



Kansas “Shoot-out”

Regional Mine Rescue
Competition

Hutchinson, KS

July 17-20, 2023

Day 1 Problem

Welcome to the Volunteer Mine, I'm the mine superintendent, and on behalf of everyone here, I would like to say thanks to your team for answering our call for help. You are located here on the surface in the mine office where this fresh air base has been established. Last night around 11pm, 12 of our employees entered the mine via the primary hoist cage. Six of these employees were assigned to work on level 1. The other 6 employees were assigned to work on level 2. Around 2am, the skip hoist operator located here on the surface started lowering the skip cage into the mine with boxes of supplies, and diesel fuel on board, while our employees awaited at the landing of both levels. The cage had lowered approximately 30feet past the surface collar when employees awaiting at the landing gates started smelling something burning. Our employees on both levels started communicating with the hoist operator via the phones provided at both shaft landings. Telling the hoist operator, they were smelling what appears to be something burning in the downcast shaft. The hoist operator immediately stopped the descent of the cage and tried to pull it back up. The hoist started raising the cage and then suddenly stopped at approximately 15ft inside the downcast shaft. The employees on both levels then communicated with the hoist operator telling him they were going to close the fire control doors throughout their respective levels as trained to do so by the evac plan. This was the last communications we have had with these employees underground. The skip hoist operator called the emergency hot line to report the incident while myself and others here on the surface started spraying water on the skip hoist cage from the surface landing. After several countless hours of fighting the fire, it appears we have extinguished all flames. The skip hoist remains down due to an electrical issue. Gas readings are being monitored at the main hoist upcast shaft, the readings currently are 0%Ch4, 0ppmCO, 20.7%O2, and 0ppmNO2. We believe our employees were able to close the doors on their respective levels, causing the ventilation path through these two levels to cease. This being accomplished would have allowed all fire gasses to flow through level 3, which then would have been upcasted out of the mine via the upcast shaft. If the doors were closed by our employees isolating them inside their respective levels, may also explain why they cannot communicate with us now, being the only phones on each level are found at the shaft station landings.

Let me tell you a little about our mine. This mine had set idle for months due to loss of sales. In the pass week, we started back underground to do rehab work, cleaning up falls, scaling on bad ribs, and re-supporting the back in some areas. Volunteer mine is a 3-level shaft mine. The mine has a primary escape hoist located at the primary upcast shaft. This hoist cage will accommodate 18 persons, and from the surface can reach level 1 in 10 seconds, level 2 in 20 seconds, and level 3 in 30 seconds. Though currently down, the mine has a secondary escape skip hoist located at the secondary downcast shaft. This hoist cage will accommodate 6 persons, and from the surface can reach level 1 in 10 seconds, level 2 in 20 seconds, and level 3 in 30 seconds. Currently we are a category V-I mine: Under CFR 57.22004; the presence of methane has not been established and are not in another category or subcategory. We comply with CFR 57.11050(a) having two escape ways to the surface from the lowest level. Currently the mine does not provide refuge under CFR 57.11050(b). During our last fire drill, we were able to have all our employees out of the mine in 55 minutes. As you know the secondary escape hoist is down currently, but the main fan located at the secondary downcast shaft is running and is being monitored and guarded by your back-up team here on the surface. As stated, the main fan is running and due to our mine being a shaft mine and the fan cannot be reversed, and we are unable to have all our employees out of the mines in 10 minutes, we have control doors installed throughout each level as required by CFR 57.4760(a). We also have between level 1 and level 2 an upcast winze as seen on our escape maps. The mine is walking height and 6-foot rock bolts are installed on each level. The map is up to date, and there is no other mines or mining in this area. The mobile equipment used underground have engines powered by diesel. No alternating current is currently used underground. The battery's located on equipment would be an ignition source and cannot be removed from the machine or disconnected.

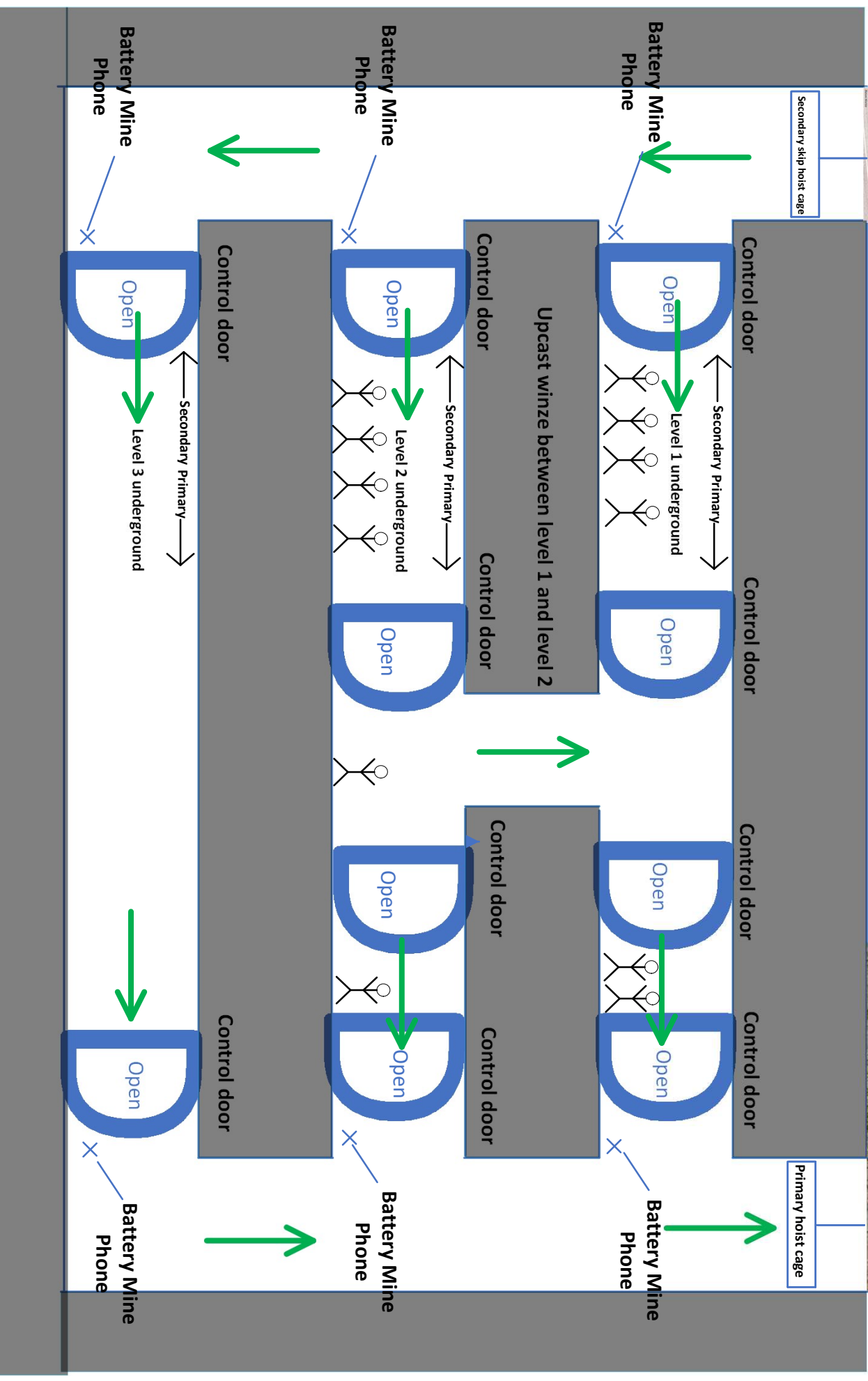
Your team instructions.

