

# Alabama Coal Association 30th Annual Mine Rescue Contest



**May 17, 2006**  
**Bevill State Community College**



## STATEMENT

Good morning (afternoon). My name is \_\_\_\_\_ and I am the Mine Manager at the Sunshine Coal Company, Bright Star Mine. Thank each of you for coming to help us in our time of crisis.

This morning the 9 person day shift crew entered the mine at 7:00 a.m. as usual. The pre-shift had been called out by the owl shift section foreman. He had reported that there were no hazards observed. However, he stayed between shifts to do some repair work on a battery ram car and did not return to the surface. The day shift called out from the 1<sup>st</sup> Left Section and intended to produce coal shortly thereafter. At approximately 8:45 a.m., the owl shift foreman called outside and informed us that he had been working in the area of the power borehole in No. 2 entry and felt a concussion and was blown off his feet.

When he was able to come to himself he smelled smoke from inby and was going to check out the problem and would get back with the dispatcher on the surface when he determined what had occurred and if he needed assistance. Several attempts to reach him after that have been unsuccessful. A miner entered the No. 1 entry to attempt to find the crew and he encountered smoke and returned to the surface. We have established a fresh air base at this location and appreciate any assistance that you can render.

This mine has had numerous ignitions during the past several weeks due to our mining in an area prone to methane bleeders in the roof. We made an air change over the weekend and increased our air to the section and have been relatively successful in the methane control in the past few days. The mine is subject to areas of unsafe roof, accumulations of water and an uneven mine floor on a steep pitch. We have a pump system on the section. Power for the pumps is supplied from an 8 inch vertical borehole located in the

No. 2 entry approximately 3 or 4 crosscuts outby the face. This borehole has been plugged at the top and cannot be used for ventilation purposes. The sole purpose of the borehole is for transmission of power and monitoring of methane. The hole contains power cables for the water pumps and an intrinsically safe AMS line. Since the map that we have was updated 3 weeks ago, we are unsure of the exact location of the faces and the borehole. We do know that the borehole penetrated the coal bed within a pillar instead of in the entry and the continuous mining machine was used to slab a pillar so the borehole could be used for power. We were experiencing a lot of problems with methane accumulating in the borehole while drilling and there were several time periods when drilling was stopped due to explosive mixtures coming from the hole. Methane continued to be a problem once the hole penetrated the coal bed so we installed an AMS at the bottom of the hole to monitor the atmosphere within the hole. This AMS transmits data to the surface monitoring location and is monitored 24 hours per day. When the AMS indicates that the methane in the hole reaches 4% or greater, the power cable for the pumps is shut off and we do not energize the cable until the methane is less than 4%. This is the safety factor we have chosen for the mixture of methane in the hole to prevent more incidents in the borehole like we had during drilling. We will be monitoring the AMS at the bottom of the borehole at all times and will be giving you five minute updates of the methane levels for your information. The current readings from the AMS are as follows

CO equals 108 Parts Per Million

CH<sub>4</sub> equals 2.1%

O<sub>2</sub> equals 19.9%

You may assume, unless told otherwise, that readings given to you are valid until you receive new readings. For this reason, should you choose to energize the pump cable at any time the cable must be de-energized to prevent further ignitions or explosions within the hole once you have completed your task,

The areas outby this fresh air base have been explored by previous teams. You have a map of the explored areas of the mine. This map is up to date and all ventilation controls are shown as left by the teams. Air quantities measured by the teams are also shown.

Any work you require outby the fresh air base will be accomplished by making a request to the superintendent for the change to be made. The superintendent will then inform your briefing officer when the changes you request are complete. Placards will be changed to indicate the ventilation changes that you have requested if those changes affect ventilation inby this point.

We have a fan that is operating exhausting and air is entering the section in No. 1 entry and returning out the No. 3 entry. Entries are numbered left to right. All power inby this point is currently de-energized, including the borehole power cable for the pumps, except for the power to the intrinsically safe AMS line which must remain energized for the safety of you and the miners. You may request that power be restored at any time. All appropriate officials have been notified and are onsite to assist you if necessary. A back-up mine rescue team is available should you need assistance.

You may begin when you are ready.

