2022 National Metal and Nonmetal Mine Rescue Contest

JUDGES' PACKET
Field Competition

August 10, 2022
Lexington, Kentucky

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Introduction

Welcome to the 2022 National Metal and Nonmetal Mine Rescue Contest. Before we begin, we want to commend each of you for the countless hours that you have volunteered, and your selfless dedication and willingness to participate as a mine rescue team member. We would also like to recognize each team for the hard work spent during this past year while training and preparing to help your fellow miners during a mine emergency. In addition, we want to thank each team's company for their support and financial backing for this important training function.

This year all teams will participate in a one-day field competition. We have put together a very challenging problem for the day. Which will make you think and exercise all of your mine rescue skills. Hopefully, every team will go away feeling that they are better prepared for an actual emergency based on what they have learned.

Your team's final placement will be based on your discounts for the day's field problem plus your written test discounts. Those teams with the least number of total discounts will vie for the trophies.

Even though there can only be a handful of contest winners, the real winners are the miners and their families, the communities, and the companies you represent. It is for all of them that we are here today.

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

Mine Information Sheet
Kent Mining Co. – Tucky Three Mine

Mine Design & Openings:
The Kent Mining Co.'s, Tucky Three Mine is a new Single level underground mine opened by two 18-foot diameter shafts approximately 800 feet deep. The downcast Shaft #1 is equipped with hoists used to transport equipment, personnel and supplies. Shaft #1 serves as the primary escape way for all personnel underground. The downcast Shaft #2 is equipped with hoists used to transport equipment, personnel and supplies. Shaft #2 serves as the secondary or alternate escape way. The mine has three 6-foot diameter ventilation raises to surface, known as Ventilation Raise #1, #2, and #3. Ventilation Raise #2 is the only raise that has an exhaust fan located on surface. None of the ventilation raises have conveyances. **Note: The surface collar of the ventilation shafts are not accessible from the Fresh Air Base.**

Ventilation:
The mine uses a push/pull ventilation system utilizing two main fans. The Intake Fan is located on the surface at Shaft #1 and pushes about 300,000 cfm of fresh air into the mine. The fan operates in the stable portion of its performance curve and cannot be reversed. The Exhaust Fan is located on the surface at Ventilation Raise #2 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 upcast Ventilation Raise #1; however, fresh air is exhausted through this opening. 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, both the Intake Fan and Exhaust Fan are not operating. Either fan can be restarted, if the team decides it is safe to do so, fan controls are located on surface. The mine has plans to install a new exhaust fan at the surface of shaft #2 to assist ventilation but the project is not expected to start until 2023.

Mine Classification:
The Tucky Three Mine has not yet been classified. Mine management expected the mine to be classified as non-gassy based on the mined material and geographical location. The mine has recently experienced traces of methane as the mine has developed. The mine is scheduled for sampling next month for further evaluation.

Mining & Equipment:
The mine uses a conventional room and pillar method to extract ore from faces in the advancing production levels. The entries are initially driven 8 feet high and 10 feet wide. Typical pillar dimensions are 12 feet by 15 feet (W x L). The broken ore is loaded into haul trucks by use of front-end loaders. The broken ore is dumped into a skip pocket and ore is then hoisted to the surface via skips in Shaft #2. The mine operates two 10-hour shifts per day, five days per week, with a single 10-hour maintenance shift on Saturday's. Hours of operation are from 5:00 a.m. to 3:00 p.m. Most underground mobile equipment is diesel-powered. The face drills and auxiliary fans are electric powered by cables from power centers located underground.

Mine Information Sheet (continued)
Kent Mining Co. – Tucky Three 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 cribbing, wooden posts or roof jacks.

Water and Pumps:
The mine does not generally have water problems but during initial development the mine began experiencing seepage from natural aquafers located adjacent to the mines natural ore zone. There are two 10-foot-deep sumps known as Sump #1 and Sump #2 that collect water. The water in the sumps are periodically pumped to surface via a 6 - inch diameter polypipe that runs to surface. The mine utilizes portable battery-operated utility pumps and air operated diaphragm pumps for secondary pumping if necessary.

Electric Power:
The electrical power circuits for the shafts and the surface pumping station are on. Power circuits to the main fans and the underground installations have been locked out and guarded. The main fan controls are located on surface and can be energized at a moment's notice at the team's request.

Explosives:
Explosives are used during the mining cycle and are stored on surface at this time. Underground magazines are currently under construction and once complete all explosives will be stored underground. Blasting is conducted at the end of day 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 January 1, 2022.

Other Mines:
There are several known mines, active and abandoned, in this immediate area. At this time, the Tucky Three Mine is not connected to any of these mines.

Materials:
All available equipment and materials to work the problem are located in the mine and on surface and are identified by placards. **Note: The team will only be allowed to carry two sets of brattice material and frames at any given time. Line curtains will not count toward this maximum. The team can carry as many roof support items as physically possible during working of the problem.**

Communications:
The mine utilizes two-way handheld radios for communication underground and to the surface. At this time, there has been no contact with the missing miners.

Team Briefing Statement

You are located at the fresh air base that has been established on the surface of the Kent Mining Co.'s Tucky Three Mine. Today is Wednesday August 10, 2022, six miners were scheduled to work underground on this shift and due to the previous Saturday being a scheduled holiday, the miners were also assigned to conduct maintenance today. Maintenance tasks include cleanup of the sumps, replacement of a section of the water line, and transporting equipment to surface for scheduled preventative maintenance. The mine was also scheduled for an end of shift blast underground today.

At approximately 1:00 p.m. two miners exited the mine in efforts to gather explosive materials for the end of the day blast and materials to complete repairs. After leaving the mine and once on surface the miners felt the ground shake and what appeared to be some kind of explosion underground. The two miners called underground but did not reach anyone by radio. They left the surface storage magazine and planned to go back underground but once they arrived at Shaft #1, they felt the ground shake again and decided to return to the surface office. Before leaving the shaft, they turned off the main fan controls. The miners contacted local officials and called the MSHA's emergency line to report the incident.

At this time, all power to the underground has been locked out and guarded. Power has been restored to the hoists and main fan only. The main fan is off but can be restarted if needed, controls are located next to the shaft. Continuous gas monitoring has been established at the shafts. The latest readings show "clear air" at Shaft #1, Shaft #2, and the ventilation raise #1. We do not know the status of the communication system, because there has been no contact with the missing miners.

We have contacted all of the government agencies for help. Guards have been posted at the ventilation raises. 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 90 minutes.**

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 four 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 #1 Judge and inform them that you will also be acting as the "Mine Manager" for contest purposes. Then, introduce the #2 Judge. The team has been briefed on the problem and the mine information in isolation. Read the following information to the team:

During the working of the problem, I will assume the role of mine manager as well as #1 Judge. In the event the team has a request for the mine manager, you will still need to direct the question to the mine manager and I will respond accordingly. As the #1 Judge, I will answer questions 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.

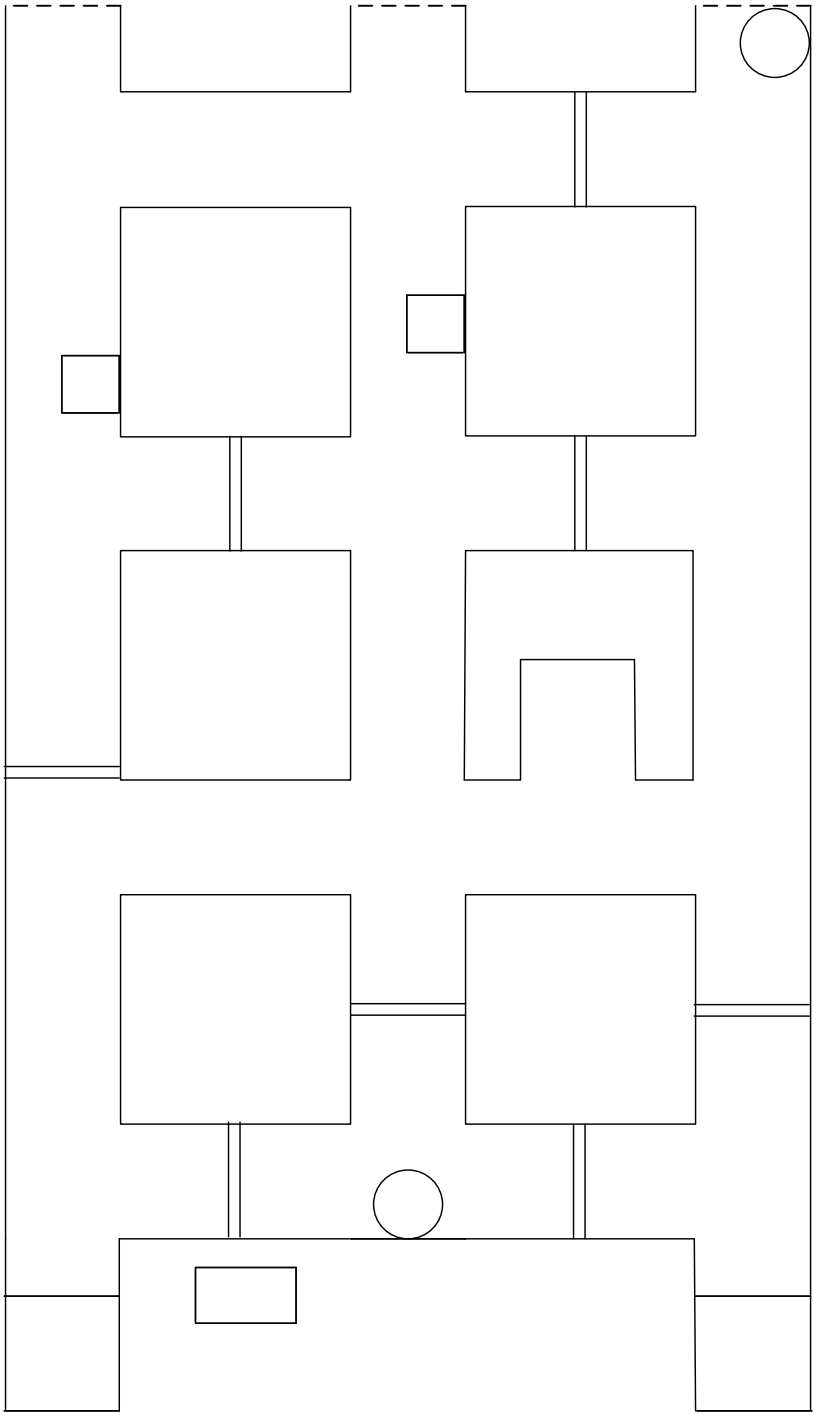
The fresh air base attendant or team alternate is not allowed to speak with anyone <u>except</u> the team members, the mine manager, or the judges.