Your team has 75 minutes to complete the following task. Travel into the mine via the primary escape hoist to level 1, explorer the entire level if it can be done safely, account for our six employees on level 1, bring survivors to the fresh air base located here on the surface. The team may carry only 3 brattice cloths, 1 line curtain, and 8 timbers as you travel through the mine. Mobile equipment cannot be moved by your team as found in the mine. If your team encounters a roof fall, it cannot be moved by your team. If your team encounters unsafe roof, unsafe ribs, or overhanging brows they will not be scalable by your team. All materials needed to work the problem will be found in the mine.

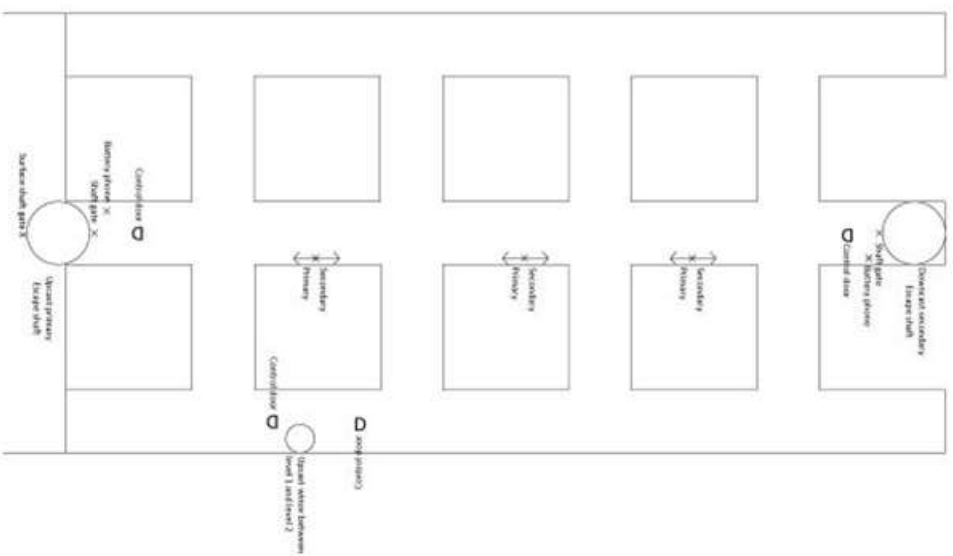
All agencies are present at the mine, and we have a back-up team here on the surface, the backup team is limited to the following work, monitoring the main fan and monitoring the skip hoist cage resting in the shaft for flare up of flames.

Good Luck.

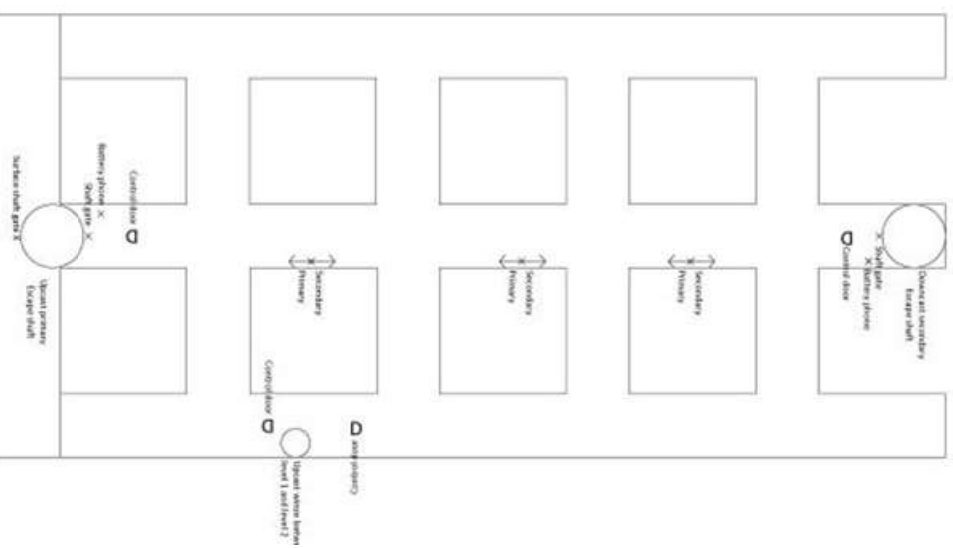
Mine office + primary hoist + Upcast primary escape shaft



