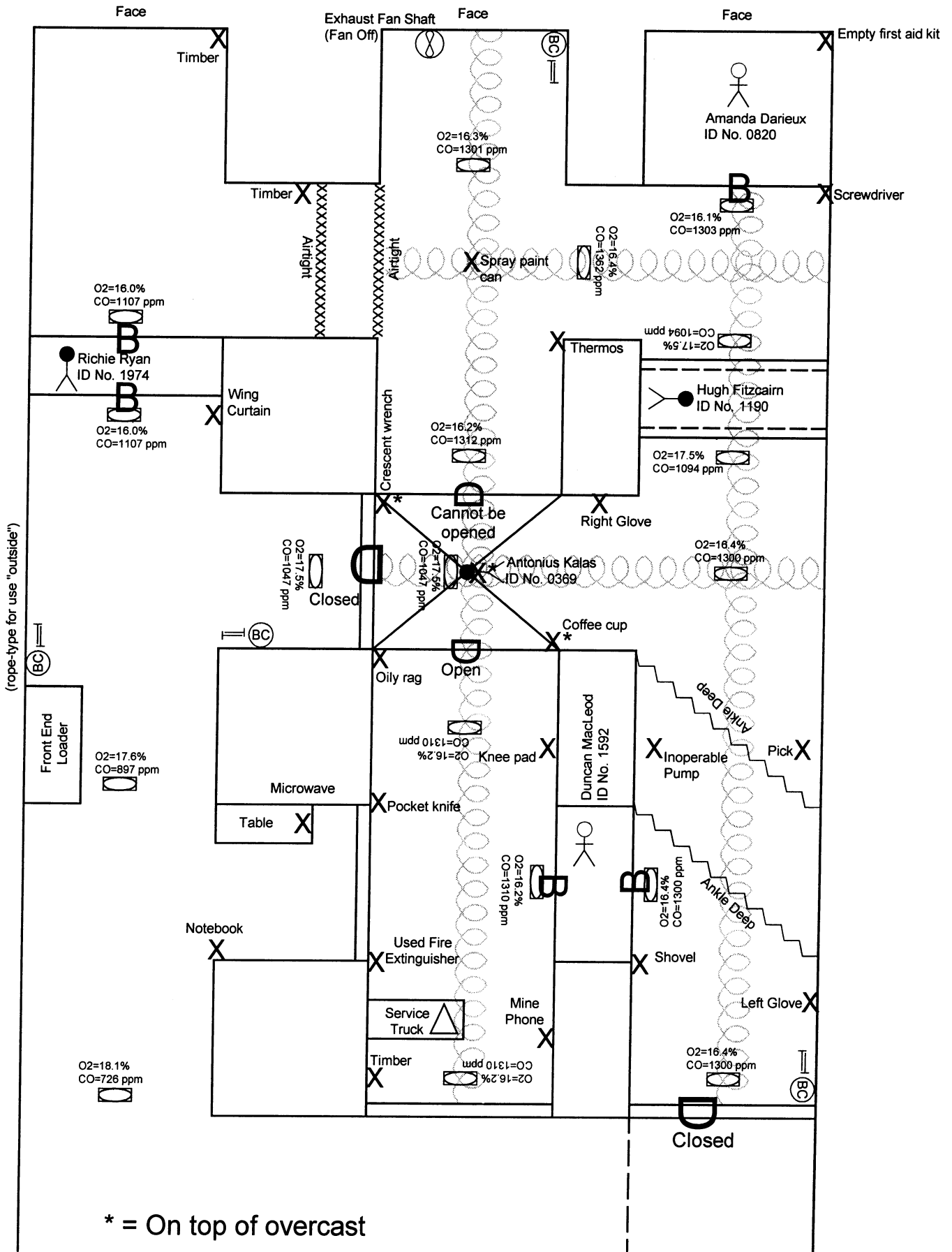