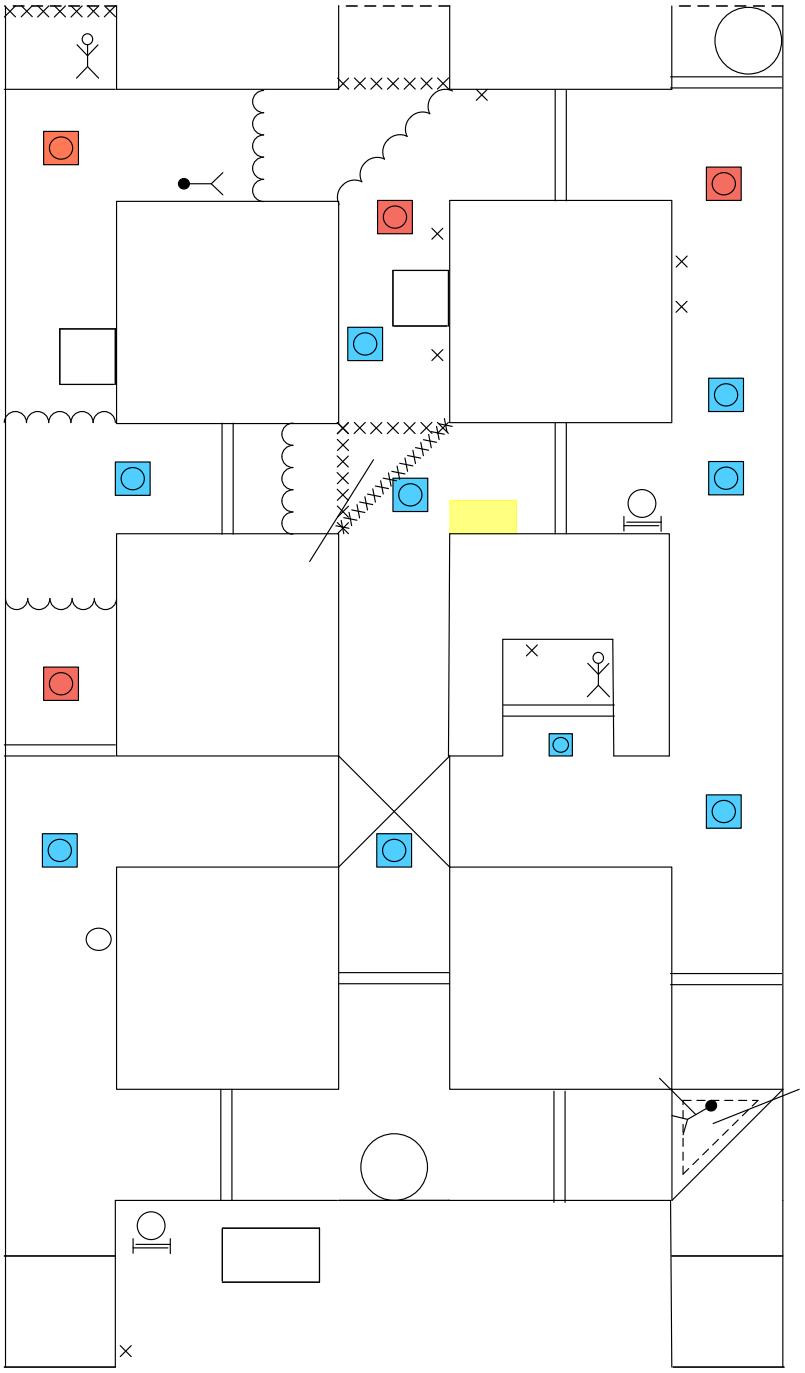
At the end of the problem, both the team map and the fresh air base attendant's map will be collected and scored. All map editing must take place prior to stopping the clock. The alternate's map will also be collected at this time but it will not be scored.

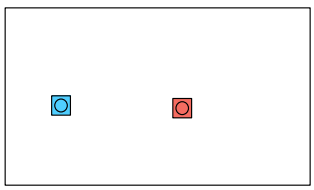
Do you understand this information and these instructions?

When they verify understanding the instructions, have the Team Captain start the clock and hand the team their copies of the Team Briefing Information, the Mine Information Sheets, and the <u>three</u> mine maps. Remember to add: **"Good Luck!"**

2022 National Contest
Team Map (800-foot Level)





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Problem Solution

DISCLAIMER:
There may be other ways to successfully solve this problem. The following outlines one possible way for use during MSHA field judges' training.

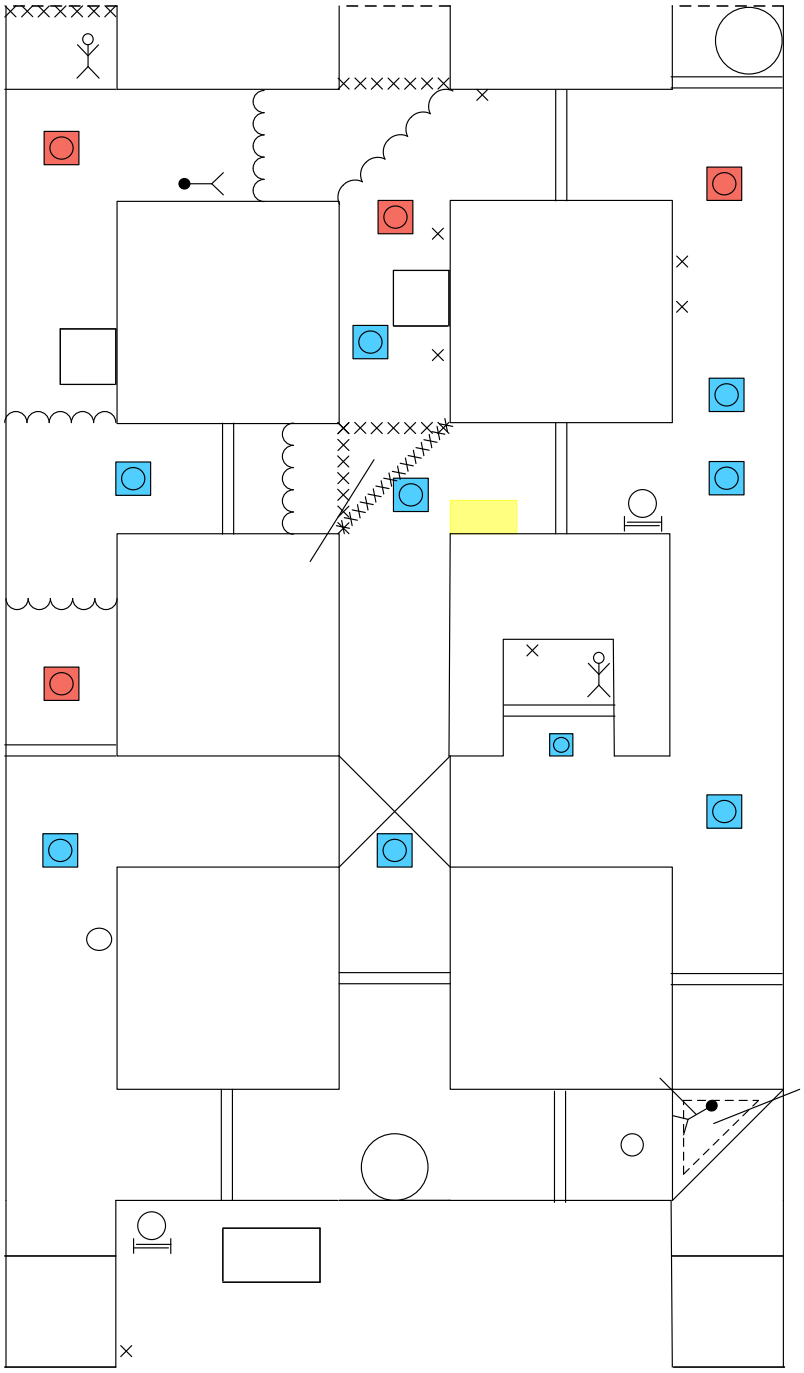
Each team received a briefing in isolation. At that time, each team was allowed to review the team briefing statement, mine information sheet, mine maps, and instructions for rescue teams and fresh air base attendants. However, copies of these documents and maps were collected at the conclusion of the briefing session.