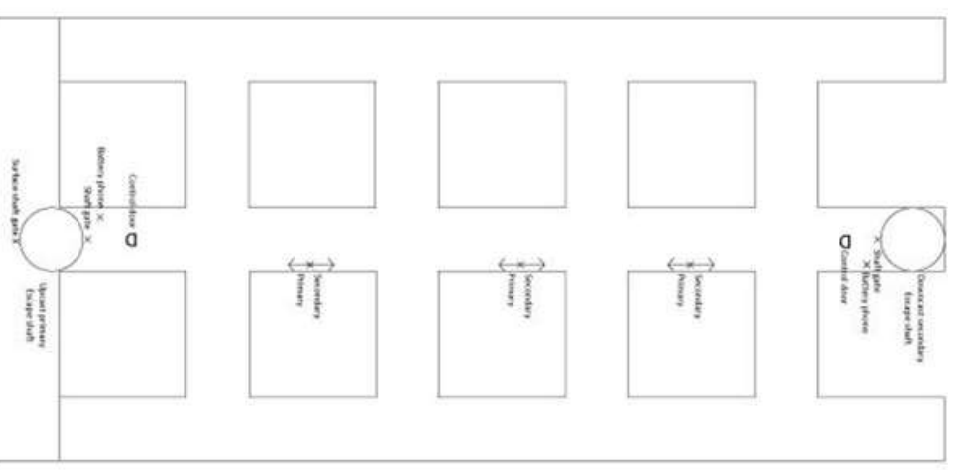
Level 1 Plan View Escape-Map



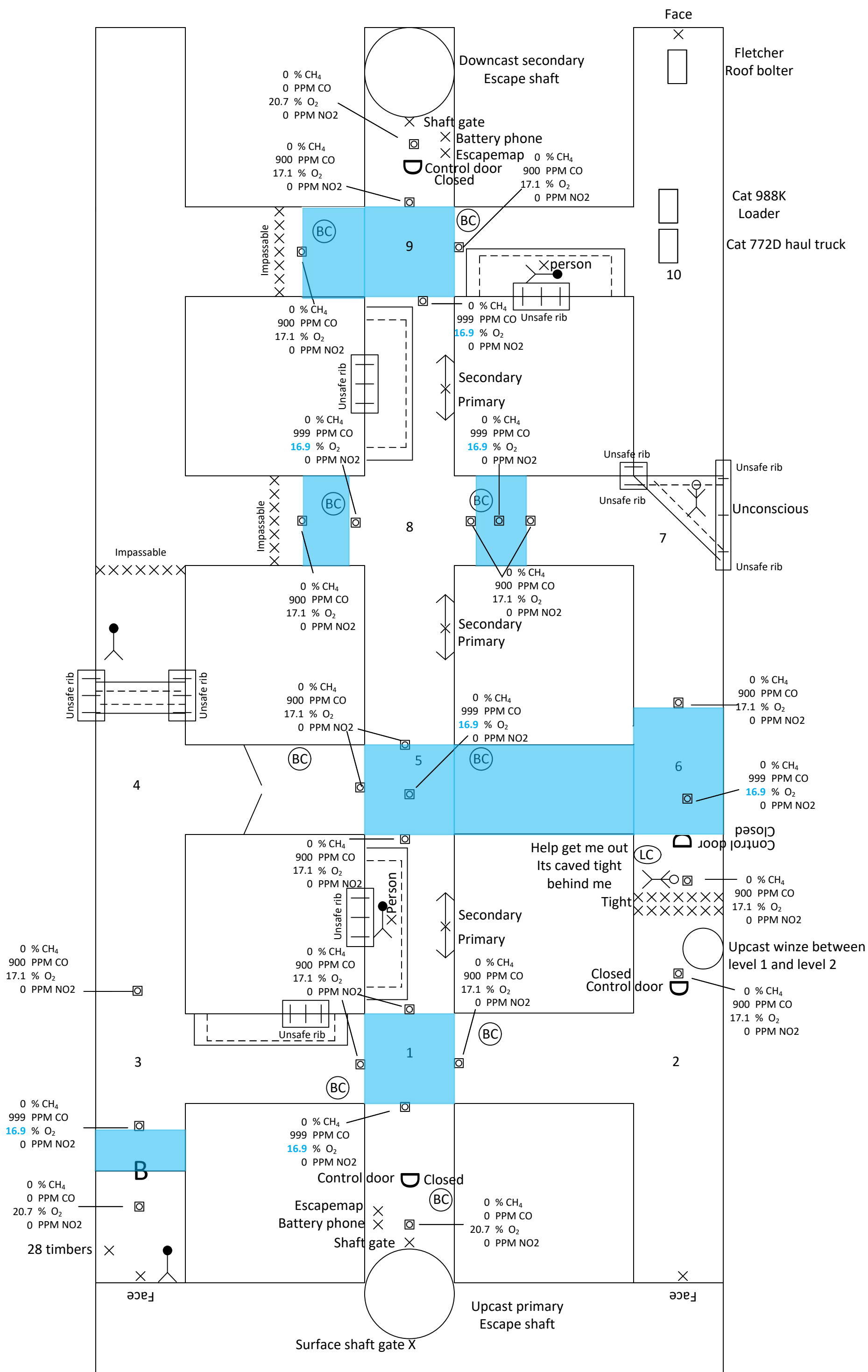
Level 2 Plan View Escape-Map



Level 3 Plan View Escape-Map



Problem Map Day 1



Welcome to Day 1, mine rescue field problem.

Prior to reporting to the field each day, the team will be given a briefing, therefore reading the team statement to the team is not necessary when they reach the field.

The communication cable can be strung out prior to starting the clock, and if Visio is used the SD card will be given to the command center attendant during this time for loading. If radios are used by the team, the team must provide the #1 judge with a radio.