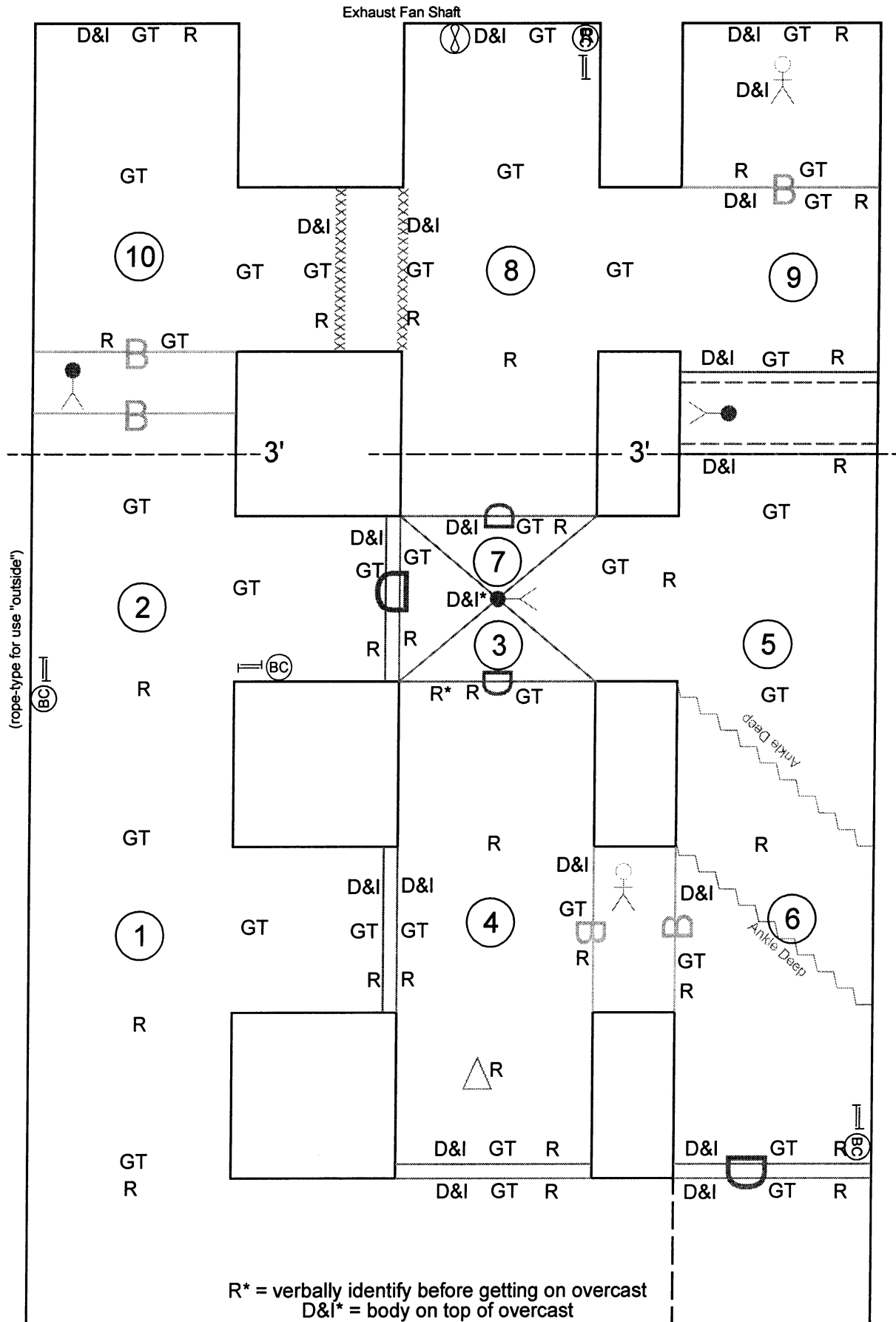