# **PROBLEM**

**EXPLORE THE ENTIRE**

**MINE IF IT CAN BE**

**DONE SAFELY.**

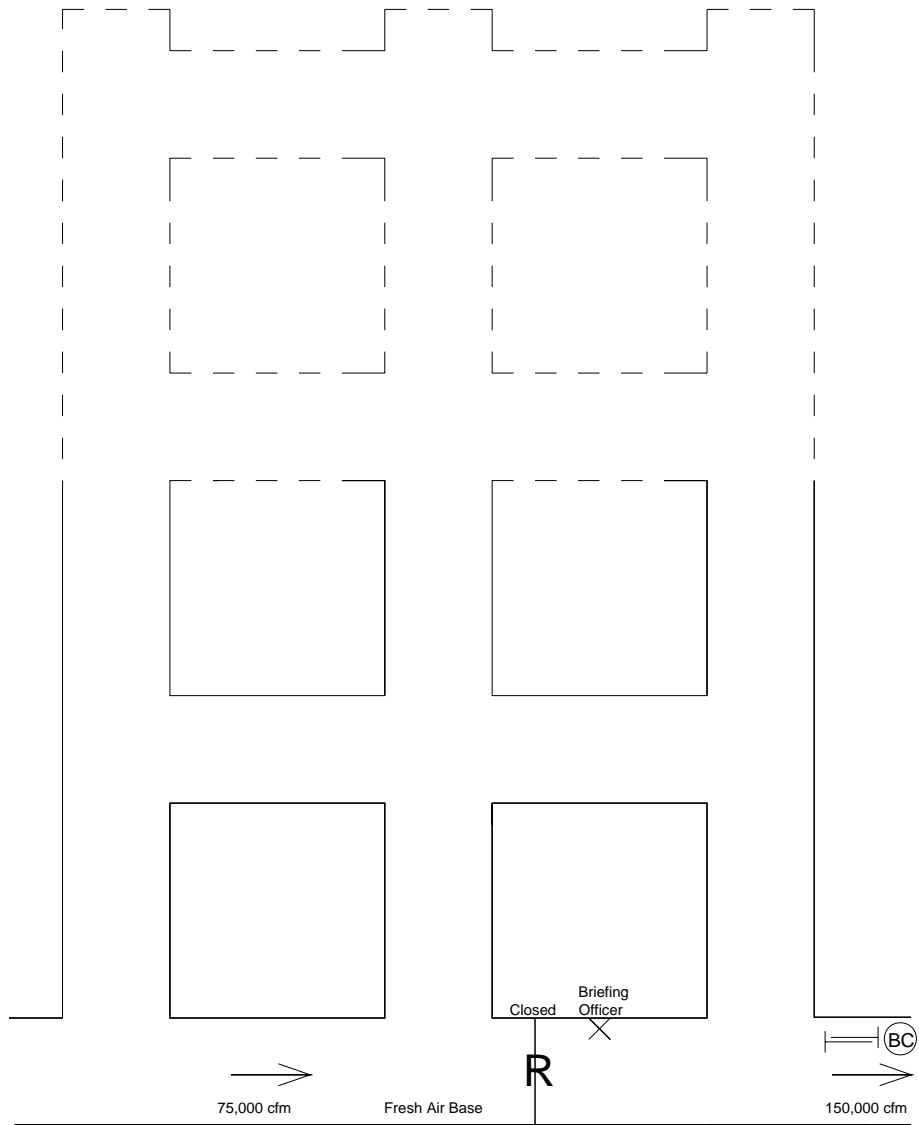
**LOCATE ALL MISSING**

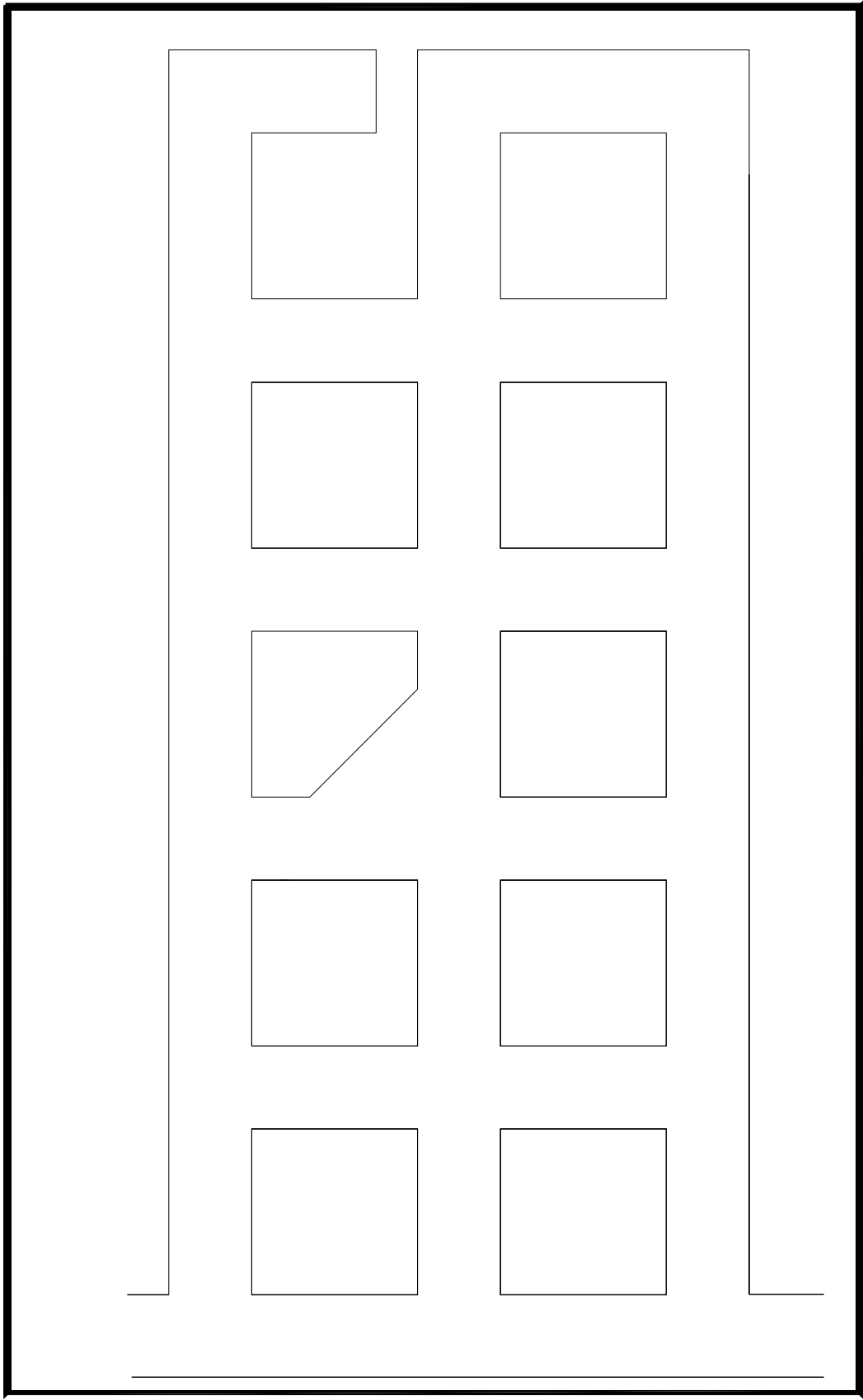
**PERSONS AND BRING**

**ANY SURVIVORS TO**

**THE FRESH AIR**

**BASE.**







## 2006 MINE RESCUE EXPLORATION

**NOTE TO JUDGES:** The team must set up their equipment on the same side of the regulator where the briefing officer is located. Make sure that they are guided through or around the regulator to facilitate this.

The team will begin to explore all areas of the fresh air base. In order to accomplish this, team must build airlock to enter the closed regulator to the left of the briefing officer. Completion of the exploration of the fresh air base may then be accomplished. Since there are no timbers for the unsafe roof inby the FAB in No. 3 entry, team may enter the section via either No. 1 or No. 2 entry. We will assume that team enters the section in No. 2 entry.

**TS-1** will be made in the 2-1 intersection. Team must make team check at this team stop. Examination will be made to the right toward No. 3 entry, inby in the No. 2 entry and to the left into No. 1 entry right crosscut. Team may choose at this time to continue exploration into either crosscut since neither is blocked.

**TS-2** Assume that team continues exploration into No. 3 entry to the 3-1 intersection. They will examine outby in No. 3 entry to the inby end of the unsafe roof and make appropriate gas tests and roof tests. They will examine inby in No. 3 entry and make an appropriate roof test for the unsafe roof/rib. Team must then tie across into the No. 1 entry.

**TS-3** will be made in the 1-1 intersection. Team will tie outby in No. 1 entry and inby into the smoke. **NOTE: At this time all team members must remain on the lifeline as long as any team member is in the smoke.** Since Nos. 1 and 2 entries are contaminated inby the first line of crosscuts, exploration may continue in any entry (contaminated or adjacent). No. 1 entry is blocked by the water over knee deep, team may continue exploration to

**TS-4** in the 2-2 intersection. Team may examine to the left to the closed door in the stopping inby in the No. 2 entry including the area of the 8 inch borehole and to the right. Appropriate gas and roof tests will be required.

**TS-5** will be made in the 3-2 intersection through the blown out stopping. Team will complete roof test outby, if left incomplete from previous exploration, and inby in the No. 3 entry. Team may continue exploration in either No. 2 or No. 3 since No. 1 entry is blocked at this point.

**TS-6** may be made in the 2-3 intersection. Team will make all required tests to the left, to the right and inby. Team may continue exploration by attempting to tie across into the No. 1 entry through the curtain. They will encounter the unsafe roof to the left of the curtain and be unable to continue. Continued exploration will be toward the No. 3 entry to tie across.