Each day when the necessary introductions have been made. **The #1 judge will state' I have no new information to provide your team'.**

The captain must start the clock prior to receiving the problem and the maps.

Team will go under oxygen,

The team is now ready to start underground.

Judge 1 surface rule 10

Failure of team to count off the first time in the mine and last time out of the mine.

The cage will always be on the level the team is located on. 10 seconds up or down each trip used by the team. **#1 judge will tell the team after 10 seconds they are up or down.**

Judge 1 underground rule 6

Failure to use posted hoisting signals.

Judge 1 underground rule 10b1

The team must check the shaft for possible damage, or presence of fire or flooding.

The team may place a dry sheet of paper or other dry combustible material on the cage and send down to level 1 to check for presence of fire or flooding. When the material used is brought back to the surface the **#1 judge will tell the team the shaft is clear to level 1.**

The team has reached level 1 landing.

Judge 1 underground rule 7

Failure to close shaft station gate.

Judge 1 underground rule 3

Failure of team to stop at the shaft station landing to perform apparatus checks, team must be off the cage.

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at the shaft station landing.

Judge 2 underground rule 1

Gas test at closed control door.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the closed door.

Judge 2 underground rule 10

The team would be required to build a temporary stopping before opening the closed control door.

Judge 1 underground rule 8b3

The captain must verbally indicate he or she is checking the back or roof prior to building the temporary stopping.

Judge 2 underground rule 1

Gas test must be made when control door is opened.

Judge 1 underground rule 8b4

The captain must verbally indicate he or she is checking the back or roof upon passing through the control door.

Blue areas on the map show the IDLH, irrespirable gas extent. 16.9% oxygen is an IDLH atmosphere and will be used throughout the mine level as the irrespirable atmosphere.

Stop #1

Judge 2 underground rule 1

Gas test in each opening.

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground. Elongated unsafe roof with unsafe rib in the crosscut leading to #1 drift and in the #2 drift.

The team will be in visual contact with a person placard located in the elongated unsafe roof in the #2 drift. The person placard is located with an unsafe rib directly behind the placard. If the captain elects to travel into the unsafe roof from the side, a minimal of 4 timbers shown in red on the timber map must be set prior to checking the placard. If the captain elects to travel down the unsafe rib line to check the person placard, additional timbers shown in blue must be set to reach the person placard safely. Once the team has contacted the person placard by touch, **the #1 judge will tell the team it is a body.** No mapping orientation will be required at this body

Judge 1 underground rule 10a5

Team members contacting the employee's body must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of employee's body.

Stop #2

Judge 2 underground rule 1

Gas test in each opening, at the closed door, and at the face.

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections, and at face areas.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at face and close door.

Judge 1 underground rule 11

The area behind the closed control door and winze must be made before breaking the two plus three limit.

Judge 2 underground rule 10

The team must build a temporary stopping before opening the closed control door.

Judge 1 underground rule 8b3

The captain must verbally indicate he or she is checking the back or roof prior to building the temporary stopping.

Judge 2 underground rule 1

Gas test must be made when control door is opened.

Judge 1 underground rule 8b4

The captain must verbally indicate he or she is checking the back or roof upon passing through the door.

Judge 1 underground rule 10a3

Each team member traveling over the upcast winze between level 1 and level 2 which they could fall will be assessed 15 points each.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground, caved tight in the #3 drift.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at caved tight.

Stop #3

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening and at barricade.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at barricade.

There will be no response from anyone located inside this barricade.

Judge 1 underground rule 18a

The team may injure or result in the death of a survivor when breaching a barricade with an IDLH atmosphere outside.

Later when the barricade has been ventilated to remove the IDLH and the team is ready to enter the barricaded area. The team will find a body. Mapping orientation is required for this employee's body.

Judge 2 underground rule 10

The team must erect a temporary stopping prior to breaching the barricade.

Judge 1 underground rule 8b3

The captain must verbally indicate he or she is checking the back or roof prior to building stopping.

Judge 2 underground rule 1

Gas test must be made after breaching barricade.

Judge 1 underground rule 8b4

The captain must verbally indicate he or she is checking the back or roof upon passing through the barricade.

Judge 1 underground rule 10a5

Team members contacting the employee's body must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of employee's body and at the face.

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at face areas.

Stop #4

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground. Unsafe roof with unsafe ribs in the #1 drift.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at unsafe roof.

When timbers are found later.

Judge 1 rule 18 f, the team must first travel to each area of elongated and other unsafe roof areas they have already made visual contact with a person or person placard, they will set the required timbers at each of the location prior to traveling to this unexplored area behind the unsafe roof at stop 4. They will now set the required timbers to enter the unsafe roof with unsafe ribs, to continue their search for the last missing employee. A minimal of 6 timbers shown in red on the timber map must be set to safely travel through this area. The team will find an employee's body, mapping orientation is required for this employee's body.

Judge 1 underground rule 10a5

Team members contacting the employee's body must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of the employee's body and at the caved impassable.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground. Caved impassable in the #1 drift.

Stop #5

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening.

Stop #6

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening and closed door.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at close door.

A live conscious, walking, talking person/employee is located inside the closed door, and will state, "HELP GET ME OUT ITS CAVED TIGHT BEHIND ME". No mapping orientation required for the live standing person/employee.

The closed control door has an IDLH atmosphere, 16.9% oxygen located outside of it. The door is located right on the imaginary line of the intersection.

Judge 1 underground rule 18a

The team may injure or result in the death of a survivor when breaching a barricade with an IDLH atmosphere outside.

After ventilating later, no airlock will be required due to the person has told its cave tight behind him.

Judge 2 underground rule 1

Gas test must be made after opening the door.

Judge 1 underground rule 8b4

The captain must verbally indicate he or she is checking the back or roof upon passing through the door.

Judge 1 underground rule 10a5

Team members contacting the patient/employee must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of person/employee and at the caved tight.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground, caved tight in the #3 drift.