PROBLEM MAP

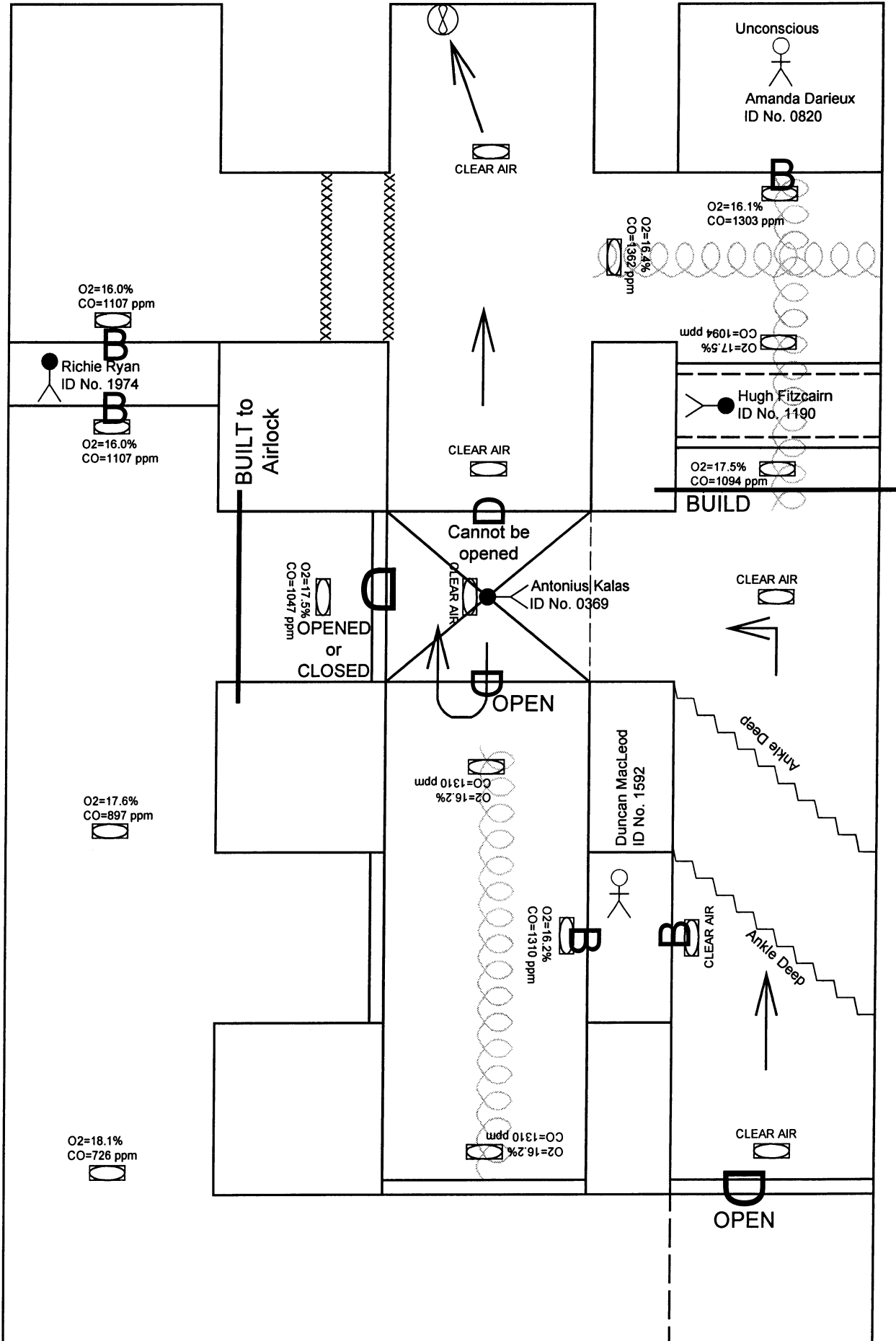


EXPLORATION MAP

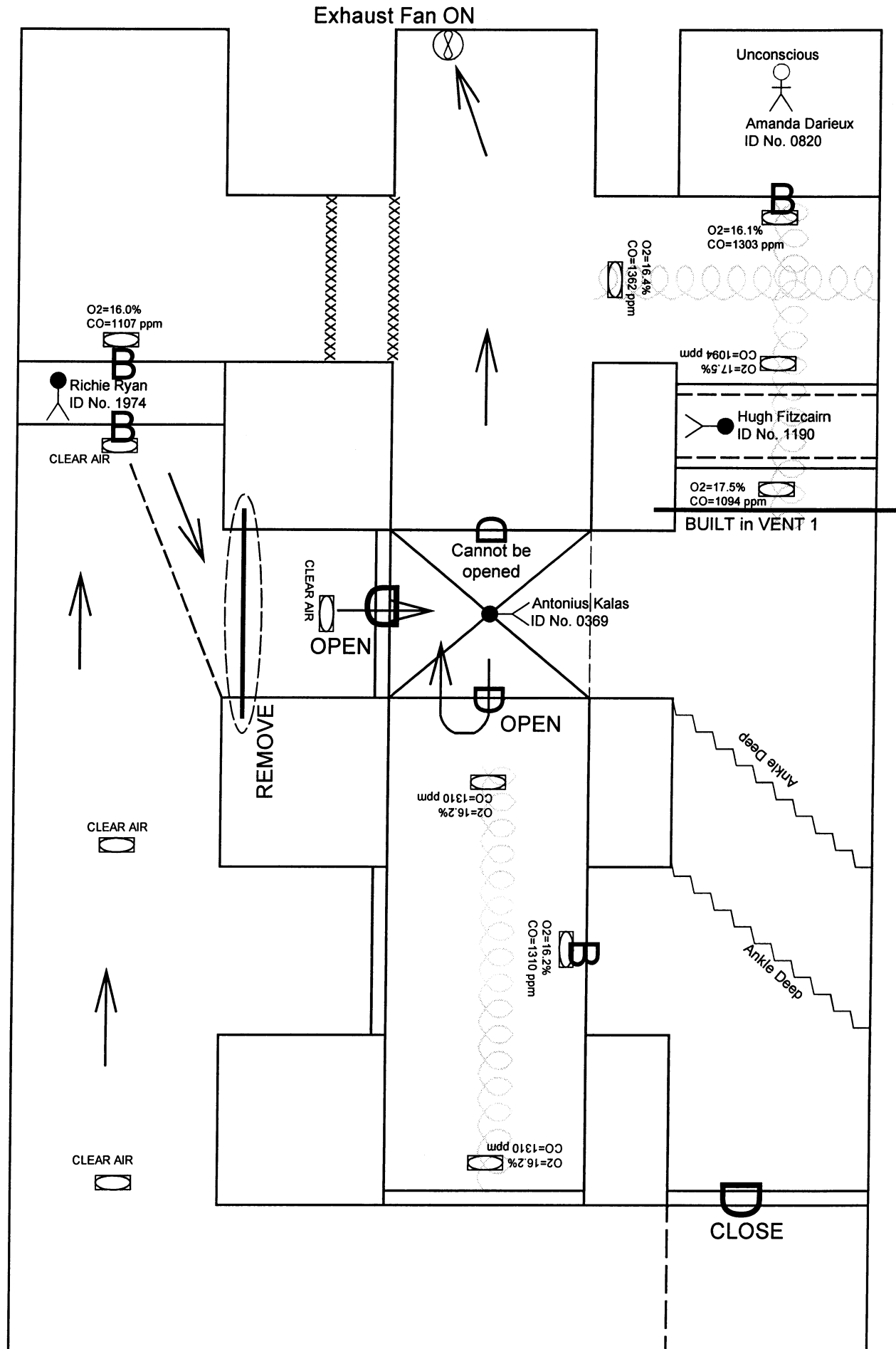


VENTILATION 1

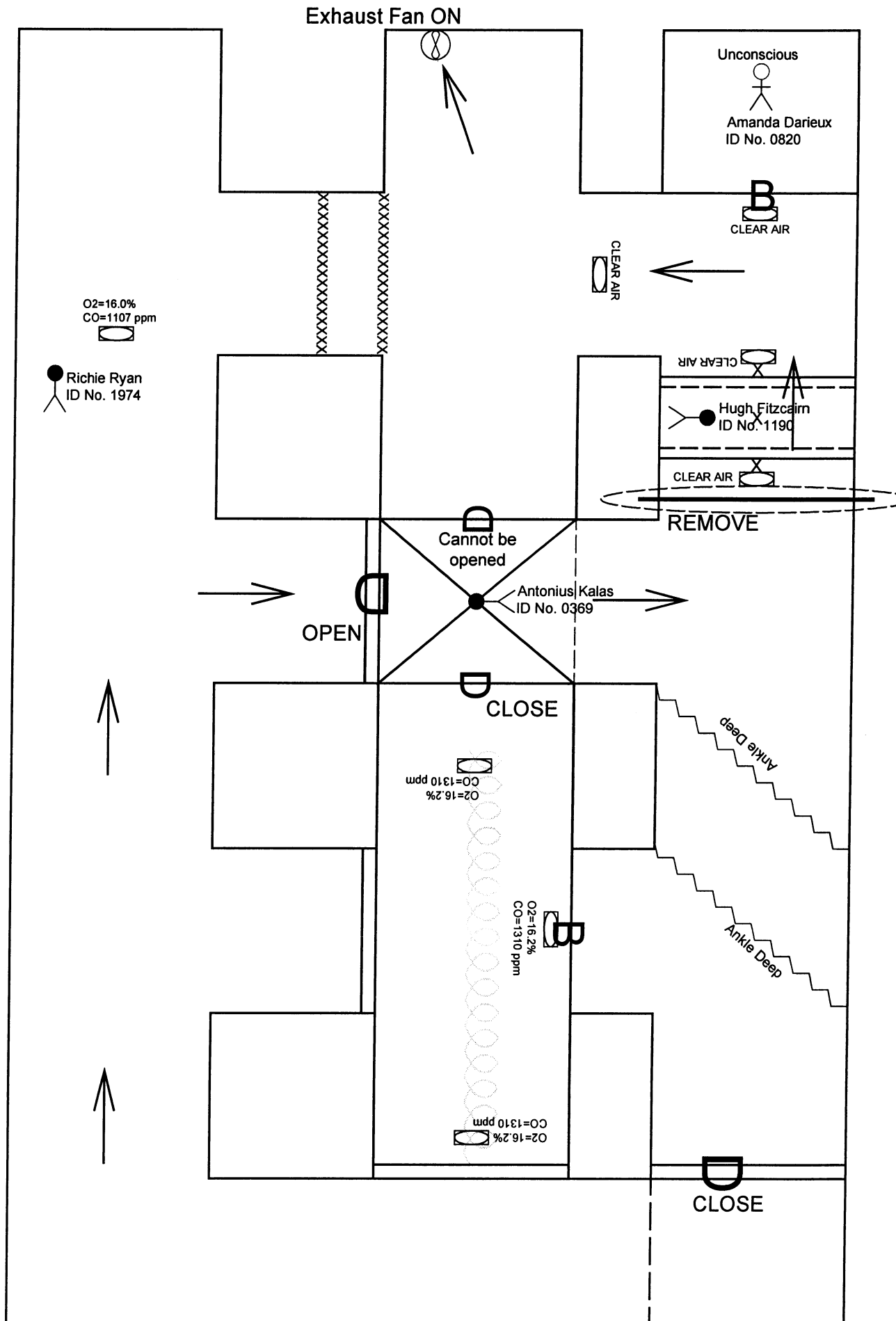
Exhaust Fan ON



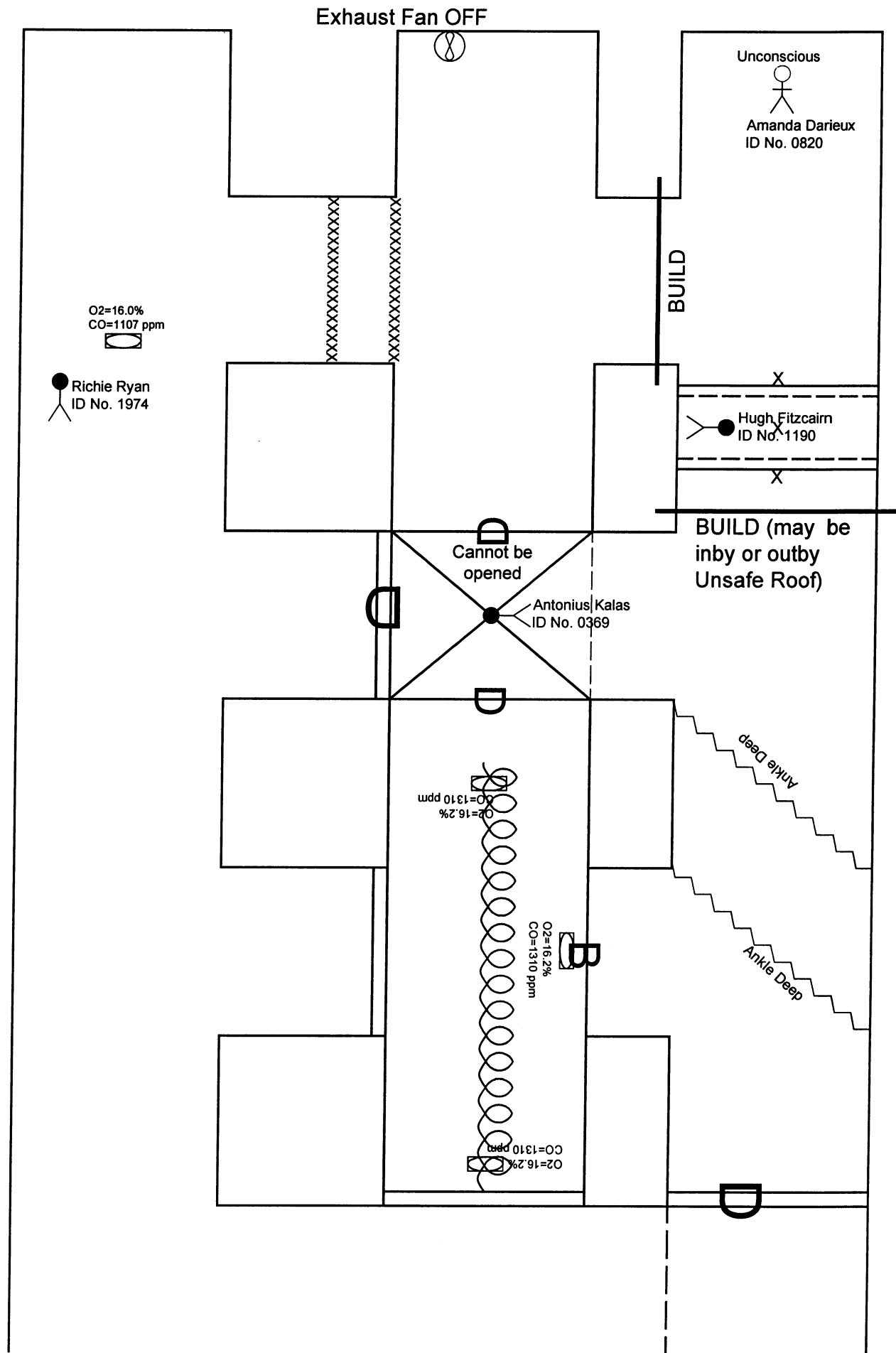
VENTILATION 2



VENTILATION 3



BREACHING DRIFT #3 BARRICADE



Briefing Statement

My name is _____ and I am the mine manager of the Highlander Mine.

You are standing at an established fresh air base on the surface of the Highlander Mine.

Six miners were performing general maintenance in the mine last night. At approximately 10:00 p.m., 2 miners came out of the mine and reported seeing flames and smoke. One of these miners immediately left mine property while the other went back in the mine to help. No one else has entered the mine since the miner went back in, and no one else has come out of the mine. We have not been able to communicate with anyone in the mine and don't know what has happened.

The Highlander Mine is a Category VI mine with no history of liberating any explosive gases. There are some areas of bad roof and we occasionally have water issues.