**TS-7** will be made in the 3-3 intersection. Team will tie outby making appropriate gas tests and must make appropriate roof tests for the unsafe roof inby. Team will return to the No. 2 entry for further exploration.

**TS-8** will be made in the 2-4 intersection. Team will examine to the right to the barricade. There will be no response. Team will examine to the left to the No. 1 entry toward the area of the smoke and inby in the No. 2 entry. Team must continue to explore outby into the No. 1 entry which is unexplored.

**TS-9** will be made in the 1-4 intersection. Team will examine outby, making appropriate gas tests and will examine inby where they will encounter the battery ram car on fire. Team will extinguish the fire and continue to as far as they can while on the lifeline without advancing the No. 5 team member inby the inby corner of the intersection. This is because of the unexplored area outby in the No. 1 entry at the 1-2 intersection. Team would be appropriately discounted for unsystematic exploration in this case as referenced below.

**Rule 45E** – *Where crosscuts are blocked, the No. 5 team member may not advance beyond the inby corner of the second crosscut before the team ties across and/or behind into all accessible areas outby that crosscut. Where crosscuts are staggered, the second crosscut will be determined by two crosscuts on the same side, either left or right, in the entry being traveled. After the accessible areas outby are completely explored to the side*

*where the two crosscuts were determined, the team will be permitted to explore the original entry until it encounters the second crosscut to the other side. This may require building an airlock or ventilation controls such as a stopping, door, etc., or returning to the fresh-air base, and exploring into other entries at the discretion of the team and according to the conditions of the mine.*

**TS-10** will be made outby in the 1-3 intersection. Team will examine to the No. 1 end of the unsafe roof between No. 1 and No. 2 entry and make appropriate roof and gas tests. Team may then continue to explore outby.

**TS-11** will be made in the 1-2 intersection. Team will locate the unconscious victim inby the water over knee deep. **Keep in mind that all team members must still remain on the lifeline as they are still in smoke.** Team may remove the patient to the fresh air base.

**NOTE:** To accomplish the rescue of the unconscious patient, team may request that the No. 1 pump be energized. Should this occur, they would notify the briefing officer of the request and the briefing officer would then request that the pump be energized to the fresh air base judge. The request would immediately be granted and upon the pump being energized, the judges would immediately turn over the card indicating that the water is has been pumped out. The team may proceed through the water and outby in the No. 1 entry. Team may request that the briefing officer tear down the regulator at the fresh air base and short circuit the air straight across to facilitate communication with the briefing officer. This would require only that the request for an air change be made. Team may also decide to retreat with the patient the same way that they advanced into the area and return to the FAB in that manner. Team may then re-enter the section for continued exploration.

**TS-12** will be made in the face intersection of the No. 2 entry. Team may advance into the water ankle deep and through the water knee deep until they encounter the water over knee deep. Team may request of the briefing officer that that the No. 3 pump be energized in order to pump the water over knee deep in the face intersection of the No. 2 entry. Should this request be made, approval will immediately be granted by the fresh air base judge and the water would immediately be pumped out. The judges will turn over

the placard to indicate that the water has been removed. The team will then find the barricade from which there will be no response. Since the atmosphere in front of the barricade is not respirable, team is not able to breach the barricade at this point and must continue exploration.

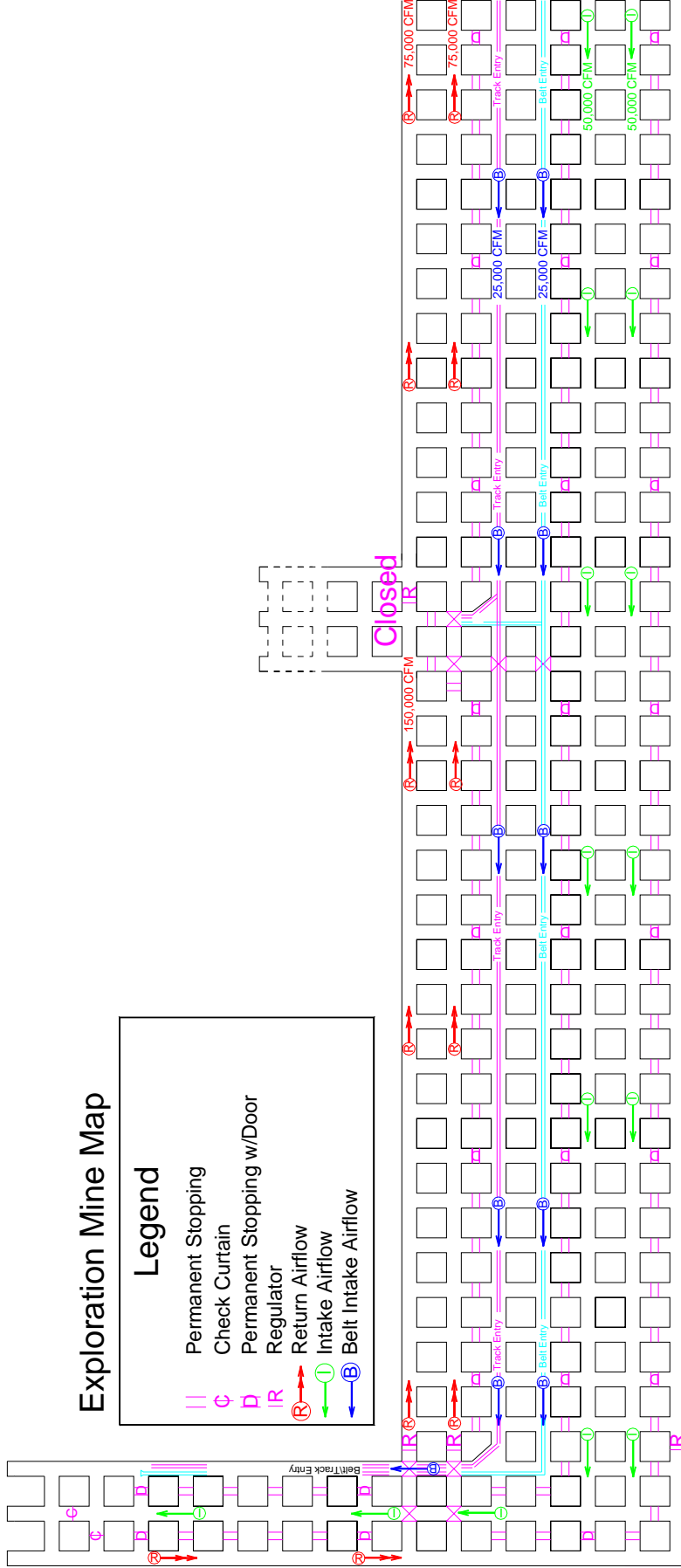
**TS-13** will be made in the face of the No. 1 entry. Team will make all required gas and roof/rib/face tests from this team stop. **Team must also remain on the lifeline as the smoke has not been cleared. Once this area has been explored, all areas of the mine that can be safely examined without setting timbers have been explored.**