The team will now take the live, walking, talking employee to the surface.

Stop #7

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground, unsafe roof with unsafe ribs in the #3 drift.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at unsafe roof.

An unconscious live person/employee will be laying in the unsafe roof that has unsafe ribs on both sides, a minimal of four timbers must be set for recovery. Mapping orientation is required for the unconscious employee.

Judge 1 underground rule 10a5

Team members contacting the patient, employee must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of person, employee.

Judge 2 underground rule 12

An unconscious survivor/employee must be secured to stretcher by at least two bandages or straps, one around trunk of body and one around legs, covered with blanket, and placed so as not to crimp air hoses. Hands of unconscious person must be secured.

Judge 2 underground rule 13b

To properly protect an unconscious survivor/employee, an approved oxygen breathing apparatus equipped with a full face-piece must be used.

Stop #8

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground, caved impassable in the crosscut leading to #1 drift, and the elongated unsafe roof with an unsafe rib located in the #2 drift.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the cave impassable.

Stop #9

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections.

Judge 2 underground rule 1

Gas test in each opening and at the closed door.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground, caved impassable located in the crosscut leading to the #1 drift, and elongated unsafe roof with an unsafe rib located in the crosscut leading to the #3 drift.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the cave impassable and at closed door.

The team will be in visual contact with a person placard located in the elongated unsafe roof in the crosscut leading to the #3 drift. The same timber setting must be followed as addressed earlier. Once the team has contacted the person/employee placard by touch, **the #1 judge will tell the team it is a body.** No mapping orientation will be required at this body.

Judge 1 underground rule 10a5

Team members contacting the patient/employee must have on (BSI)

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at the location of the employee's body.

Judge 2 underground rule 10

The team must build a temporary stopping before opening the closed control door.

Judge 1 underground rule 8b3

The captain must verbally indicate he or she is checking the back or roof prior to building stopping.

Judge 2 underground rule 1

Gas test must be made when control door is opened.

Judge 1 underground rule 8b4

The captain must verbally indicate he or she is checking the back or roof upon passing through the door and at the shaft station.

Stop #10

Judge 2 underground rule 1

Gas test in each opening and at face.

Judge 1 underground rule 8b1

The captain must verbally indicate he or she is checking the back or roof at intersections, and at face areas.

Judge 1 underground rule 9

The captain must verbally indicate to the judges placing initials and date at face and unsafe roof.

Judge 1 underground rule 8a

The captain must indicate to the team he or she has recognized bad ground. Unsafe roof with unsafe ribs in the #3 drift.

The team is now ready to start ventilating.

Judge 1 underground rule 18b

Directing an IDLH atmosphere over survivor through a change in ventilation.

The first vent change is to remove the IDLH that was found in the intersection at stop #9. The team not knowing the location of all employees on level 1, must insure they erect stoppings to keep the IDLH from passing into areas that have not been explored in the #1 drift, and they must ensure they have stoppings erected to protect the employees they have made visual contact within the unsafe roof found at stop #9, stop #7, and stop #1. The first vent of removing this IDLH at stop #9 intersection will allow for the second vent change to clear the control door at stop #6 without endangering persons that are in the unsafe roof at stop #9 and stop #7. After second vent, has cleared the door found at stop #6 and the team has taken the employee to the surface, the team now has a line curtain to complete the last vent change of clearing the barricade they found at stop #3. After clearing barricade and air locking into the barricade at stop #3, the team will now have timbers to timber into persons they have made visual contact with first, prior to timbering into the area at stop #4, where they will locate the last missing employee on level 1.

If timbers are not properly set to safely enter an area as shown on the timber map.