I will provide you with a mine map that was updated yesterday. There are 3 drift openings into the mine from the surface and 1 exhaust fan shaft. Drift #3 is being mined toward some old abandoned workings but I do not know if these workings were inadvertently intersected or not.

The exhaust fan is currently off and I can have it turned on and off as you need. The exhaust fan shaft has been examined at the surface and explosive gases were not found. Guards have been posted on the surface at the fan.

There is no power to the underground portion of the mine at this time.

The local, state, and federal agencies were notified and are on site.

All materials necessary to complete the problem can be found in the mine.

You will be the first team to enter the mine since the incident was reported. I need you to explore and map all safely accessible areas, to account for all missing miners and call out their names and ID numbers to the surface when found, and to bring all survivors to the surface. A back-up team has assembled on-site and will replace you in 90 minutes.

Good Luck!

Mine Rescue Problem

You have 90 minutes to:

1. Explore and map all areas of the mine that are safely accessible
2. Account for all missing miners and call out their names and ID numbers to the surface when found
3. Bring all survivors to the surface

Captain's Briefing

Building Materials

Inside the simulated mine, including any "extensions" in place "outside" the simulated mine, builds must be made with brattice cloth and frames comprised of pogo sticks and curtain. If builds are needed anywhere else then the rope/ribbon type with hooks must be used.

The team can only carry 2 sets of building material at once. If present, the rope/ribbon type counts as 1 set of building materials.

Smoke

If smoke is in the simulated mine portion of the problem, it will be visible and placards are not used. Any visible smoke should be mapped accordingly.

If smoke is in the simulated mine portion, teams will need to keep up with where the smoke has been cleared during any ventilation changes because there will be no smoke placards to move or turn over. Following a ventilation change, any smoke that may be present in the ventilation path will be considered immediately cleared even if some smoke may still be visible.

Any smoke, if used, inside a barricade will not be part of the problem and should not be mapped.

Overcast

Any overcast that may be present can be crossed under and over.

Pillar Sizes

The pillars in this problem are smaller than normal. Please work the problem as if they are standard 20'x20' pillars.

Body/Person Placards

Each miner's identification will be on the back side of any Body or Person placard.

If you see a Body placard – assume injuries were obviously fatal and there is no need for assessment. ID will be on back of Body placard. BSI precautions must be used to touch a Body placard as if it is a person.

Maps

At the start you will be given 2 mylar maps. One is labeled **TEAM MAP** and the other is labeled **B.O. MAP**. The **TEAM MAP** is for using in the mine and the **B.O. MAP** is for the Briefing Officer at the FAB. Please make sure you give the maps to the right people. Please make sure you put your team working order number in the space provided at the top (**Team No. _____**) as well.