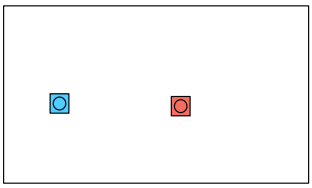
Upon arrival at the fresh air base, the team will meet the Mine Manager and will be introduced to the judges. The Mine Manager will read the Problem Orientation and update the team with any information obtained since their briefing. Questions will be answered only as required by the rules or to explain 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.

Since the mine has not yet been officially classified, the team may not inform the Judge that they either have non-sparking tools or request the non-sparking tools at this time. However, they will need to request the non-sparking tools once the explosive air/gas mixture is found. If the team requests non-sparking tools from the official in charge, their tools will be deemed non-sparking.



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Note: Shaft #1 and Shaft #2 Examination

When ready, the team must examine both shafts near the Fresh Air Base. The team has already been informed that the surface collar of the ventilation shafts are not accessible from the Fresh Air Base. The team will identify "Brattice Cloth and Brattice Frames (2 sets)" next to the FAB and will likely take the building materials with them.

Shaft #1 check reveals:
The team must conduct necessary gas tests. A placard at the shaft shows "clear air." A second placard will indicate "Fan Controls" in the "OFF" position. 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 will close the cage door and release the cage prior to traveling to Shaft #2. The team's failure to check this shaft for damage will result in a team endangerment (75 discounts) per Judge 1 – UG Rule #10(b)(1).

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 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.

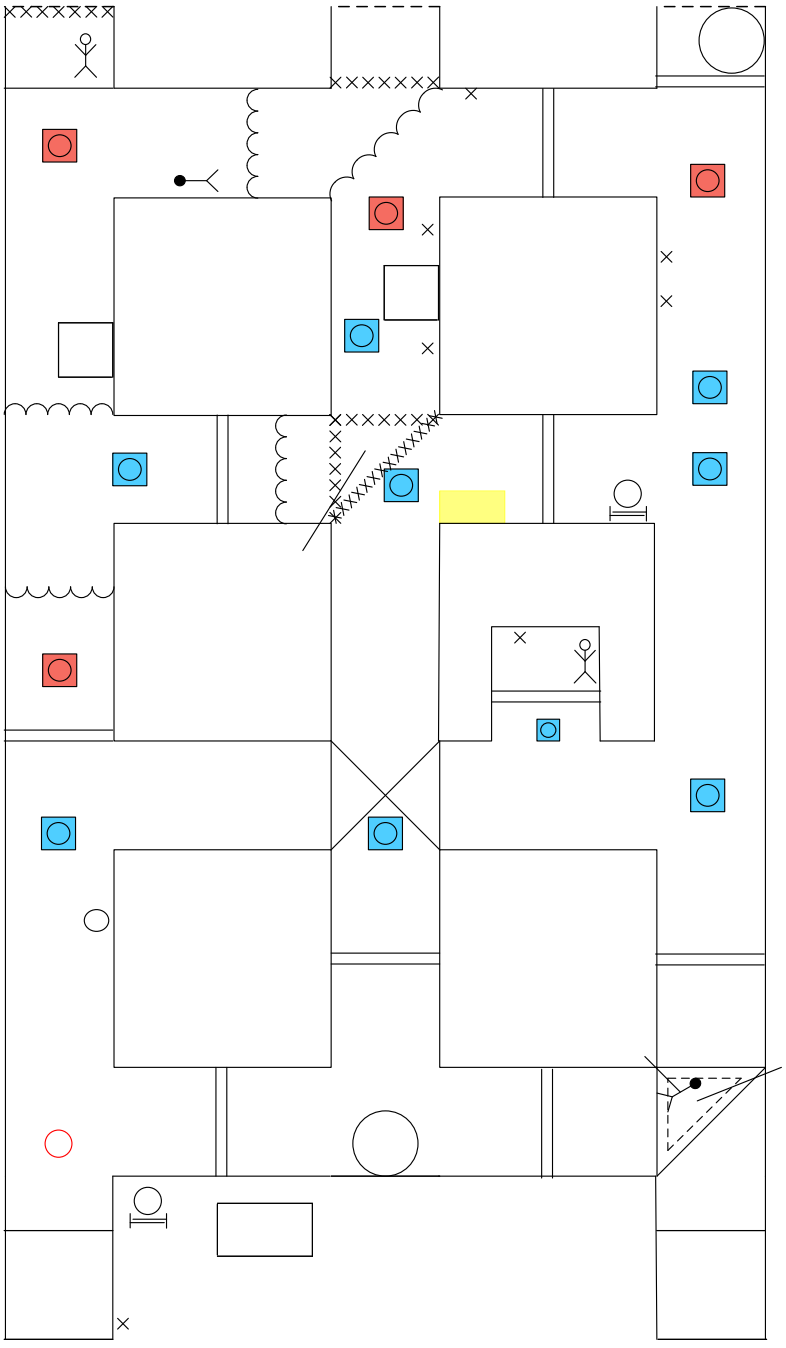
Note: At each shaft, Judge No. 1 will indicate movement of the conveyance as soon as the proper hoisting signal codes are demonstrated.

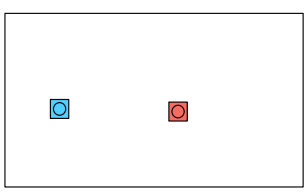
Shaft #2 check reveals:
The team must conduct necessary gas tests. A placard at the shaft shows "Clear Air" The conveyance will be at the top of the shaft and the team will place combustible material on the cage and send it down, using the posted Nevada hoisting signal codes. The team must then signal the cage to return to the surface. When the material is checked, it will be intact and dry. The team's failure to check this shaft for damage will result in a team endangerment (75 discounts) per Judge 1 – UG Rule #10(b)(1).

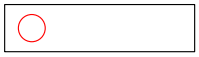
The team's failure to close the shaft gate will result in discounts (5 x each infraction) per Judge 1 – UG Rule #7.

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 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.





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Note: Team Stop No. 1 (see Solution Map 1)

Team Stop No. 1
The team will elect to advance into the mine through Shaft #1. In order to do this, the team must count off before entering the cage (first time they go underground). Then, they must close the shaft gate and signal the hoist operator. Afterward, the team will descend to Shaft #1 station. Before exiting the cage the captain must check for loose roof in front of the cage. A gas test will show that the gas concentrations have not changed from those found at the shaft collar. After the team releases the cage, the team will advance north in entry 1 until they reach the intersection of XC-A. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. The team will find a placard indicating "Clear Air". The team will also conduct their 50' check at this time. The team may stretch east in XC-A and identify a "Permanent Stopping with Door" the door will be open. The team will conduct the necessary gas test and check the back/roof upon passing through the door.

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.

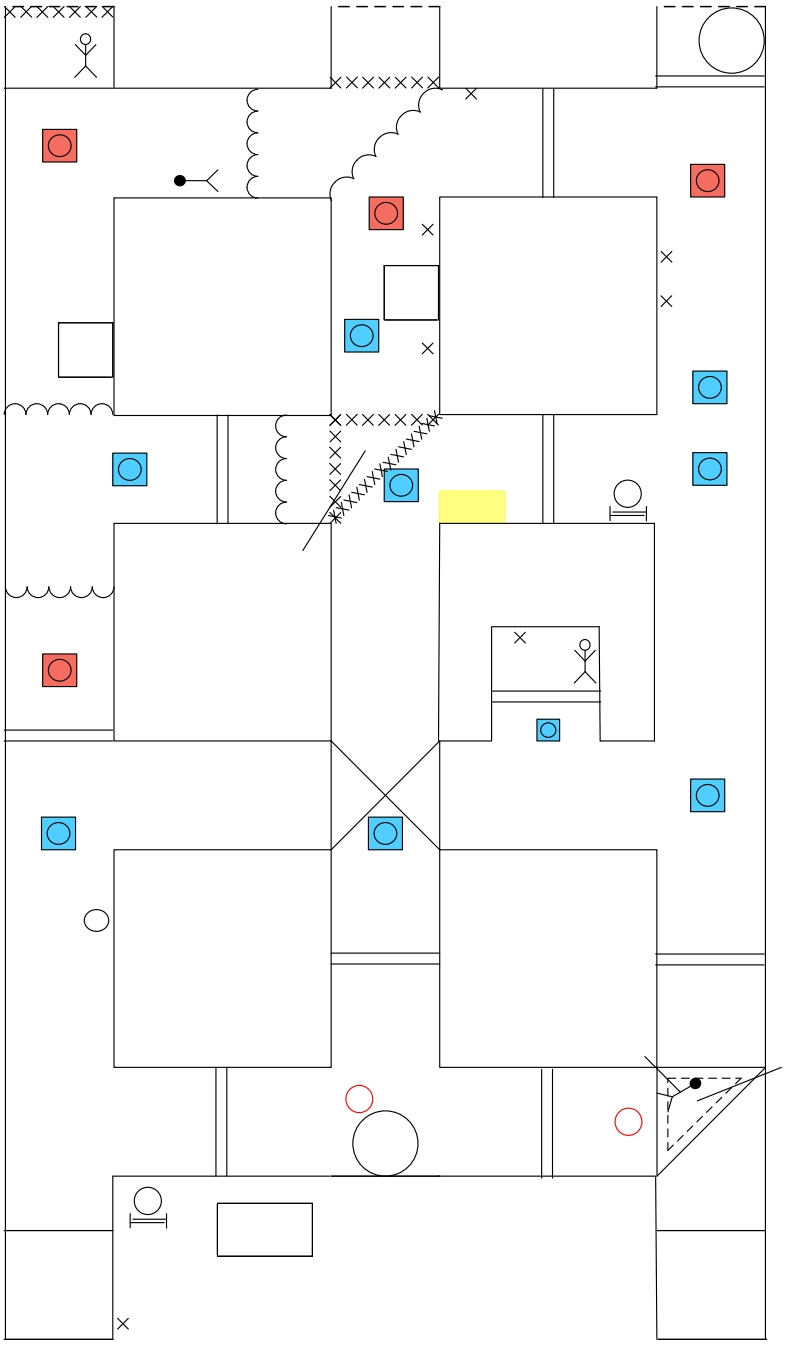
The team's failure to close the shaft gate will result in discounts (5 x each infraction) per Judge 1 – UG Rule #7.