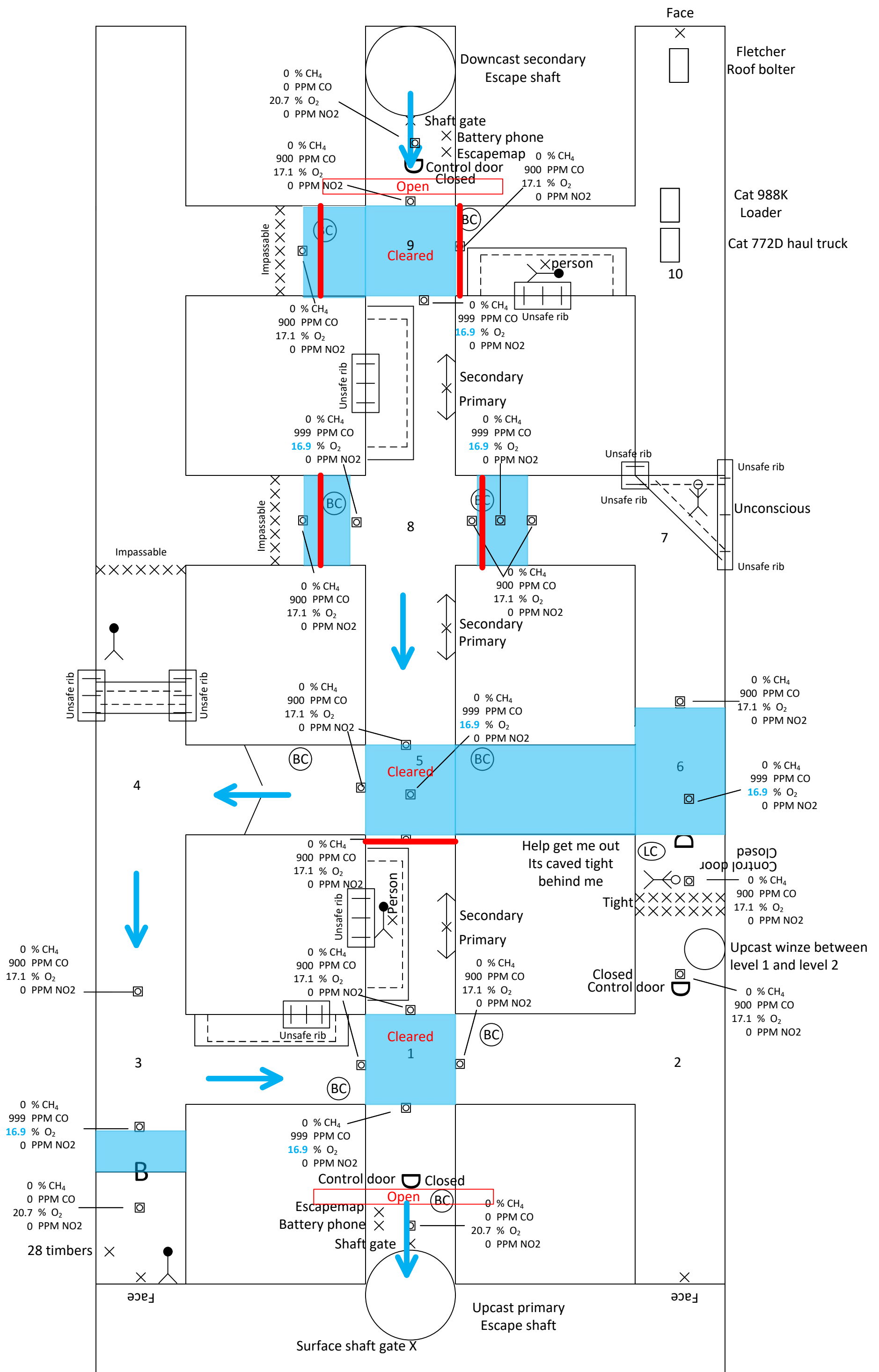
Judge 1 underground rule 10 a 1

15 points will be assessed for each team member who travels under bad roof or ground.

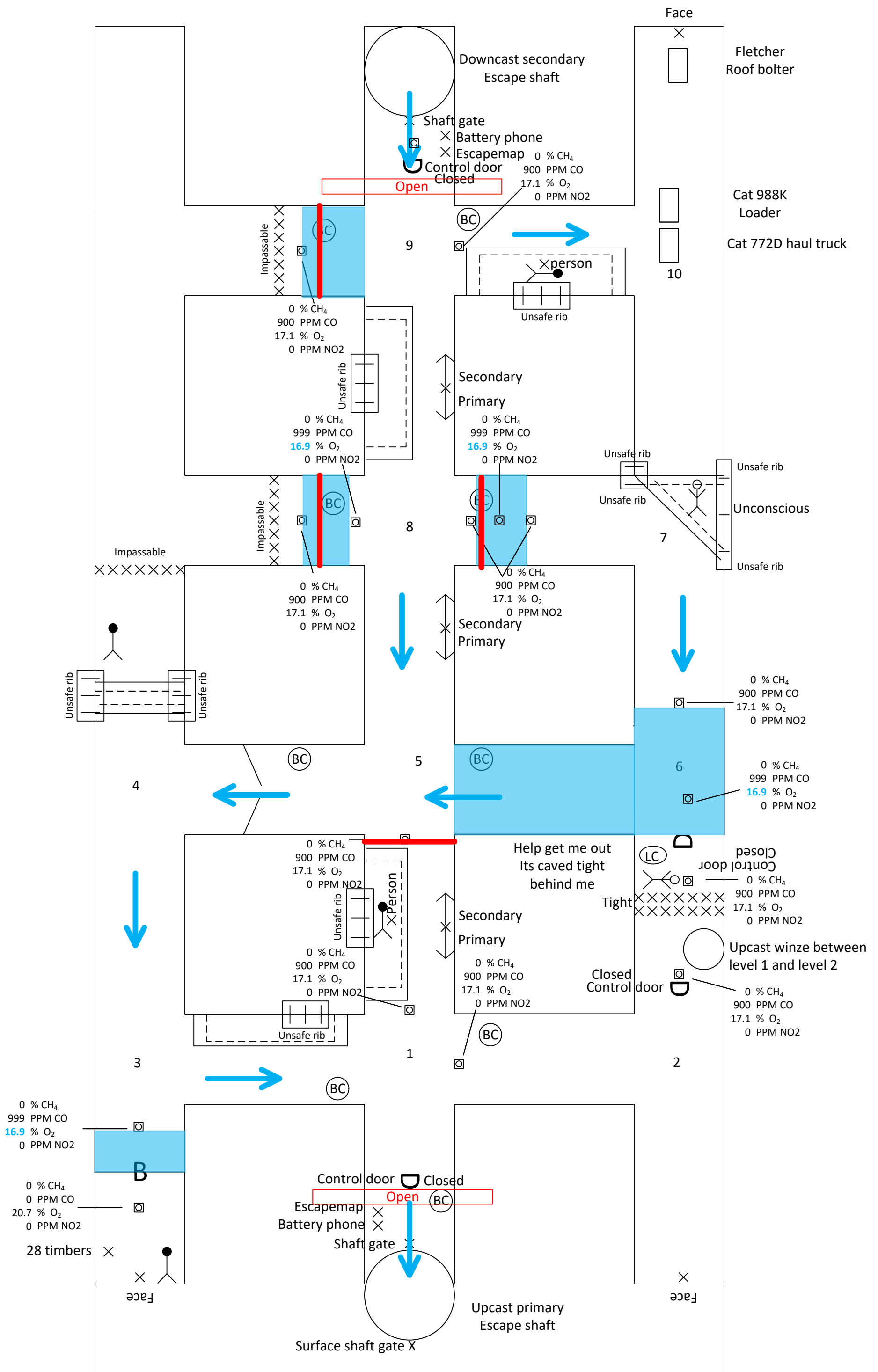
Judge 2 surface rule 6

If the team is still working and has not stopped the timing device at the fresh air base at the 75 minutes time limit, **The #1 judge will stop the team and tell them their time is up.**