Team has only located the three timbers from inby 1-4 intersection so they are unable to set the timbers through the unsafe roof outby 3-4 due to size. Team does not have enough line curtain to ventilate the barricade in inby 2-4 so they must attempt to ventilate the barricade in 2-4 right crosscut. **Team must keep in mind the location of the briefing officer and that the atmosphere at his location must remain respirable at all times.**

# Exploration Mine Map

**Legend**

- || Permanent Stopping
- ⊕ Check Curtain
- ⊕ Permanent Stopping w/Door
- IR Regulator
- Ⓡ Return Airflow
- Ⓢ Intake Airflow
- Ⓟ Belt Intake Airflow

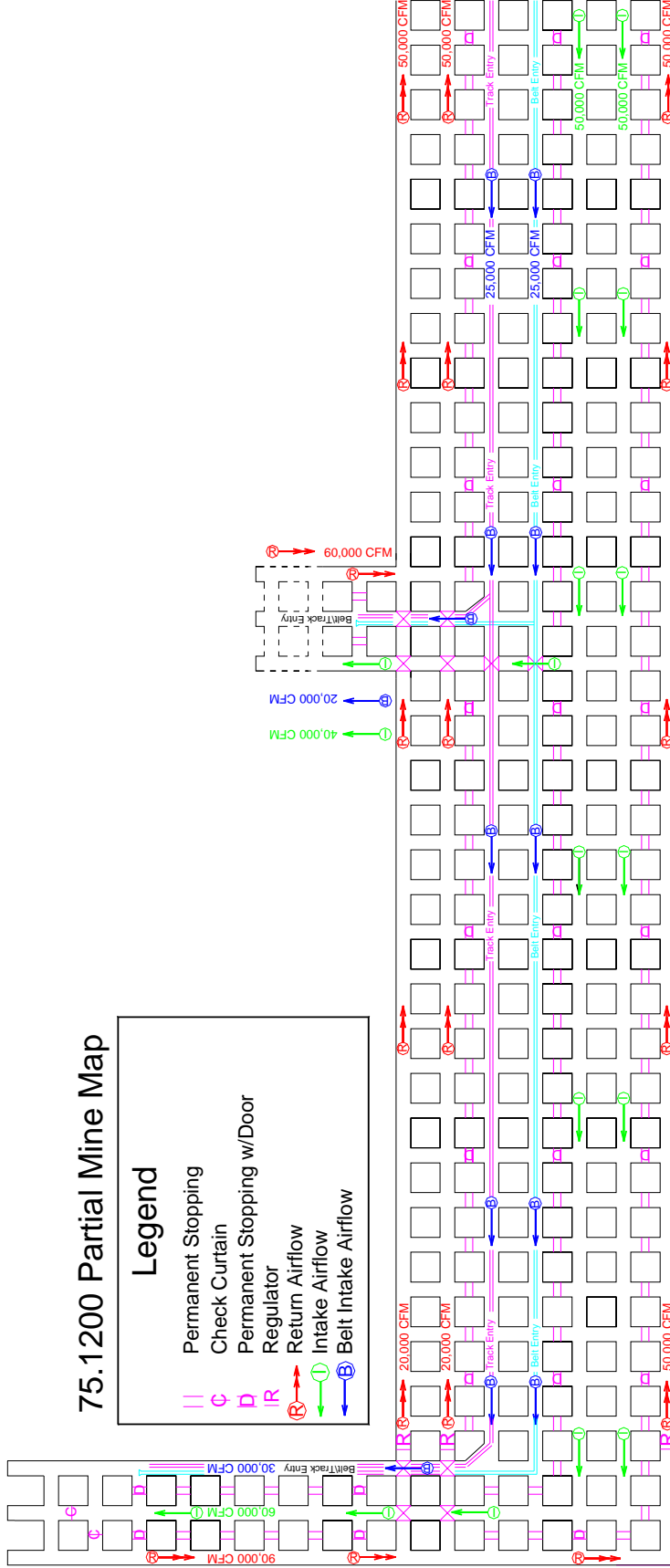


Closed

# 75.1200 Partial Mine Map

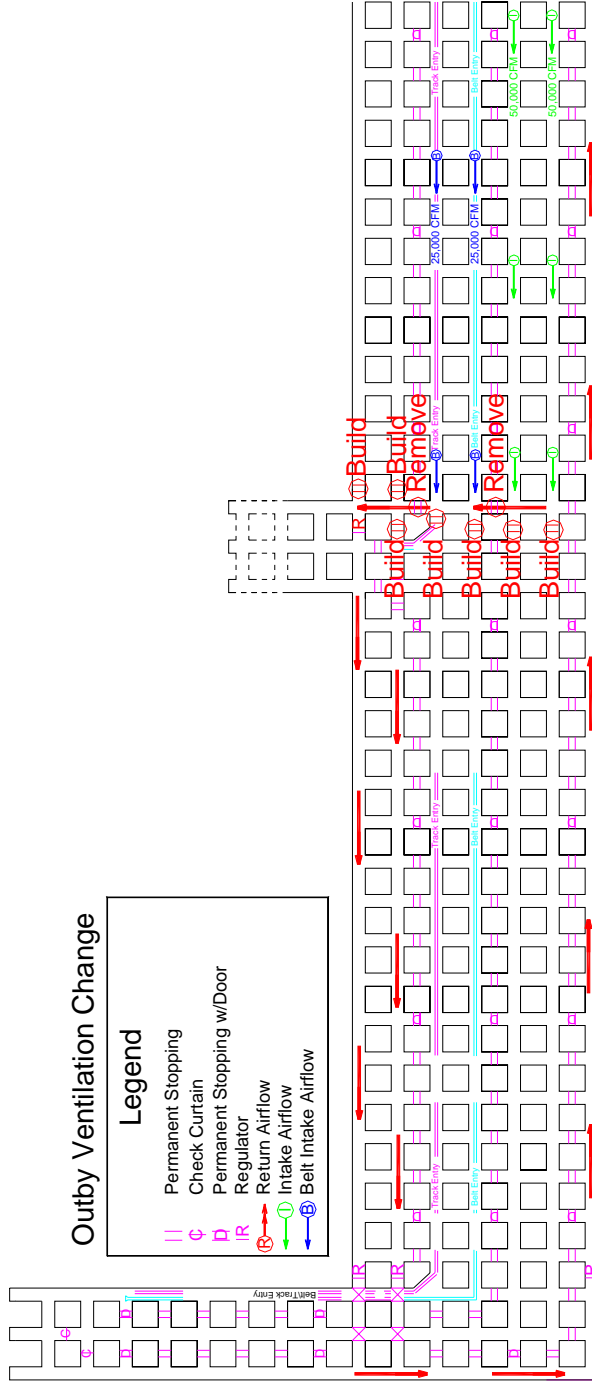
## Legend

- Permanent Stopping
- Check Curtain
- Permanent Stopping w/Door
- Regulator
- Return Airflow
- Intake Airflow
- Belt Intake Airflow