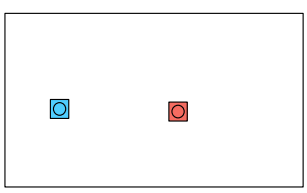
The team's failure to use the posted hoisting signals will result in discounts (1 x each infraction) per Judge 1 – UG Rule #6.

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) assess discounts (1x each omission) per Judge 2 - UG Rule #1. **All additional areas requiring gas testing by the team are shown on the Solution Maps (with Team Stops) as "GT".**

Note: After advancing not more than fifty (50) feet from the fresh air base, the captain must give a signal for the team to stop. At this time, all team members and their apparatus must be checked. After the 50 feet apparatus check, the team is required to conduct apparatus examinations not exceeding 20-minute intervals while working the problem. 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.



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

Team Stop No. 2
The team will advance east in XC-A until they reach the intersection of entry 2. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. The team will also identify "Ventilation Raise #1" and a placard indicating "Clear Air". The team can stretch to the north in entry 2, they will identify a "Permanent Stopping with Door" and the door will be open. The team will perform the necessary gas tests and the captain will date and initial (DI) the stopping as their farthest point of advance in this direction to this point in the problem.

If a team member advances underneath the outlined ventilation raise, assess individual endangerment discounts (15 x each person) per Judge 1 – UG Rule #10.

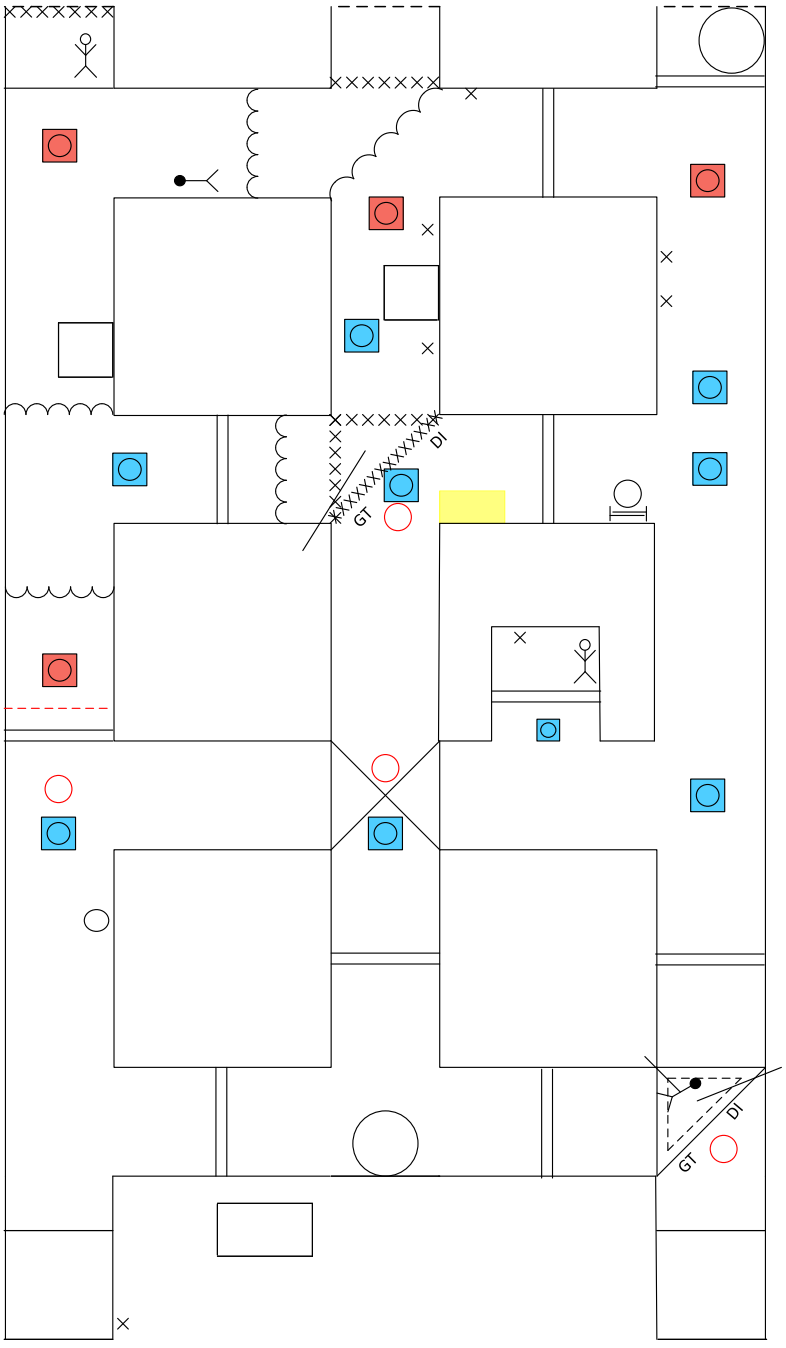
The captain's failure to D&I where required (at the point of farthest advance of the team in any direction such as at stoppings, faces of rooms and drifts, water over knee deep, impassable falls, barricades, fires out of control, etc., assess discounts (2 x each place – max 10) per Judge 1 - UG Rule #9. **All additional areas requiring a date and initial by the team captain are shown on the Solution Maps (with Team Stops) as "DI".**

Team Stop No. 3
The team will continue exploration east in XC-A until they reach the intersection of entry 3. While advancing the team will identify a "Permanent Stopping with Door", the door will be open. The team will perform the necessary gas tests and check roof/back as they pass through the door. The team will continue exploration until they identify "Unsafe Roof (half intersection)". The team will perform the necessary gas test from rib to rib. The team will also visually identify a missing miner under the unsafe area. The team will not have the means to support the area at this time. The team captain will "DI" the area as their farthest point of advance and continue exploration.

Note: If the team asks for roof support materials, the Mine Manager will explain that everything needed to work the problem can be found in the mine. It will take at least two hours to obtain additional materials and send them to the 800-foot Level.

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

The team will retreat to surface to enter mine via Shaft #2 to continue exploration and attempt to reach the missing miner under the unsafe roof area.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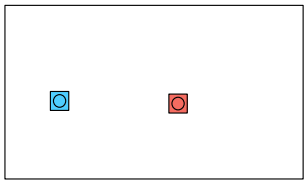


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Note: Team Stop Nos. 4 - 7 (see Solution Map 3)