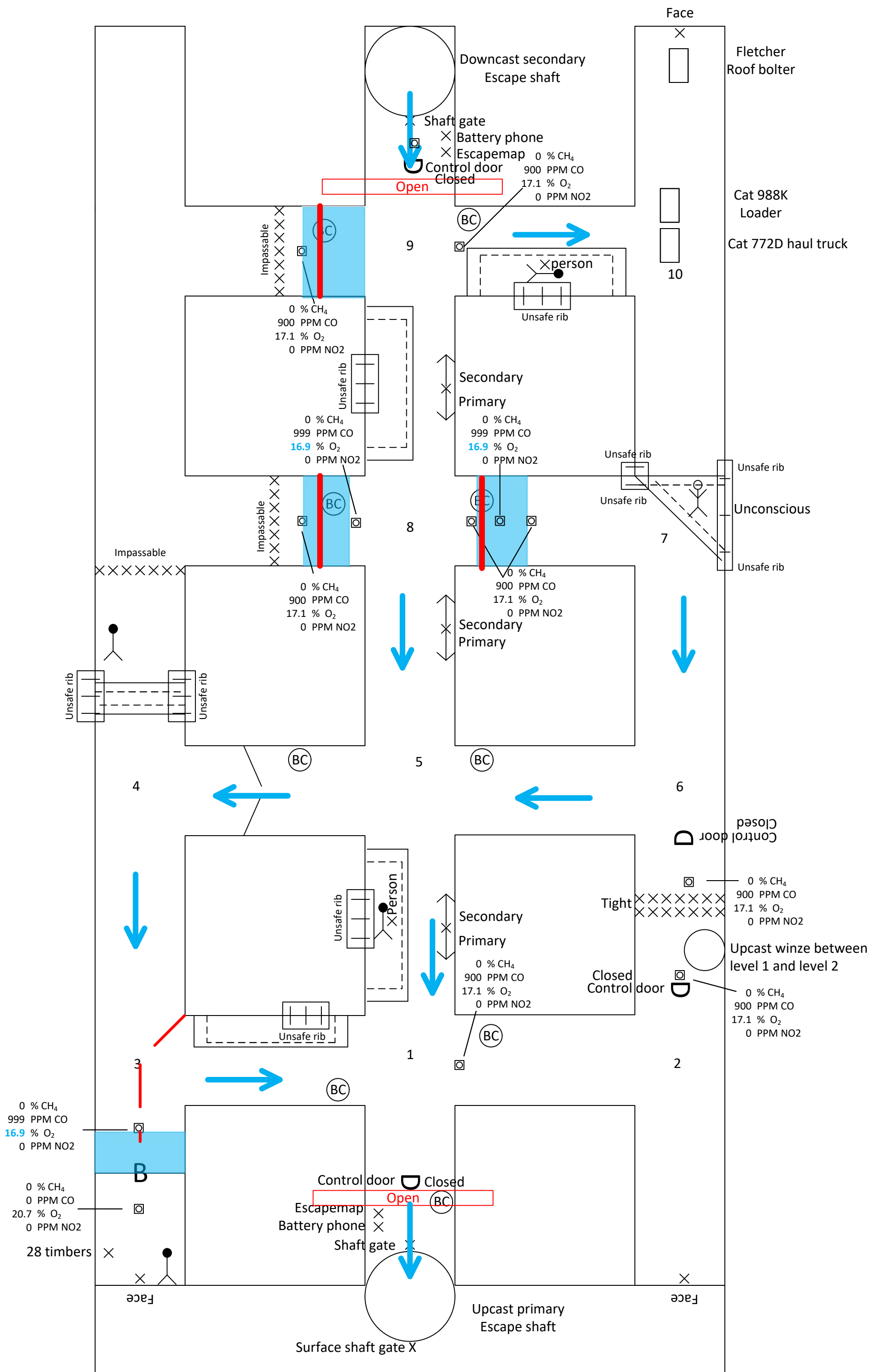
1st vent day 1



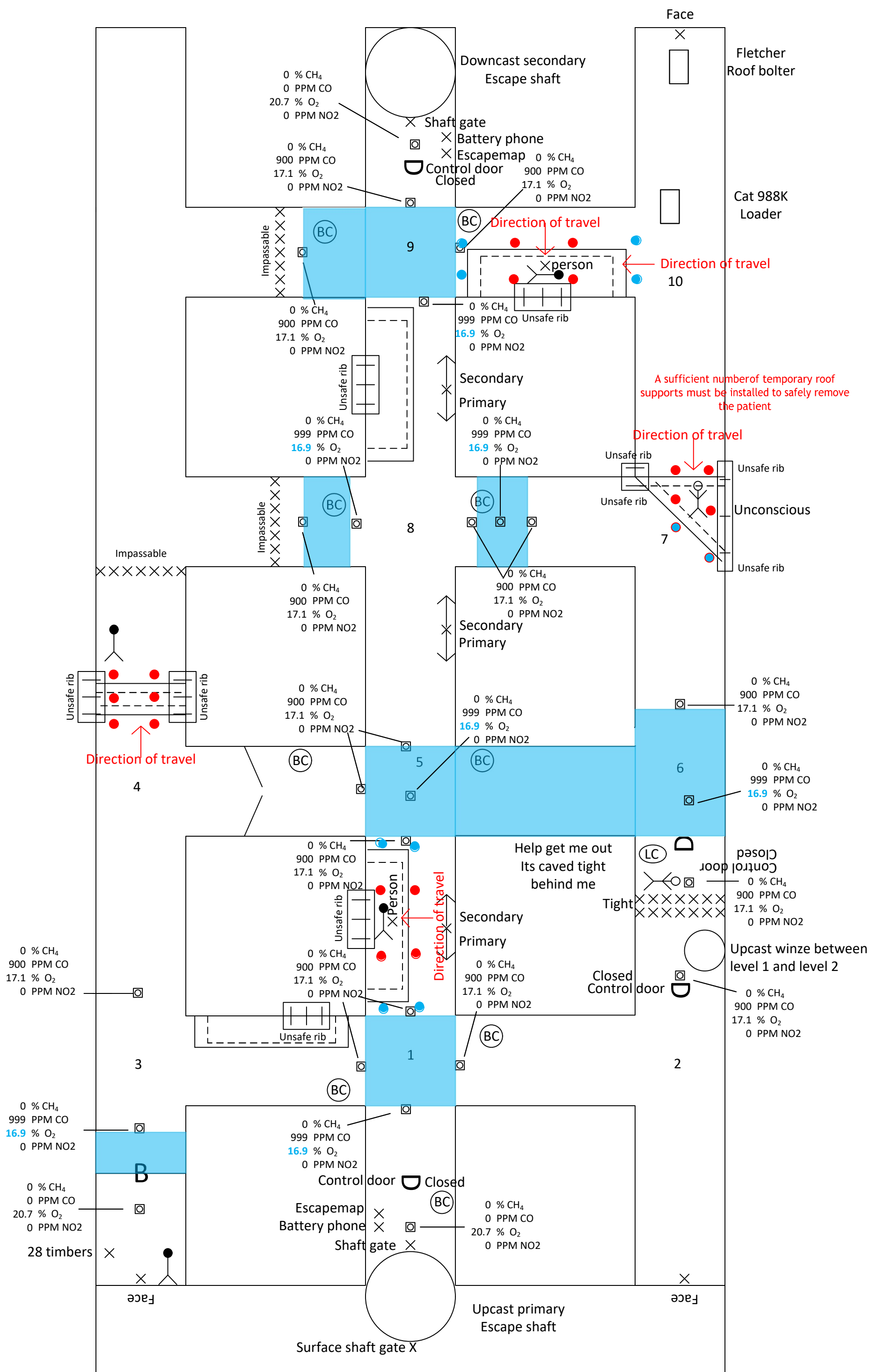
2nd vent day 1



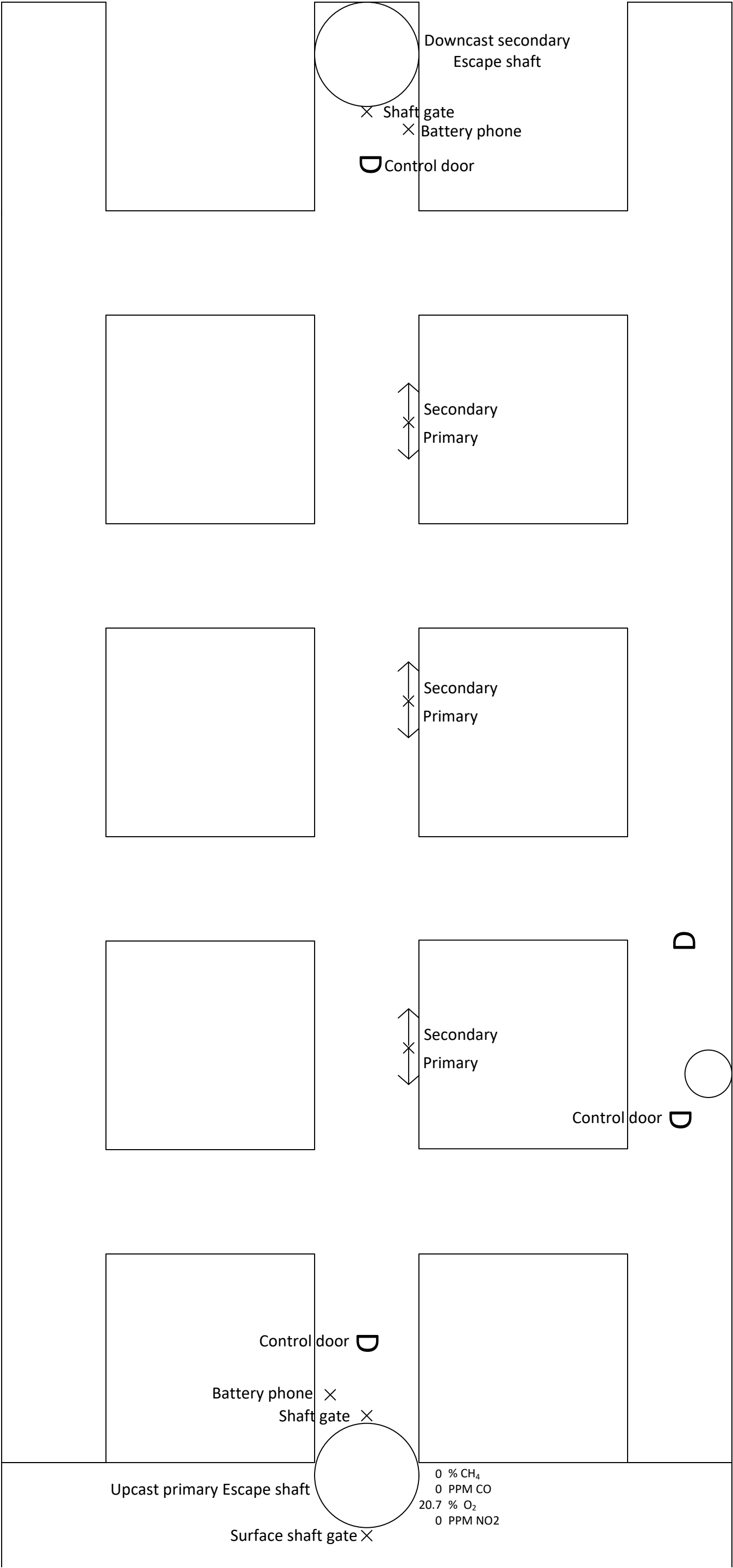
3rd vent day 1



Judge 1 underground rule 10.a.1. Team endangerment
15 points will be assessed for each team member
who travels under bad roof or ground;



Team map Day 1



Briefing Officer Map Day 1