2017 Tennessee Region Mine Rescue Contest

Solution Steps

There are usually multiple ways to solve most mine rescue contest problems. This problem is no exception. Below are the steps for one way to solve this problem.

BEFORE EXPLORATION

Team Arrival

The team may string out their communication cable but no other work can be done until the clock is started (*Judge 1 – Surface Rule 9*). The team will line up and captain will introduce the team and remark, “We are here to offer our help. I have a fully equipped, properly trained, and physically fit mine rescue team and we are ready to do anything you may require in the rescue and recovery work at your mine.”

Briefing

The Mine Manager will indicate that they do need the team’s assistance and will read the “**Briefing Statement**” furnished in the team packet.

Starting the Clock

After the Mine Manager reads the “**Briefing Statement**”, the captain will start the clock and date the board (month, day, year, and team position number) (*Judge 1 – Surface Rule 8*).

Team Handouts

After the clock has been started the Mine Manager will hand the team a copy of the “**Mine Rescue Problem**”, the “**Briefing Statement**” two 11”x17” blank maps, and one 8.5”x11” inch blank map. These items are furnished in the team packet. The map for the Briefing Officer is marked B.O. The team map is marked TEAM.

Judges’ Maps

The team packet also includes blank maps for the judges to use for tracking team stops, gas tests, D&Is, roof tests, and ventilation.

Equipment Checks

Equipment checks are supposed to be conducted prior to the team reporting to the field and are not required to be made again. However, deficiencies with the team’s equipment identified by judges during the working of the problem should be discounted appropriately. (*See Judge 1 – Surface Rules 1, 2, 3, 4, 5, 6, and 7*). The team members will don their apparatuses and go under oxygen

Gas Box Testing Station

The team will find a gas box testing station at the fresh air base. A team member must use the team's multi-gas instruments to determine the gas concentrations in the unknown mixture. The team must provide its own calibration cap to report: oxygen (O₂), methane (CH₄), carbon monoxide (CO), and nitrogen dioxide (NO₂) concentrations.

- O₂ must be reported within $\pm 0.5\%$ of the actual value to be correct (*Judge 2 – Underground Rule 4(a)*).
- CH₄ must be reported within $\pm 0.2\%$ of the actual value to be correct (*Judge 2 – Underground Rule 4(b)*). An instrument with a catalytic sensor must be used to be within tolerance.
- CO must be reported within $\pm 10.0\%$ of the actual value to be correct (*Judge 2 – Underground Rule 4(c)*).
- NO₂ must be reported within ± 3 ppm of the actual value to be correct (*Judge 2 – Underground Rule 4(d)*).

EXPLORATION

Fresh Air Base

The captain will find a “Permanent Stopping” blocking advance in drift #2. The captain will find a “Permanent Stopping With Door” with the door in the closed position blocking advance in drift #3 (materials for airlocking in have not been found at this time).

The captain will date and initial (D&I) (*Judge 1 – Underground Rule 9*), perform gas tests (GT) (*Judge 2 – Underground Rule 1*), and verbally indicate he/she is checking the back or roof (R) (*Judge 1 – Underground Rule 8(b)(2)*) at the stoppings at drifts #2 and #3.

The team must “count off” before entering the mine for the first time at drift #1 (*Judge 1 – Surface Rule 10*). Hand or audible counting off is acceptable.

Team Stop #1

Upon entering the mine at drift #1, the captain will GT (*Judge 2 – Underground Rule 1*) and will find a gas placard (O₂=18.1% and CO=726 ppm).

The captain will verbally indicate he/she is checking the back or roof at the intersection before physically entering the area (*Judge 1 – Underground Rule 8(b)(1)*).

Apparatus checks will be made at Team Stop #1 (*Judge 1 – Underground Rule 3*).

The captain will break the plane of the intersection to the east and make a gas test (*Judge 2 – Underground Rule 1*).

The team will advance through the crosscut to the east. The captain will find a notebook, a table, and a microwave in the crosscut. A “Permanent Stopping” blocks advance to drift #2 and the captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at the stopping. The team will return to the intersection.

The captain will break the plane of the intersection to the north, make a gas test (*Judge 2 – Underground Rule 1*) and will find a gas placard (O₂=17.6%, CO= 897 ppm). A front-end loader is located along the west rib. Inby the loader is brattice cloth and frames (this is rope to be used outside the enclosed portion only!)