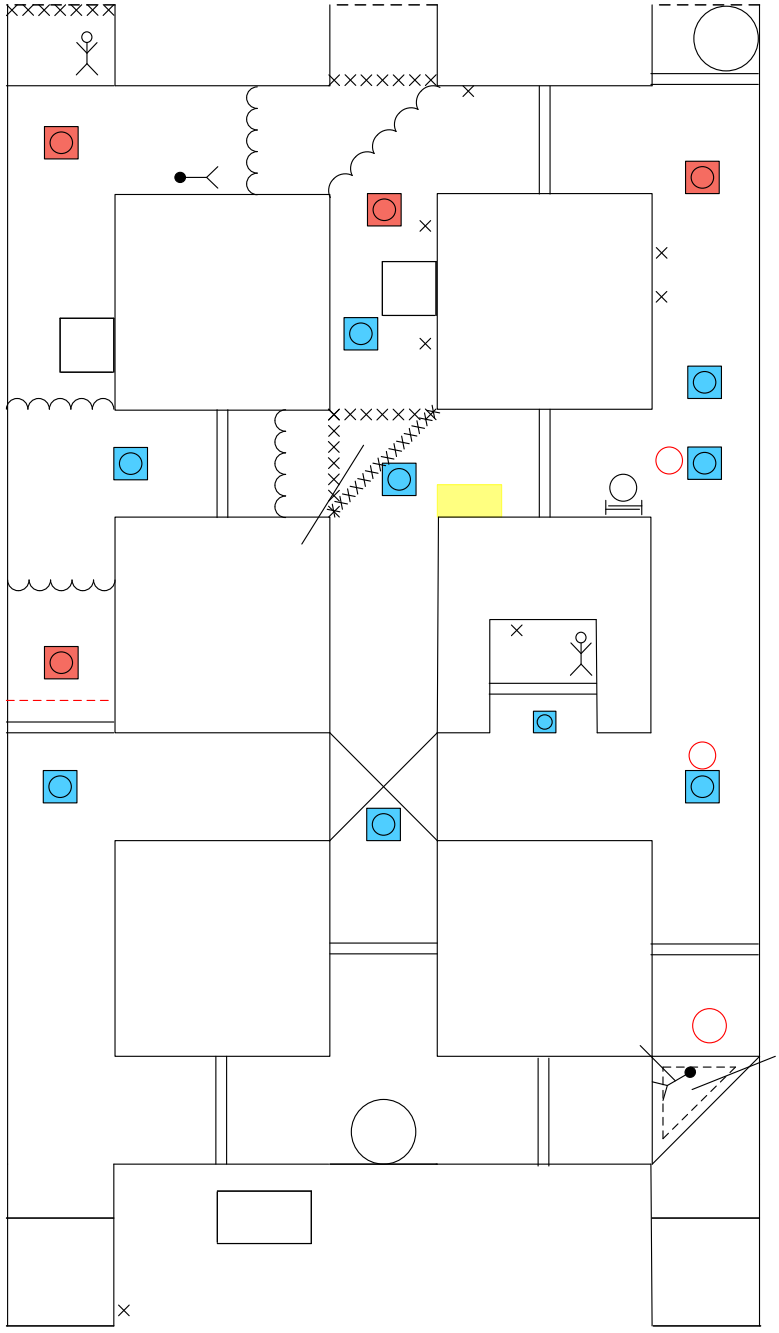
Team Stop No. 4
Now, the team can continue systematic exploration of the mine. The team will enter the mine through Shaft #2. After entering the cage, they must close the shaft gate and signal the hoist operator. Afterward, the team will descend to Shaft #2 Station. Before exiting the cage the captain must check for loose roof in front of the cage. A gas test will show "clear air." The team will advance north in entry 3 until they reach the intersection of XC-A. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. The team will identify "Unsafe Roof (half Intersection)". The team will not have the means to support the unsafe area at this time. The team captain will "DI" this area as their farthest point of advance and the team will retreat back to the intersection of XC-A and entry 1 via shaft #1.

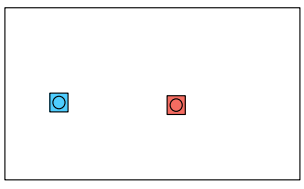
Team Stop No. 5
The team will advance north in entry 1 until they reach the intersection of XC-B. While advancing the team will identify a "Line Curtain". The team will be permitted to carry this material along with the two sets of building materials that they already have on their stretcher. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%". The team also identifies a "Permanent Stopping with Door" the door is open. The team captain will "DI" the stopping as their farthest point of advance at this time. The team can advance east in XC-B until they reach the "Overcast" stopping. The team will conduct necessary gas tests and team captain will "DI" their farthest point of advance.

Note: Where crosscuts are blocked, no team member may advance more than three (3) feet beyond the second intersection before tying across and/or behind into all unexplored areas that intersect. Failure of team to explore or examine working systematically and thoroughly (25x each infraction) per Judge 1 - UG Rule #11.

Team Stop No. 6
The team will continue advancing northward in Entry 2 to XC-B. The team will perform the necessary gas tests and check roof/back as they pass through the door. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%". The team will identify the "Overcast" stopping on both sides of entry 2 and XC-B.

Team Stop No. 7
The team will advance north in entry 2 until they reach the intersection of XC-C. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%". The team will also identify "Caved Impassable" that extends diagonally across the intersection. The team captain will "DI" the caved impassable as the team's farthest point of advance. The team will also identify a "Damaged Power Center" on the corner of the pillar.



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Note: Team Stop Nos. 8 - 10 (see Solution Map 4)

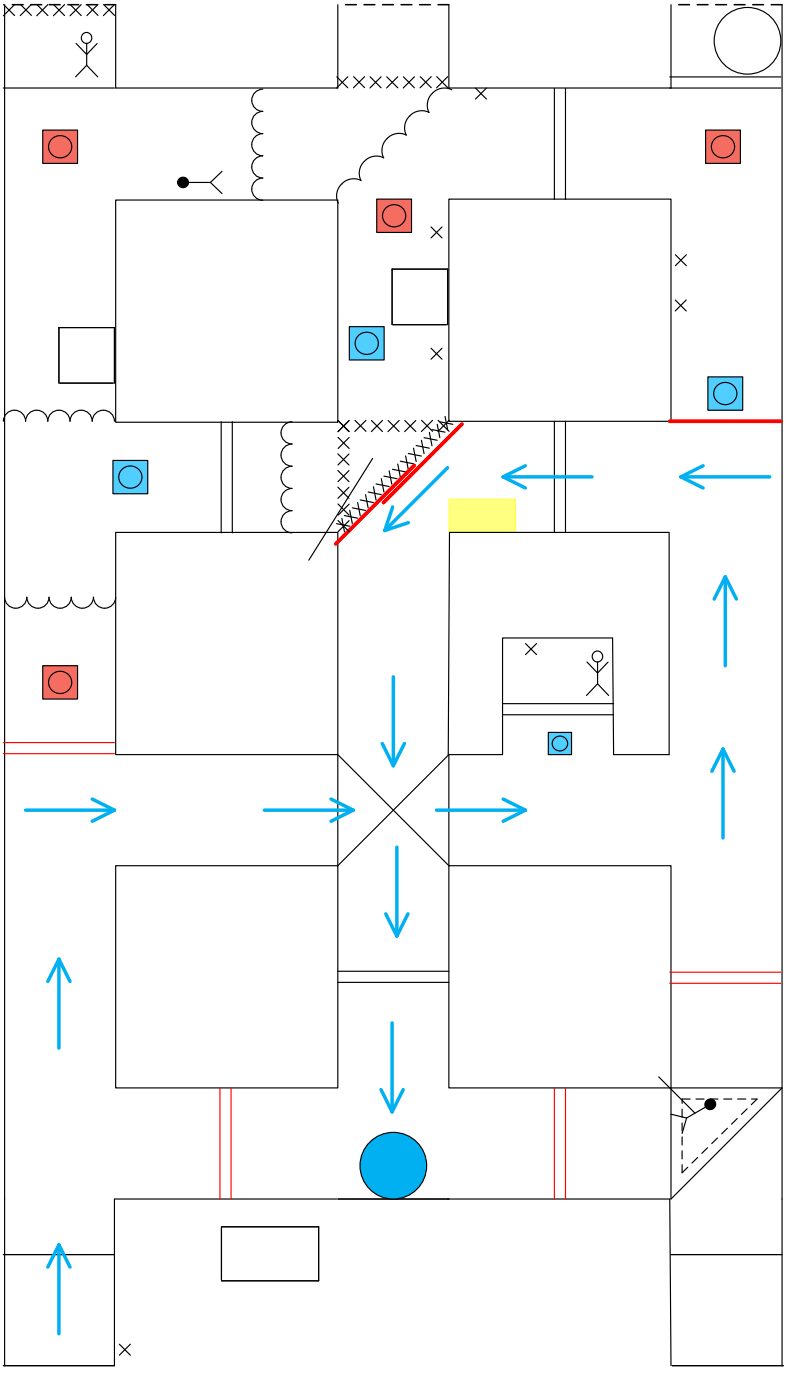
Team Stop No. 8
The team can advance east in XC-C until they reach the intersection of entry 3. While advancing the team will identify a "Permanent Stopping with Door" the door will be open. The team will conduct the necessary gas test and check the back/roof upon passing through the door. The team will also identify one set of "Brattice Cloth and Brattice Frames". The team will not be permitted to take this material since they already have two sets on their stretcher. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%".

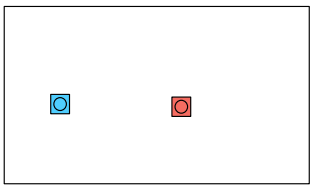
Team Stop No. 9
The team will continue exploration south in entry 3 until they reach the intersection of XC-B. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%". The team will continue exploration west in XC-B. The team will identify "Lunchroom" the door will be closed. Knocking on the door the team will make contact with a missing miner. The missing miner will relay the following message: "Get me out of here, I'm not injured, I'm completely enclosed and the air in here is ok". If the team asks any additional questions the miner will repeat the message. The team will take necessary gas tests and the team captain will "DI" the stopping as their farthest point of advance.

Note: Based on the low oxygen content outside of the lunchroom the team will not be able to enter the lunchroom and will need to ventilate the area first to safely rescue the miner. If the team opens the lunchroom door, assess 50 discounts per Judge 1 - UG Rule #18(a).

The team can advance west in XC-B until they reach the "Overcast" stopping. The team will conduct necessary gas tests and team captain will "DI" their farthest point of advance.

