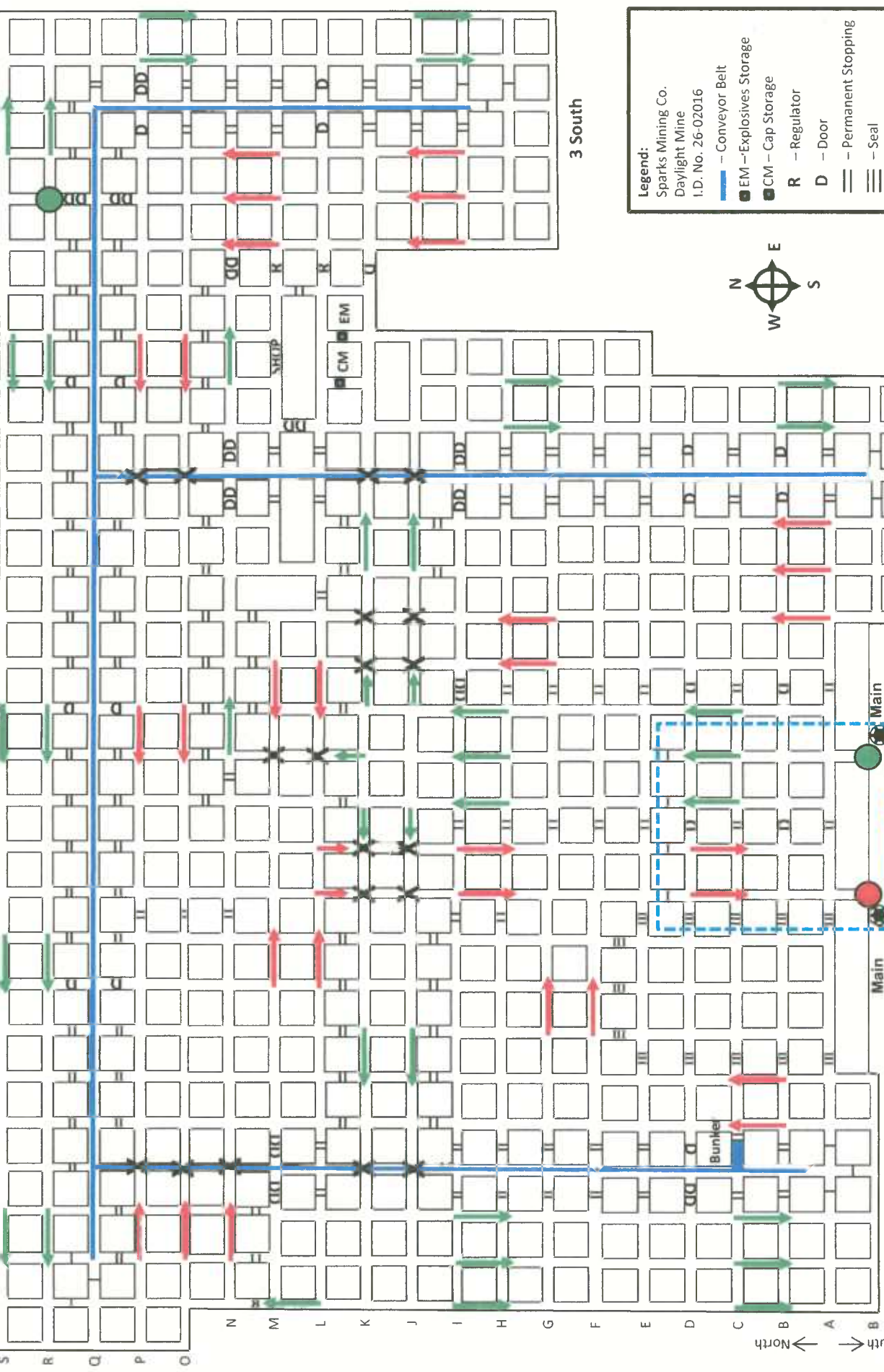


1 West

West ← → East

Intake Shaft

11 10 9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



1 South

Main Fan #2

Production Shaft

Service Shaft

Main Fan #1

2 South

2016 Day 2 - Team & FAB Maps

3 South

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

- Conveyor Belt
- Explosives Storage
- Cap Storage
- Regulator
- Door
- Permanent Stopping
- Seal
- Overcast
- Intake Airflow
- Return Airflow



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.