Team Stop #2

The captain will verbally indicate he/she is checking the back or roof at the intersection before physically entering the area (*Judge 1 – Underground Rule 8(b)(1)*).

The captain will break the plane of the intersection to the east and make a gas test (*Judge 2 – Underground Rule 1*).

The captain will break the plane of the intersection to the north and make a gas test (*Judge 2 – Underground Rule 1*). No team member can advance more than 3 feet north of the intersection at this time (*Judge 1 – Underground Rule 11*).

NOTE: The barricade in drift #1, the gas placard, and the wing curtain are more than 3 feet inby the intersection and are not “visible” at this time.

The team will advance through the crosscut to the east. The captain will find a gas placard (O₂=17.5%, CO=1047 ppm), brattice cloth and frames, and a “Permanent Stopping with Door” with the door in the closed position. The captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at the permanent stopping.

Using the brattice cloth and frames found in the crosscut, the team will construct a temporary stopping across the crosscut to form an airlock before opening the permanent stopping door (*Judge 2 – Underground Rule 10*). The captain will verbally indicate checking the back or roof before erecting the temporary stopping (*Judge 1 – Underground Rule 8(b)(3)*).

After constructing the airlock, the captain will open the door and will see smoke. All team members must be connected or have hold of the lifeline when entering the smoke (*Judge 2 – Underground Rule 9*). Before entering smoke, a personnel check must be made to assure all members are OK (*Judge 1 – Underground Rule 12*).

Team Stop #3 (under the overcast)

Before passing through the door, the captain must verbally indicate he/she is checking the back/roof (*Judge 1 – Underground Rule 8(b)(4)*). Upon entering drift #2 through the door, the captain will make a gas test (*Judge 2 – Underground Rule 1*).

All team members must remain connected or have hold of the lifeline (*Judge 2 – Underground Rule 9*).

To the north, the captain will find that the inby overcast door cannot be opened. The captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at this wall.

To the east, the captain will break the plane of the intersection crosscut and make a gas test (*Judge 2 – Underground Rule 1*).

To the south, the captain will find an open overcast door. The captain will pass through the open door and check the back or roof (*Judge 1 – Underground Rule 8(b)(4)*) and will make a gas test (*Judge 2 – Underground Rule 1*). The captain will find a gas placard (O₂=16.2%, CO=1310 ppm).

The team will find an oily rag along the west rib near the overcast, a knee pad along the east rib, and a pocket knife on the west pillar corner on the south end of the pillar while advancing to Team Stop #4.

NOTE: The overcast is traversable. The scenario above assumes the team will not cross the overcast at this time. If the team elects to cross the overcast at this time, no member can travel more than 3 feet north of the overcast (*Judge 1 – Underground Rule 11*). See Team Stop #7 for details regarding objects and actions related to crossing the overcast if the team crosses at this point.

Team Stop #4

The captain will verbally indicate he/she is checking the back or roof at the intersection before physically entering the area (*Judge 1 – Underground Rule 8(b)(1)*).

All team members must remain connected or have hold of the lifeline (*Judge 2 – Underground Rule 9*).

A “Permanent Stopping” blocks advance to the west and the captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at the stopping.

The team will find a used fire extinguisher on the pillar corner to the southwest. To the east, the captain will find a gas placard (O₂=16.2%, CO=1310 ppm) in front of the barricade. A conscious person behind the barricade to the east will yell, “HELP, HELP, GET ME OUT! I’M IN AN AIRTIGHT AREA BETWEEN 2 BARRICADES!” when the captain checks the barricade. The captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at the barricade. The person cannot be rescued because the barricade must be ventilated and it is not possible at this time. Any attempt to rescue the survivor without ventilating the barricade may result in the death or injury of the survivor (*Judge 1 – Underground Rule #18*).

To the south, the captain will find a “Service Truck” on fire. A fire extinguisher must be used to put the fire out without undue delay (*Judge 1 – Underground Rule 13*). The captain will check the back or roof at the fire location (*Judge 1 – Underground Rule 8(b)(5)*). **NOTE:** *The smoke machines need to be turned off as soon as the fire is extinguished.*

The team will find a mine phone east of the fire location and a timber south of the “Service Truck”. A “Permanent Stopping” prevents additional advance south in drift #2. The captain will D&I (*Judge 1 – Underground Rule 9*), GT (*Judge 2 – Underground Rule 1*), and R (*Judge 1 – Underground Rule 8(b)(2)*) at the