Team Stop No. 10
The team will continue exploration south in entry 3 until they reach the intersection of XC-A. While advancing the team will identify a "Permanent Stopping with Door", the door will be open. The team will perform the necessary gas tests and check roof/back as they pass through the door. At the intersection the team will identify "Unsafe Roof (half intersection)". The team will perform the necessary gas test from rib to rib. The team will not have the means to support the area at this time. The team captain will "DI" the area as their farthest point of advance and continue exploration.



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Note: Ventilation Change #1 (see Solution Map 5)

Ventilation Change #1 (enter Lunchroom)
At this point in the field problem, the team has explored all accessible areas of the mine. In order to enter the lunchroom, the team must make a ventilation change in order to clear the area in front of the lunchroom door. 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.

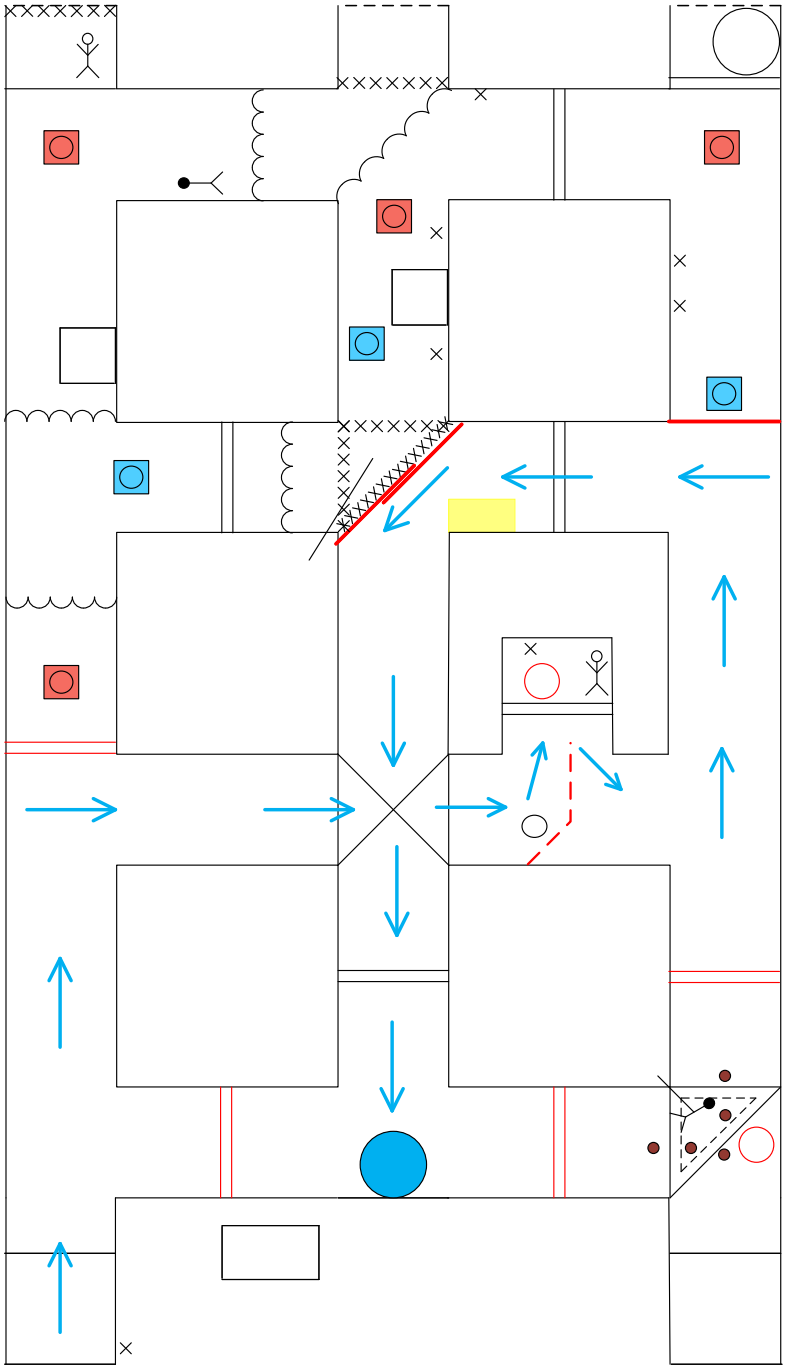
The team must explain the necessary ventilation changes prior to implementing them. For the purposes of this problem solution, the following steps will be discussed to accomplish re-ventilation:

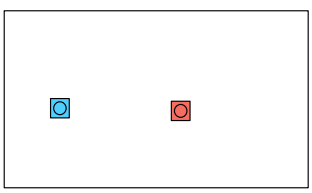
1) Close the door in entry 3 between XC-B and XC-A.
2) Build a temporary stopping in entry 3 just north of XC-C
3) Utilize two sets of building materials to build diagonally across the caved impassable in the intersection of entry 2 and XC-C.
4) Close the door in XC-A between entry 2 & entry 3.
5) Close the door in XC-A between entry 1 & entry 2.
6) Close the door in entry 1 between XC-B and XC-C
7) Turn on the Intake Fan at Shaft #1. (by team or FAB)

Note: Ventilation path is indicated by blue arrows on the map and will clear gases in XC-B. Low oxygen content will remain directly in front of the lunchroom. The team will need to utilize the line curtain to course air up to the lunchroom door in order to completely ventilate the area.

If the captain doesn't check the roof and rib prior to building a temporary stopping, assess 5 discounts per Judge 1- UG Rule #8(b)(3). If the captain does not D&I the build, assess discounts per Judge 1 – UG Rule #9 (2x each place - 10 max).

Note: Upon reentry into areas cleared of smoke and toxic or dangerous gasses, teams shall make gas tests rib to rib at all openings along the route they travel. Failure to make necessary gas tests where required, (1x each gas, each omission) per Judge 2 – UG Rule #1.



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Note: Line Curtain and Team Stop Nos. 11 - 12 (see Solution Map 6)

The team will utilize the line curtain to course air up to the lunchroom door in order to completely ventilate the area and safely rescue the miner.

Team Stop No. 11
The team will conduct a gas check at the lunchroom door and identify “Clear Air”. The team already knows the condition behind the lunchroom door and can enter the area. The team will locate “Darryl Conz (U884)” and the team captain will “DI” the location of the survivor. The team captain can continue examining the lunchroom while the miner is being examined. The team will identify “Timbers (6)”, the team will likely load the timbers onto their stretcher and “DI” the face of the room. The miner is not injured and can walk out with the team.

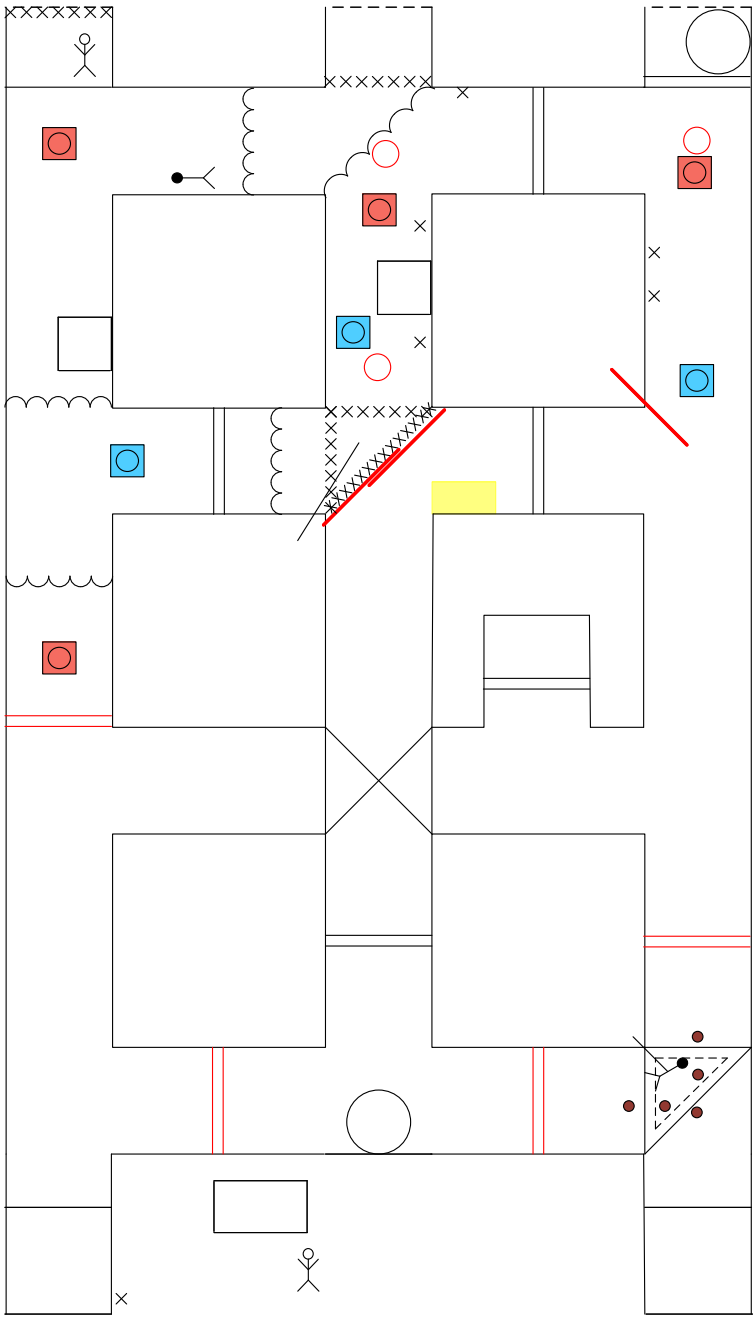
Team Stop No. 12
The team will likely have the main fan turned off as they enter the mine to continue exploration. The team now has the means to support the unsafe roof where they visually identified a missing miner. The team will enter the mine via Shaft #2 and support the unsafe roof as illustrated on the solution map 5. The team will be able to access the miner and identify “Jim Fritz (U883)”, examining the miner the team will identify that the miner is deceased. The team will examine any unexplored area and the team captain will “DI” the body.