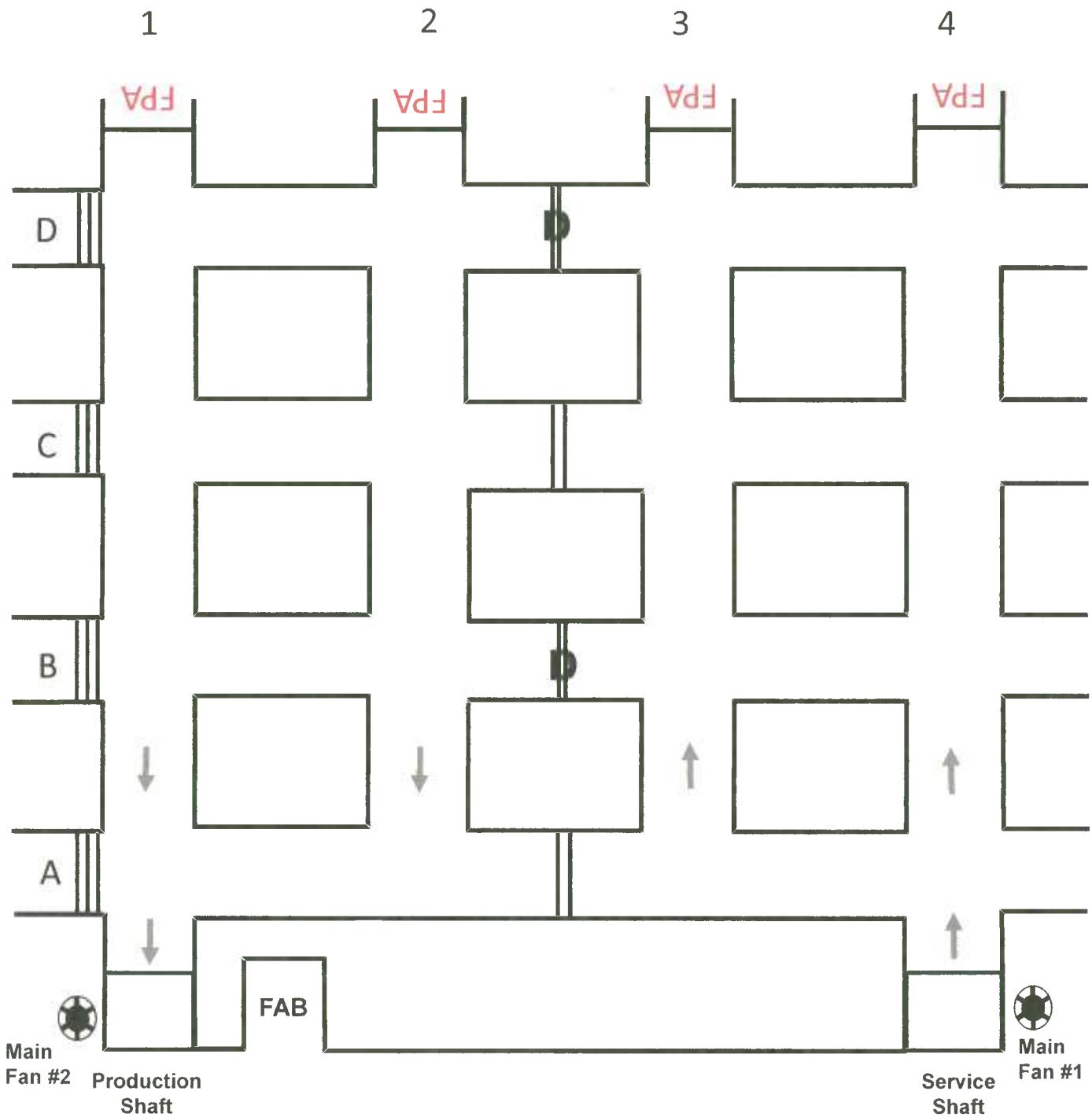
Materials:

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.