### Outby Ventilation Change

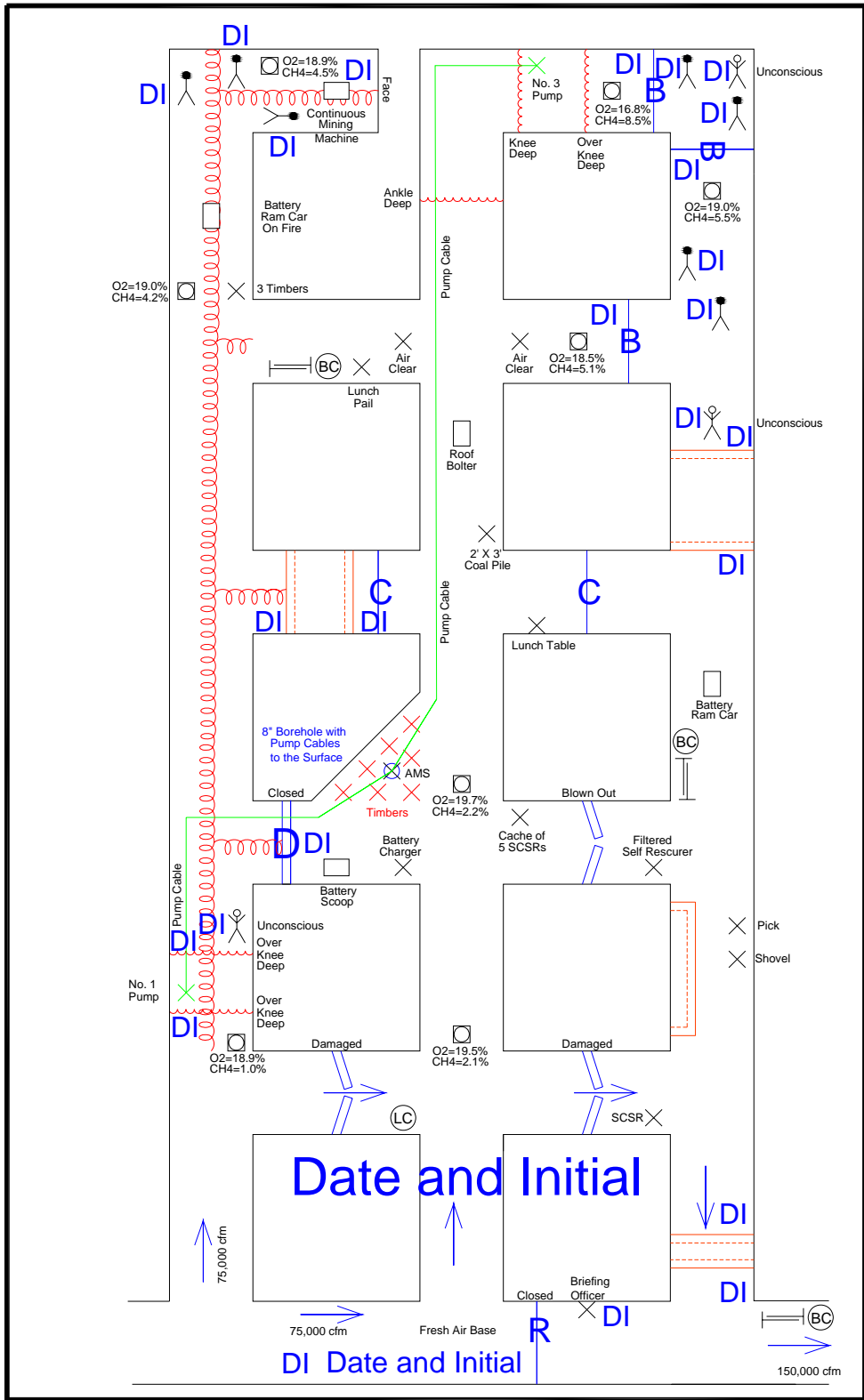
Legend	
	Permanent Stopping
⊕	Check Curtain
⊞	Permanent Stopping w/Door
⊞	Regulator
⊞	Return Airflow
⊞	Intake Airflow
⊞	Belt Intake Airflow