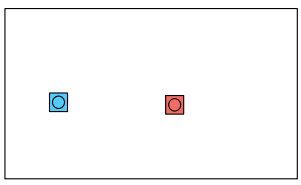
If the team removes any installed post after it has been set, assess a team endangerment (75 discounts) or individual endangerment (15 x each person) per Judge 1 – UG Rule #10(b)(7).

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 date and initial by the team captain are shown on the Solution Maps (with Team Stops) as “DI”.**

Team Name: _____

Team Draw # _____





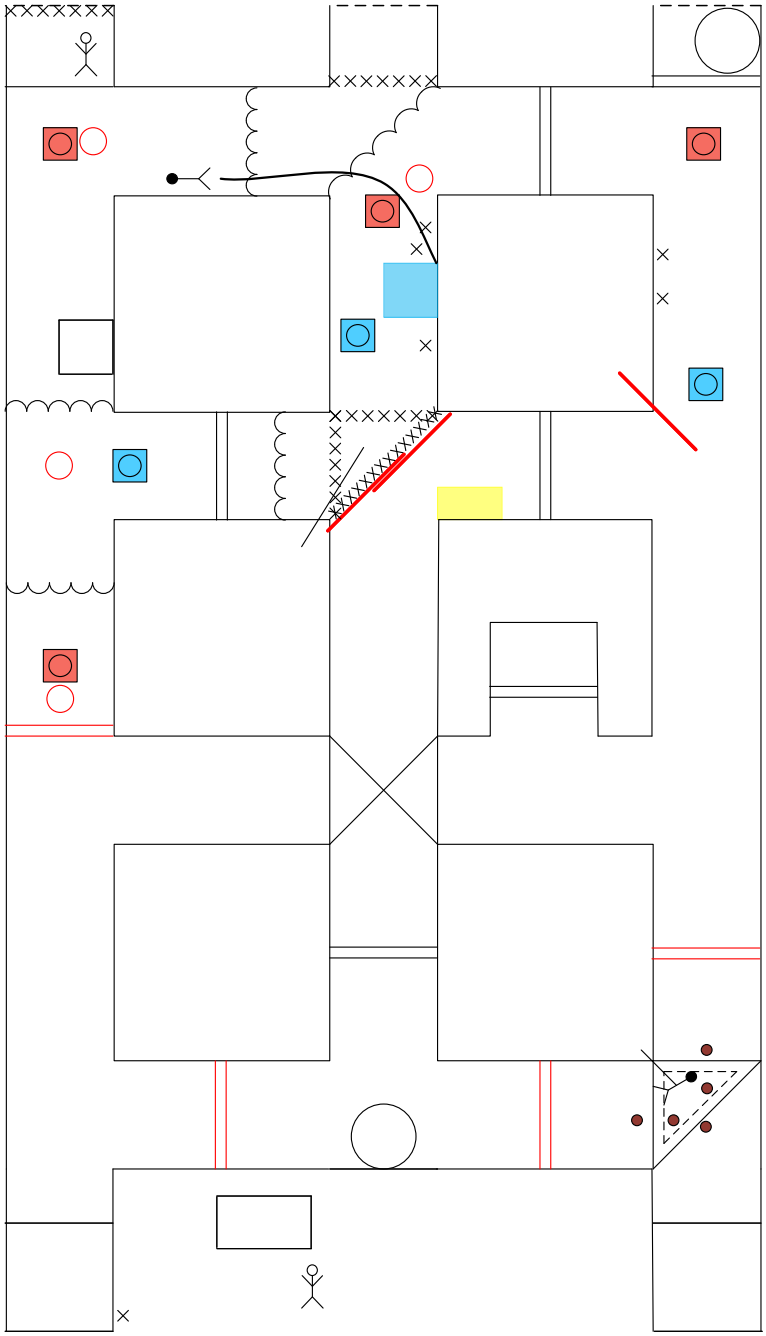
Note: Team Stop Nos. 13 - 15 (see Solution Map 7)

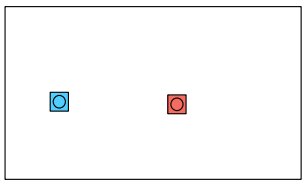
Team Stop No. 13
The team will continue exploration north in entry 3 until they reach the intersection of XC-D. The team will need to take down the temporary stopping that they built for the ventilation change. While advancing, the team will identify "Overhead Air Line" and "Portable Battery-Operated Utility Pump" on the west rib. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 7.2%". The team must call out to the fresh air base to report that they have encountered an air/gas mixture that has reached its explosive range. Since the team has found no evidence indicating that there is a fire underground (i.e., smoke or CO concentrations), the team can continue systematic exploration. North of the intersection the team will identify a "Permanent Stopping". The team will conduct the necessary gas tests and the team captain will "DI" the stopping as their farthest point of advance and continue exploration. If the team does not notify the fresh air base that they have encountered an air/gas mixture that has reached its explosive range, assess discounts **(10x each occurrence)** per Judge 1 - UG Rule #14.

Note: If the team did not notify the judge at the beginning of the problem that they have non-sparking tools, they will need to request the non-sparking tools at this time. If the team requests non-sparking tools from the official in charge, their tools will be deemed non-sparking. Failure to have non-sparking tools will result in the entire team being considered endangered and 75 points will be assessed. Per Judge 1 – Rule #10(b)(2).

Team Stop No. 14
The team will continue exploration west in XC-D. While advancing, the team will identify a "Permanent Stopping with Door" the door will be open. The team will conduct the necessary gas test and check the back/roof upon passing through the door. The team will also identify "50' Roll of Water Line" on the north rib. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 7.2%". The team will also identify "Water Knee Deep" that extends diagonally across the intersection. North of the intersection the team will identify "Caved Tight" and the team captain will "DI" the caved area as their farthest point of advance. Stretching west the team will identify "Water Over Knee Deep". The team captain will "DI" the water over knee deep as their farthest point of advance.

Team Stop No. 15
The team will continue exploration south in entry 2. While advancing, the team will identify "Overhead Air Line (Valve Off)" on the east rib. The team will also identify "Sump #2 (empty)". The team will identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%", on the east rib an "Air Actuated Pump", and "Caved Impassable". The team will conduct the necessary gas tests and "DI" the caved impassable as their farthest point of advance. If any team member travels into the sump, assess 15 points each team member, each infraction, each occurrence. Per Judge #1 – Rule #10(a)(2).



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Note: Team Stop No. 16 - 19 (see Solution Map 8 – Water)

Team Stop No. 16
The team will need to roll out the hose, drop the end in the water over knee deep, relocate the air actuated pump to the overhead airline, drop discharge end in the sump, connect the line to the overhead airline and turn the valve "ON". Once the team activates the pump, the placard will indicate "Water Knee Deep" and allow the team to continue exploration.

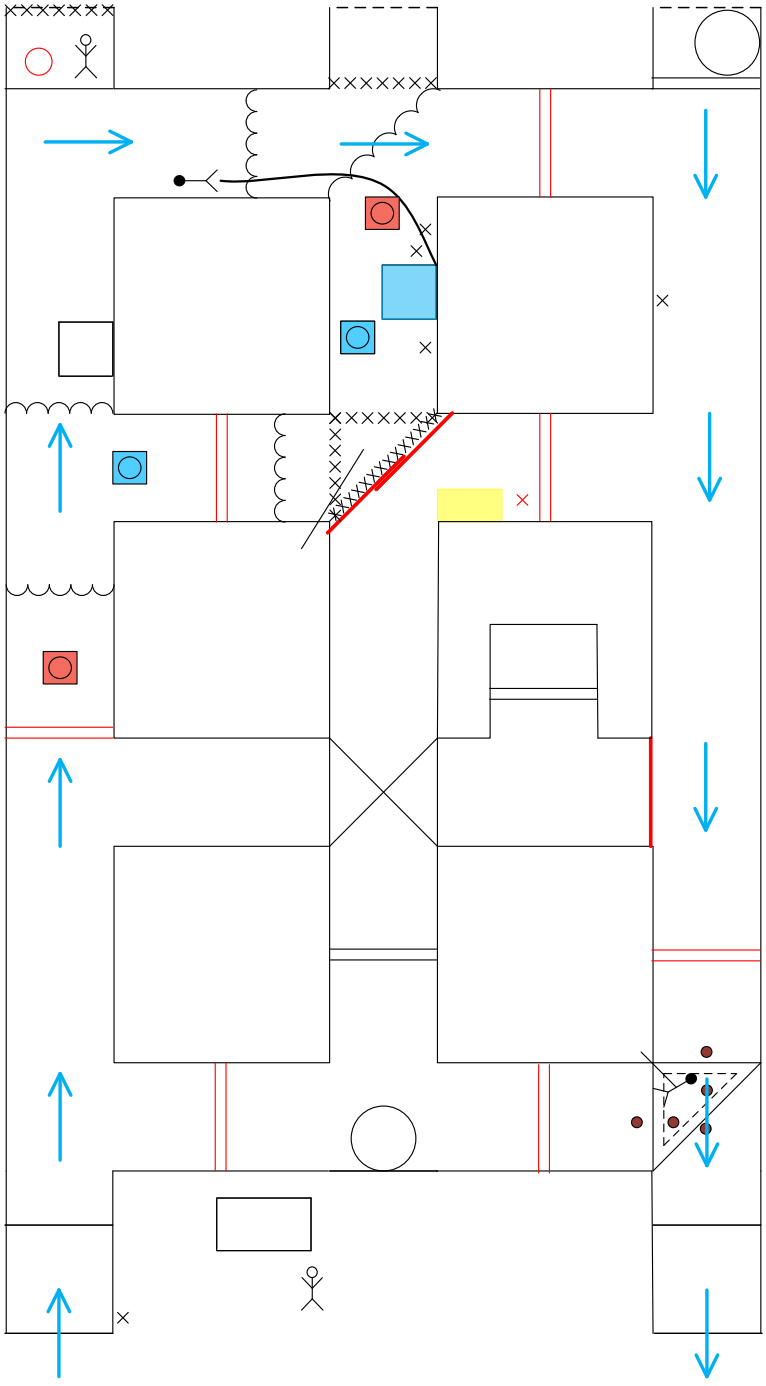
Note: If the team utilizes the portable battery-operated utility pump, assess a team endangerment (75 discounts) per Judge 1 – UG Rule #10(b)(6). The team will also be assessed (50 discounts per survivor) per Judge 1 – UG Rule #18.