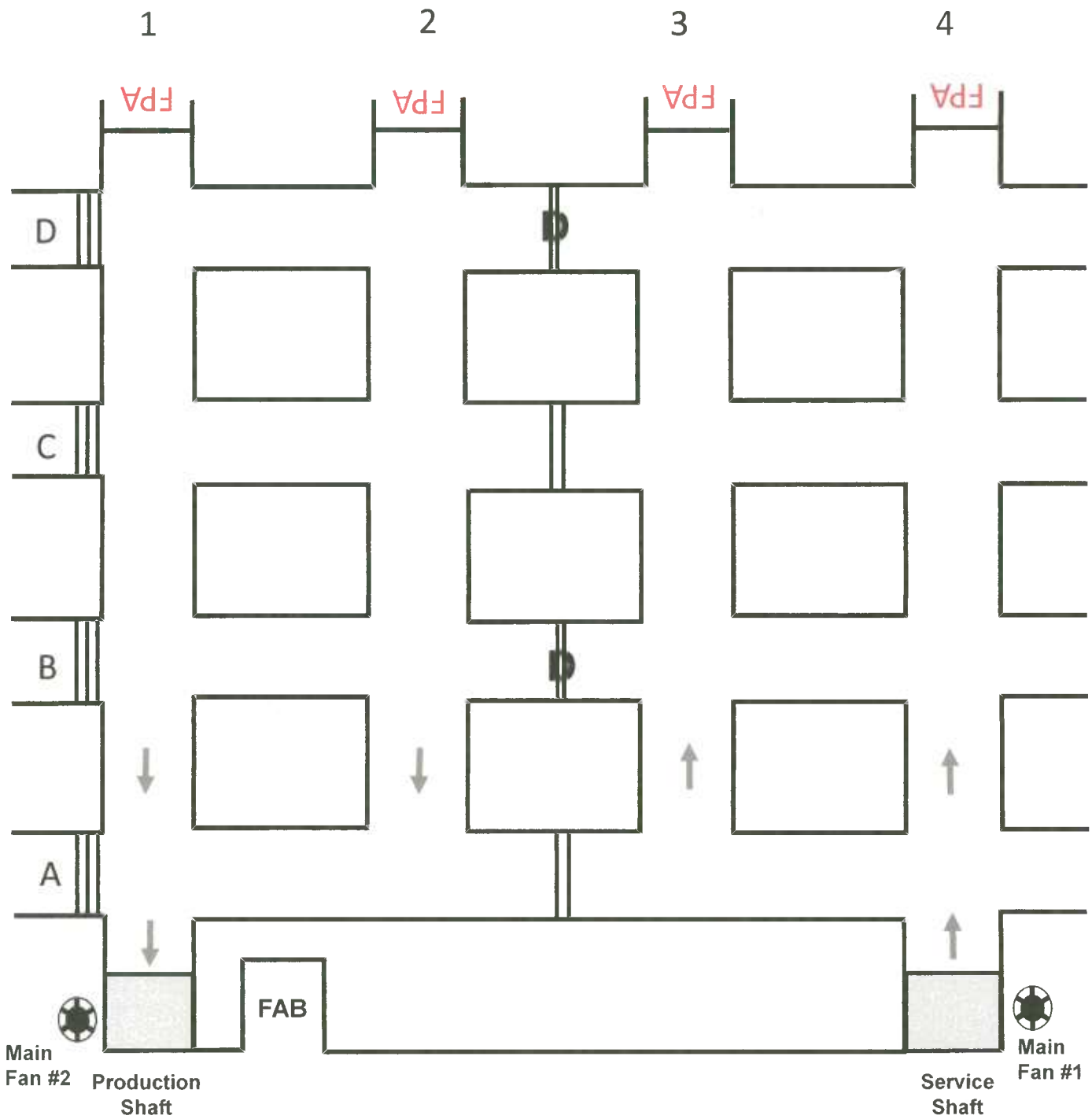
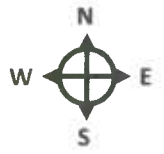
The mine uses a push/pull ventilation system utilizing two main fans. Main Fan #1 is located on the surface at the downcast Service Shaft and pushes about 200,000 cfm of fresh air into the mine. The fan can be reversed if necessary. Main Fan #2 is located on the surface at the upcast Production Shaft 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.