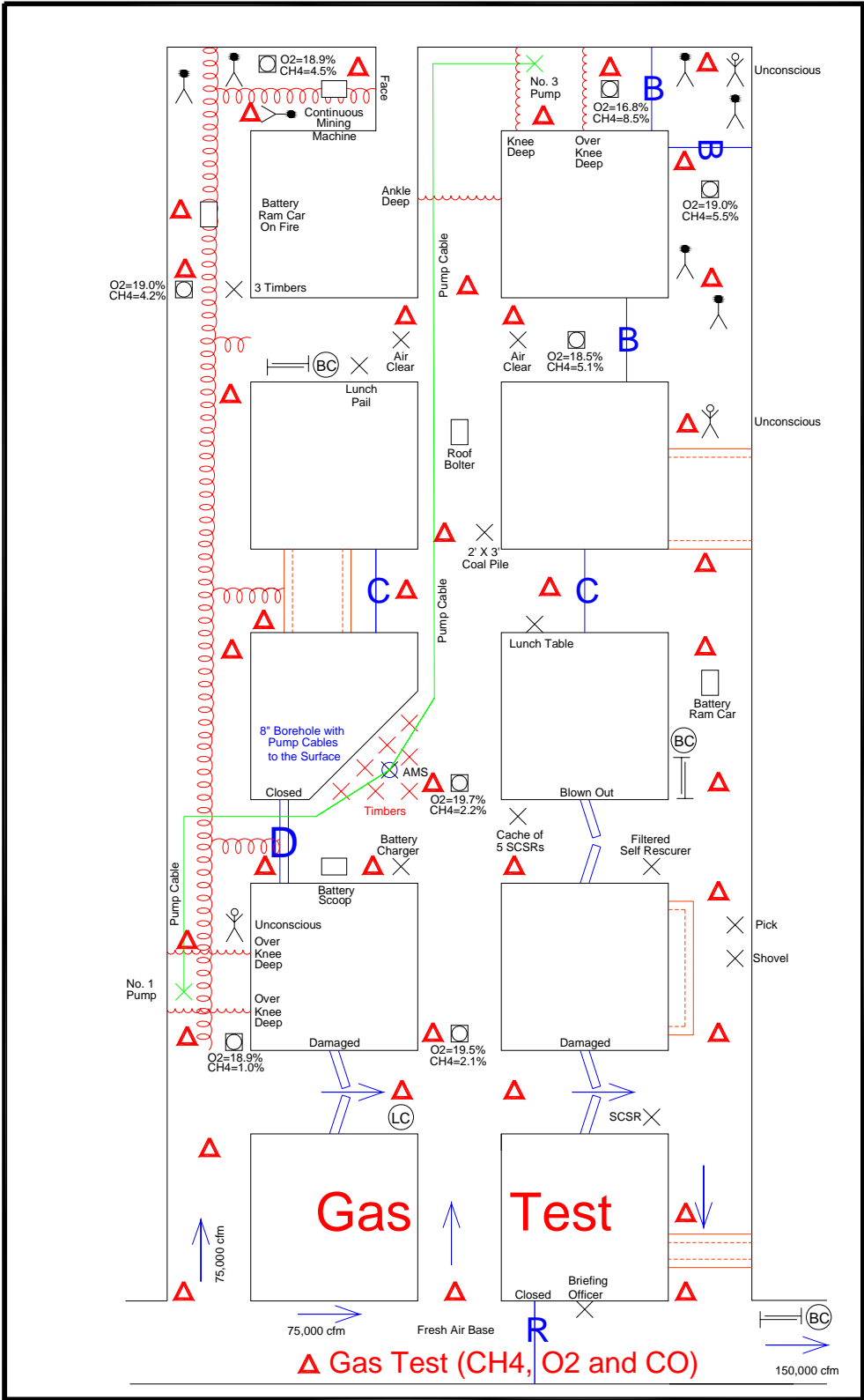


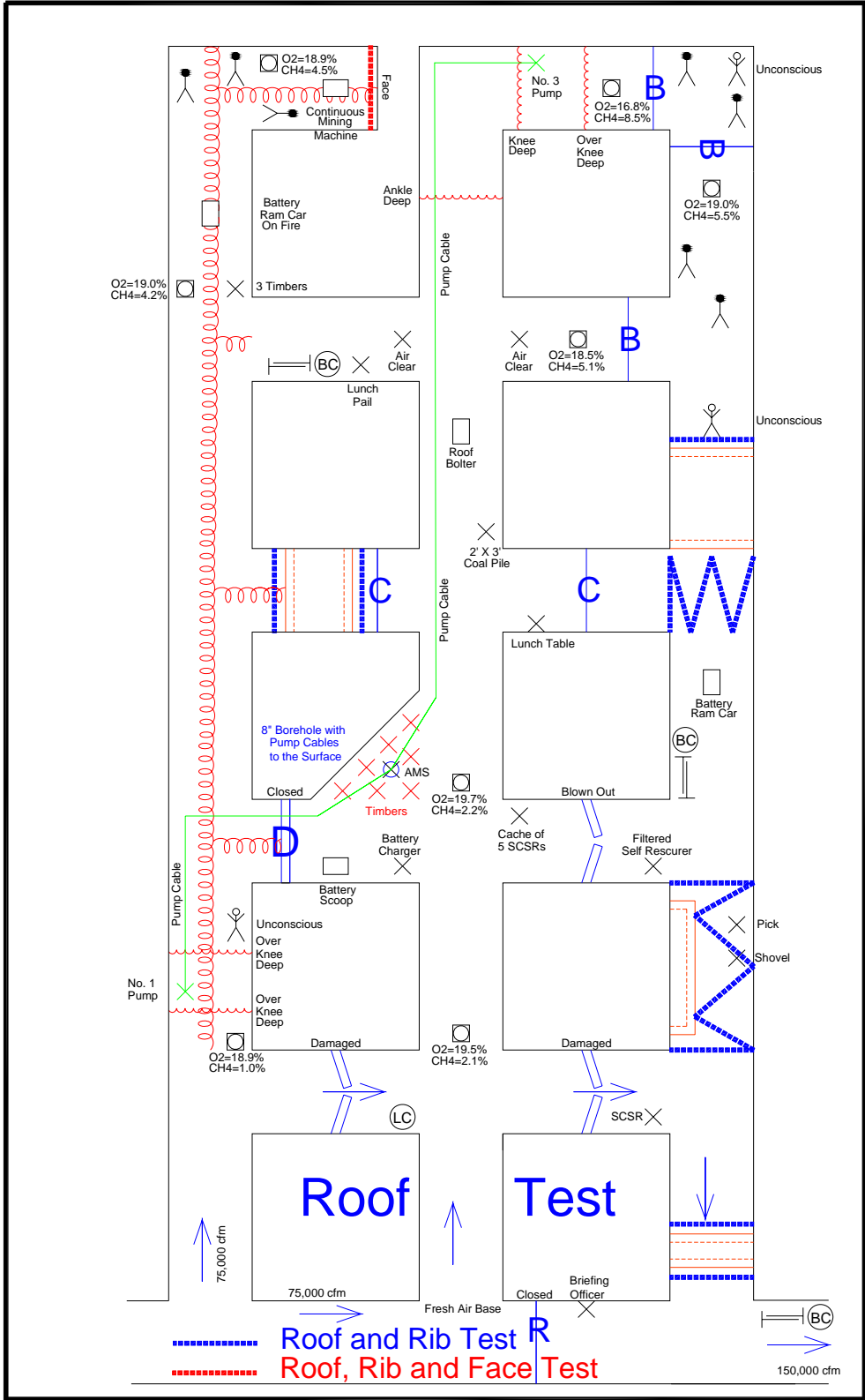
Open

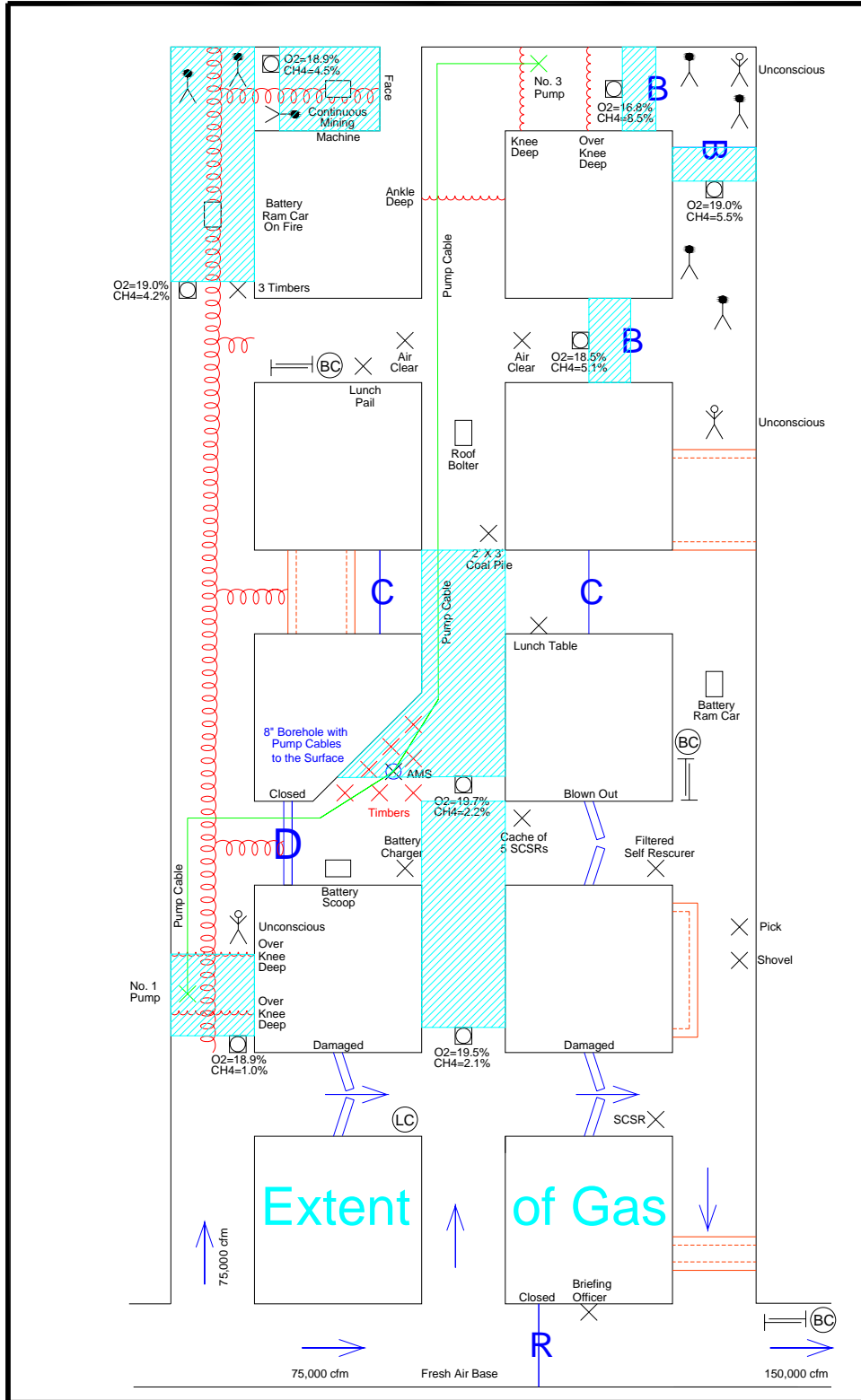












## **VENTILATION**

There may be several scenarios for ventilation of the barricade. Team may choose to ventilate by keeping the section air at the fresh air base the same as they found it. Should they choose this option, they must set the timbers in by the FAB in the unsafe roof because they will be moving an irrespirable atmosphere through the unexplored area when all victims have not been located.

### **VENTILATION OPTION NO. 1**

**NOTE: Team may use only the No. 3 entry as a return due to the location of the briefing officer and the moving of contaminated atmospheres over his location. This is dependent upon when the team chooses to make the vent changes out by. Should they make changes out by at this time, other entries may be utilized.**

Team may short circuit the ventilation across the FAB by opening the regulator or having the briefing officer do this and then changes may be made in the ventilation controls on the section without affecting ventilation. Should team leave the regulator closed, they may still make some of the changes prior to affecting ventilation so long as the two damaged stoppings in the line of first crosscuts are not rebuilt until the last step in the process. Team must use the No. 1 entry as the intake so that No. 2 entry may be used as a partial return and No. 3 entry for the final return entry due to briefing officer location.

**NOTE: Team must build to isolate the face of the No. 2 entry if they have not yet pumped the water over knee deep. This is because they do not know what is in by the water until they can explore this area.**

Team will convert the curtain in the crosscut between 1-3 and 2-3 into a stopping. Team will convert the curtain between 2-3 and 3-3 into a stopping. NOTE: Team must convert this check curtain into a stopping or risk moving an explosive mixture from in front of the barricade over the battery ram car. Team must build in by the FAB in No. 2 entry either in the first or second block to prevent all of the intake air from short circuiting in by in that entry and over into the No. 3 entry as the path of least resistance. The last steps in the process of ventilating the face of the barricade will be to repair the damaged stoppings to the left and right of 2-1 intersection and to close the regulator at the FAB if it

had been previously opened. NOTE: Team may consider moving the regulator to the other side of the briefing officer for ease of communication during this process, or at any time during the working of the problem. If team decides to take this option, they must build and block off inby the FAB in No. 2 entry to prevent the location of the briefing officer from becoming irrespirable during the ventilation process (dependent upon timing of outby vent changes). Team must install the timbers through the unsafe roof inby the FAB in No. 3 entry to facilitate its use as a return so that the area may be explored for ventilation purposes. Should team fail to install the timbers through the unsafe roof and still use the area for ventilation purposes, they will be discounted appropriately.