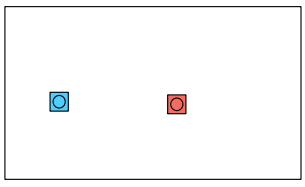
Team Stop No. 17
The team will continue exploration west in XC-D until they reach the intersection at entry 1. While advancing the team will identify "Pat Duka (U885)", examining the miner the team will identify that the miner is deceased. The team captain will "DI" the body. At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 7.2%". The team will also identify a "Barricade", knocking on the barricade, the team will make contact with the final missing miner and he will relay the following message: "Get me out of here, I'm not injured, I'm completely enclosed and the air in here is ok". If the team asks any additional questions the miner will repeat the message. The team will take necessary gas tests and the team captain will "DI" the barricade as their farthest point of advance.

Note: Based on the low oxygen content outside of the Barricade the team will not be able to enter the Barricade and will need to ventilate the area first to safely rescue the miner. If the team opens the Barricade, assess 50 discounts per Judge 1 - UG Rule #18(a).

Team Stop No. 18
The team will continue exploration south in entry 1 until they reach the intersection of XC-C. While advancing, the team will identify "Sump #1 (empty)" and "Water Knee Deep". At the intersection, the captain must perform roof or back checks as the team conducts necessary gas tests. They identify a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 0%". Stretching east in XC-C, the team will identify "Permanent Stopping with Door" the door will be open. The team will conduct the necessary gas test and check the back/roof upon passing through the door. The team will identify "Water Knee Deep" and "Caved Impassable". The team will take necessary gas tests and the team captain will "DI" the caved impassable as their farthest point of advance.

Team Stop No. 19
The team will continue exploration south in entry 1 to tie-in the remaining unexplored areas. While advancing, the team will identify "Water Knee Deep" and a placard indicating "O^2 – 16%, CO – 0%, and CH^4 – 7.2%". The team will tie-in up to the backside of the permanent stopping.



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Note: Ventilation Change #2 and Team Stop 20 (see Solution Map 9)

Ventilation Change #2 (enter Barricade)
At this point, the team has explored all accessible areas of the mine. In order to enter the barricade, 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) Maintain the door closed in XC-A between entry 1 & 2 and entry 2 & 3.
2) Open the door in entry 3 between XC-A and XC-B.
3) Build a temporary stopping in XC-B between entry 2 and entry 3 (to prevent recirculation.
4) Relocate the portable battery-operated utility pump in XC-C and Close the door in XC-C between entry 2 & entry 3 (to isolate the ignition sources from ventilation path).
5) Maintain door open in XC-D between entry 2 & entry 3.
6) Close the door in XC-C between entry 1 and entry 2.
7) Open the door in entry 1 between XC-B and XC-C
8) Turn on the Intake Fan at Shaft #1. (by team or FAB)

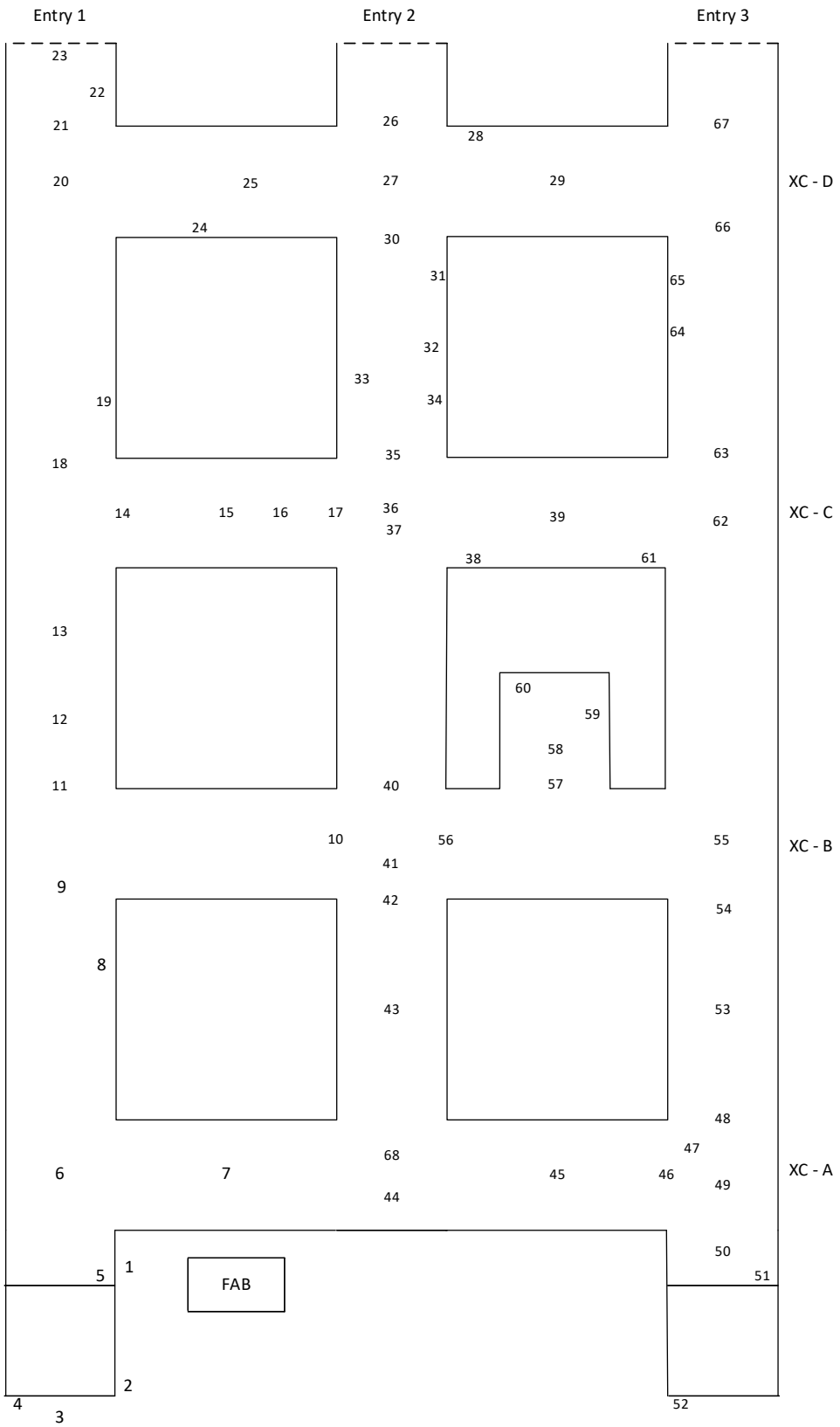
Note: Ventilation path is indicated by blue arrows on the map and will clear gases in front of the barricade.

If the captain doesn't check the roof and rib prior to building a temporary stopping, assess 5 discounts per Judge 1- UG Rule #8(b)(3). If the captain does not D&I the build, assess discounts per Judge 1 – UG Rule #9 (2x each place - 10 max).

Team Stop No. 20
The team will conduct a gas check at the barricade and identify "Clear Air". The team already knows the condition behind the barricade and can enter the area. The team will locate "Dan Guy (U886)", the team captain will "DI" the location of the survivor. The team captain can continue examining the area while the miner is being examined. The team will identify "Caved Tight", the team will "DI" the caved area as their FPA. The miner is not injured and can walk out with the team. 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 as needed, pumped the water, located all missing miners, and brought two of them out alive.

THE END!

2022 National Contest
Placard Map



2022 National Contest
Construction Map