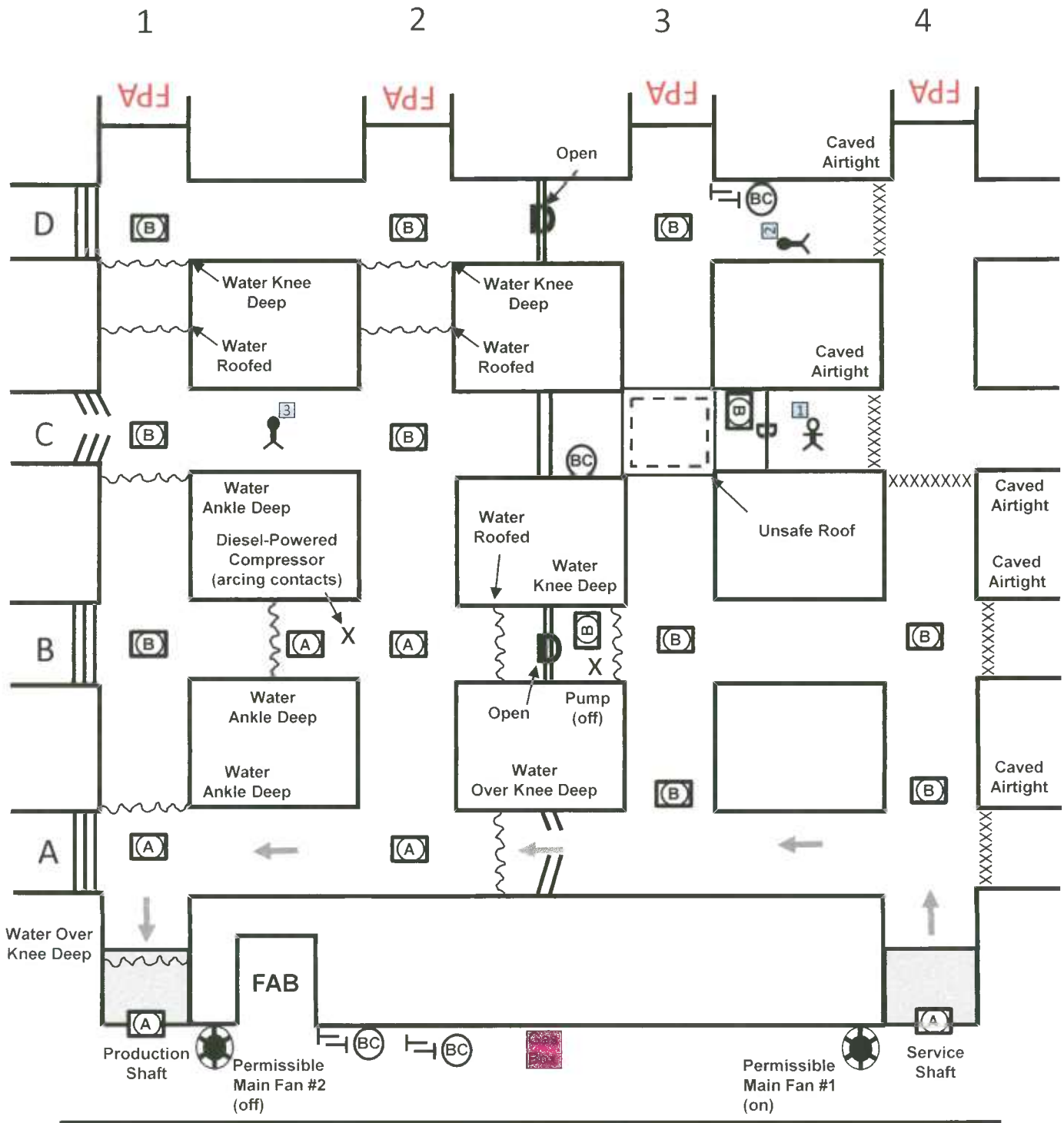
At the end of the problem, both the team map and the fresh air base attendant's map will be collected and scored. All map editing must take place prior to stopping the clock. The alternate's map will also be collected at this time but it will not be scored.

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!"**

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

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.