If the team moves an **irrespirable** atmosphere over the unsafe roof without exploring while persons are unaccounted for, then discount will be as follows:

*Rule 30F – Ventilating an unexplored area with irrespirable air when the location of a potentially live person is unknown. Any unaccounted for person is considered to be a potentially live person.....This discount will be assessed for each irrespirable mixture passed over each unexplored area (# of mixtures X # of unaccounted for persons (maximum 3 persons)).*

If the team moves an **explosive** mixture over the unsafe roof without exploring, then discount will be as follows:

*Rule 31C – Changing conditions of the mine ventilation in such a manner that an explosive mixture is moved over an unexplored area. This discount will be assessed for each explosive mixture passed over an unexplored area. (# of mixtures X # of areas X 30 point discount).*

Team may hang a line curtain to ventilate the face of the barricade and clear the explosive atmosphere. Team must close the regulator or block the No. 2 entry from being used as a return in some fashion or the location of the briefing officer will be contaminated. This will clear the barricade for the team to enter.

Team may then build and enter the barricade as conditions on the other side are unknown. They will find the two bodies and the one unconscious victim. At this team stop, while preparing to remove the patient to the FAB, team may make all examinations required and conduct appropriate gas tests and roof tests inby the unsafe roof. Team will locate the barricade inby the crosscut from which there will be no response. Team will then

remove the patient to the fresh air base. Team must now ventilate the remaining  
barricade by either ventilating the No. 3 side or the 2 Left side of the barricade.

## **VENTILATION OF BARRICADE NO. 2**

**NOTE: When team arrives at the fresh air base with the patient from the barricade No. 1, judge will hand the team captain the following note.**

**THE AMS READING AT THE BOREHOLE IS NOW AS FOLLOWS.**

**CO equals 108 parts per million**

**CH4 equals 5.2 percent**

**O2 equals 19.7 percent**

If team has not yet energized the pump cable down the borehole in order to pump the water over knee deep in the 2 left face, the cable cannot now be energized. If the cable has been energized for any reason and the power has been left on, an explosion has occurred within the borehole that may have affected the underground workings. **Team will be discounted accordingly with these scenarios should they occur.**

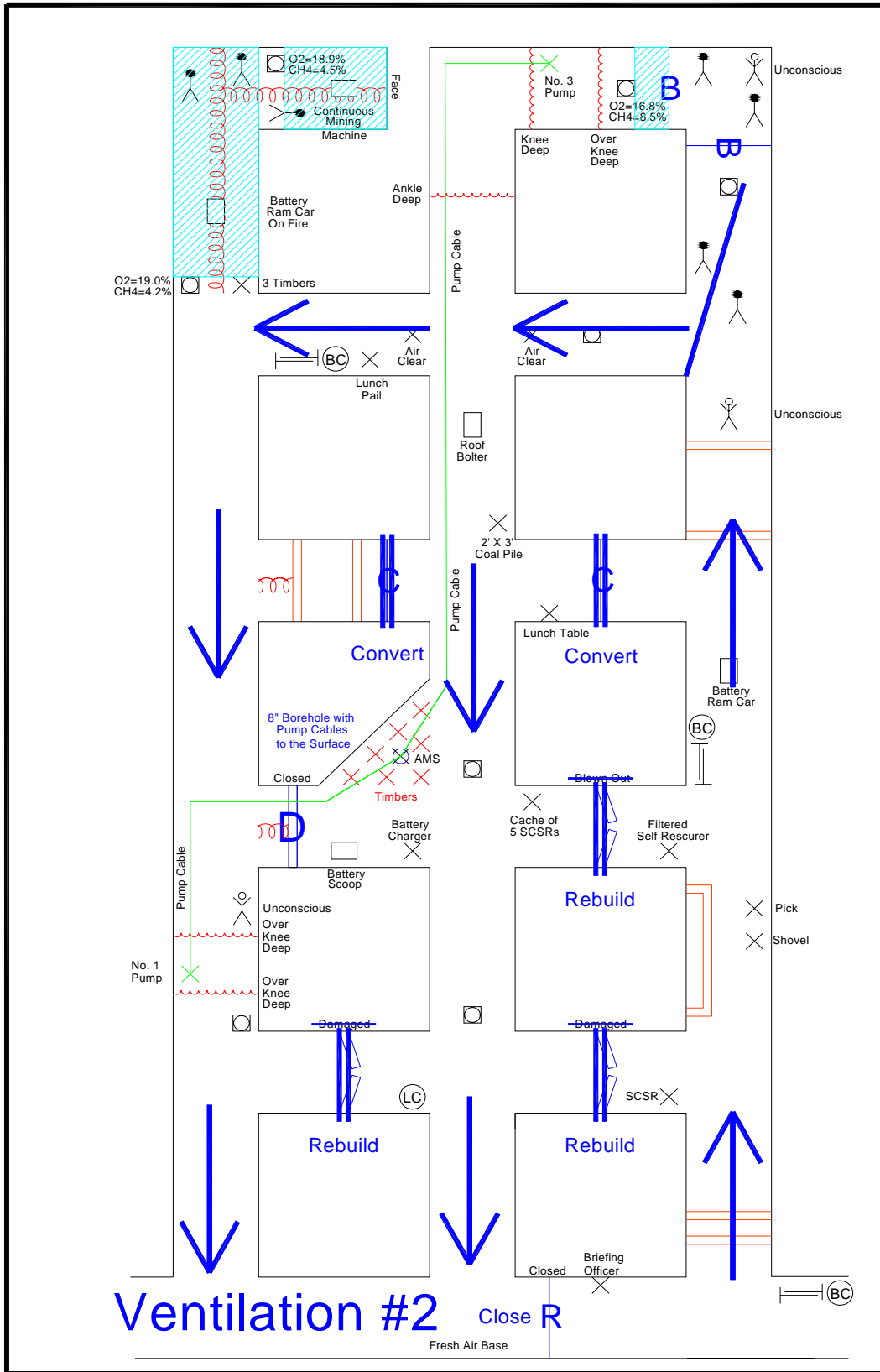
**Readings from the borehole will remain constant once this reading has been given. Judge at FAB will inform briefing officer at five minute intervals that the reading remains the same as that last given to the team captain.**

Team must now ventilate the No. 3 side of the barricade, leaving the No. 2 side isolated. There are no timbers with which to explore the unsafe roof outby the barricade so there can be no contaminant moved through the area or team will be discounted appropriately. Team may now request that ventilation changes to made outby them in the areas previously explored by other teams to facilitate this ventilation. The ventilation requires that the No. 3 entry be changed from a return into an intake.

Team must rebuild the blown out stopping between 2-2 and 3-2. The regulator at the FAB must remain closed. Team will hang line curtain and ventilate the face of the barricade. Team must build to enter the barricade as conditions are unknown. Team will air lock, enter the barricade, and locate the two bodies and the unconscious patient. Team may examine the area within the barricade and remove the patient to the fresh air base.







## Five (5) Minutes

CO equals 9 Parts Per  
Million

CH<sub>4</sub> equals 2.1%

O<sub>2</sub> equals 19.9%

## Ten (10) Minutes

CO equals 10 Parts Per  
Million

CH<sub>4</sub> equals 2.2%

O<sub>2</sub> equals 19.9%

## **Fifteen (15) Minutes**

CO equals 15 Parts Per  
Million

CH<sub>4</sub> equals 2.3%

O<sub>2</sub> equals 19.8%

## **Twenty (20) Minutes**

CO equals 20 Parts Per  
Million

CH<sub>4</sub> equals 2.5%

O<sub>2</sub> equals 19.7%

**Twenty Five (25) Minutes**

CO equals 22 Parts Per  
Million

CH<sub>4</sub> equals 2.6%

O<sub>2</sub> equals 19.7%

## **Thirty (30) Minutes**

CO equals 30 Parts Per  
Million

CH<sub>4</sub> equals 2.7%

O<sub>2</sub> equals 19.7%



**Thirty Five (35) Minutes**

CO equals 30 Parts Per  
Million

CH<sub>4</sub> equals 2.8%

O<sub>2</sub> equals 19.6%

## Forty (40) Minutes

CO equals 35 Parts Per  
Million

CH<sub>4</sub> equals 2.9%

O<sub>2</sub> equals 19.6%

**Forty Five (45) Minutes**

CO equals 38 Part Per  
Million

CH<sub>4</sub> equals 3.0%

O<sub>2</sub> equals 19.5%

## **Fifty (50) Minutes**

CO equals 49 Parts Per  
Million

CH<sub>4</sub> equals 3.2%

O<sub>2</sub> equals 19.3%

## **Fifty Five (55) Minutes**

CO equals 43 Parts Per  
Million

CH<sub>4</sub> equals 3.5%

O<sub>2</sub> equals 19.0%

## **Sixty (60) Minutes**

CO equals 45 Parts Per  
Million

CH<sub>4</sub> equals 3.6%

O<sub>2</sub> equals 19.0%

## **Sixty-Five (65) Minutes**

CO equals 47 Parts Per  
Million

CH<sub>4</sub> equals 3.7%

O<sub>2</sub> equals 19.0%

## Seventy (70) Minutes

CO equals 49 Parts Per  
Million

CH<sub>4</sub> equals 3.8%

O<sub>2</sub> equals 18.9%



## Seventy Five (75) Minutes

CO equals 49 Part Per  
Million

CH<sub>4</sub> equals 3.9%

O<sub>2</sub> equals 18.8%

## Eighty (80) Minutes

CO equals 49 Part Per  
Million

CH<sub>4</sub> equals 3.9%

O<sub>2</sub> equals 18.8%

## **Eighty Five (85) Minutes**

CO equals 49 Part Per  
Million

CH<sub>4</sub> equals 3.9%

O<sub>2</sub> equals 18.8%

## **Ninety (90) Minutes**

CO equals 49 Part Per  
Million

CH<sub>4</sub> equals 3.9%

O<sub>2</sub> equals 18.8%

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