2015 Southeast Region
Metal and Nonmetal
Mine Rescue Contest

Field Competition

Judge's Packet

June 23/24/25 2015
Maysville Kentucky

TABLE OF CONTENTS

TEAM BRIEFING STATEMENT

A fresh air base has been established in the Zanes Trace Panel of the Mason County Mining Company's Bluegrass Region Mine. One year ago, the 5-entry panel was developed off of the Ohio River Mains. As the panel approached the Simon Kenton boundary line, the panel width was reduced to 3 entries. This panel has been idle for some time due to some geological problems. Recently the area has been rehabilitated and production has resumed. A 6-person crew is assigned to this area. The area has been in full production mode for about 12 weeks.

Last night at 11:00 p.m., a foreman and six crew members went underground and traveled to the Zanes Trace Panel. An electrical storm knocked out power to the mine. Problems with the diesel-powered back up generators forced the mine superintendent to order an evacuation of all personnel from the mine.

At 12:15 a.m., three crew members form the Zanes Trace Panel called out to report an incident. An apparent fire and subsequent heavy smoke caused them to become separated from the rest of their crew. They tried to find the other four crew members, but the smoke became too dense. They also reported that a significant amount of water was coming into the panel from the roof and the roof was working in several areas. They retreated through the return entry to the Ohio River Mains where they were joined by a belt crew that was evacuating the mine. Once on the surface, the three miners were transported to the hospital and are being treated for smoke inhalation. By 1:40 a.m., all maintenance crews had been safely evacuated from the mine except for the foreman and three missing crew members on the Zanes Trace Panel.

At 3:30 a.m., the Company's mine rescue team entered the mine and explored the entire mine up to the Zanes Trace North Panel. At that time, the team reported they installed two temporary stoppings, blocking ventilation to the Zanes Trace Panel and after they did this, no smoke was observed in the return entries along Ohio River Mains. The team established a Fresh Air Base (FAB) at their furthest point of advance (FPA).

All power to the underground has been restored to the areas that have been explored by the Company's mine rescue team. Both fans are operating. Both hoists are operational. Continuous gas monitoring at both shafts show "clear air".

All government agencies have been notified and updated. Their representatives are in the command center. Guards have been posted and are monitoring both shafts and at the Main Fans. There is a fully equipped mine rescue team ready to serve as your team's backup. Another team will be sent into the mine to replace you after ***80 minutes***.

It is now 7:30 a.m. If your team is willing to help, we would like you to account for the missing miners; bring any live miners to the surface; extinguish or seal any fires; and explore and map all accessible areas of the Zanes Trace Panel. Most available equipment and materials to work the problem are located in the mine and are identified with placards. The materials are stored in several areas underground and can be readily located if needed. If there is something else deemed necessary by the team,

upon request, it can be delivered in a reasonable amount of time.

When you reach the Zanes Trace fresh air base, the Mine Manager will introduce you to the judges. Once the Team Captain has started the time cloth, the Mine Manager will provide all the information and maps to the team. The Mine Manager will not answer any additional questions concerning the team briefing statement. However, if you do not understand a term, it will be defined. The Manager will only respond to questions allowed by the rules while you are working the problem.

The fresh air base attendant and alternate will be assigned a location where they can study the team briefing information, mine information, and map. Only one attendant or alternate will be allowed to assist at the fresh air base. This fresh air base attendant can assist the team and communicate with them while they are advance past the fresh air base using the wire communication system. He must maintain an accurate map indicating all initial information that the team relays to him. He may also assist the team by relaying information to the mine manager when required by the problem. He may also assist the team when they retreat to the fresh air base.

The fresh air base attendant and mine rescue team alternate are not allowed to speak to anyone during the working of the problem except their team members and the judging officials.

GOOD LUCK!

TEAM INSTRUCTIONS

* Account for the four missing miners

* Bring any live miners to the surface

* Extinguish or seal any fires

* Explore and map all conditions found and any changes the team makes.

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. However, this person cannot physically assist the team beyond the fresh air base unless that person becomes an active team member in the event that someone drops out.

* The fresh air base attendant and mine rescue team alternate are not allowed to speak to anyone during the working of the problem except their team members, the mine manager, and the judging officials.

Mine Manager Statement

Introduce yourself to the team as the "Mine Manager." Then introduce the No. 1 & No. 2 Judges. **NOTE: the team has been briefed on the problem and the mine information.**

Provide the team with the following instructions:

> **I have no new information to report to you at this time. You will have 80 minutes to work the problem.**
>
> **At this point, no questions will be answered by the mine manager concerning the team briefing statement. The mine manager will respond to questions only as required by the rules while working the problem except that any term the team does not understand will be clarified.**
>
> **The fresh air base attendant or alternate will be required to locate at a designated area where he/she can study the map and team briefing information. He/she can assist the team and answer any questions that the team may ask. Only one attendant or alternate will be allowed to assist at the fresh air base. He/she cannot physically go beyond the fresh air base to assist the team unless he/she becomes an active team member in the event that someone drops out.**

CAUTION - the Fresh Air Base Attendant or Mine Rescue Team Alternate is not to communicate with anyone except the team members, the mine manager, or the judging officials.

At the end of the problem, both the team map and the fresh air base attendant's map will be collected and scored. The alternates map will be collected also for reference. All map editing must take place prior to stopping the clock.

Ask if they understand these instructions?

When they verify understanding the instructions, have the Team Captain start the clock and hand the team the Team Briefing Information, the Mine Information Sheets, and the Mine Maps. Remember to add: "Good Luck!"

MINE INFORMATION SHEET (Review in Lock-Up)
Mason County Mining Company, LLC – Bluegrass Region Mine

Mining & Equipment:

The Multi-level Limestone mine uses a conventional room and pillar method to extract limestone from the lower Tyrone Limestone and Oregon Formation. The Intake Shaft is downcast (intake air) and is used to transport people and to convey supplies. The mine is ventilated by one exhausting main fan located on the surface. The Production Shaft is upcast (exhaust air) and is equipped with the production skips, as well as an escape compartment which can be used to hoist 8 persons to the surface. The mine currently operates 5 working areas, one 12-hour shift per day, 6 days per week. A second 8-hour shift has recently been added to the schedule for equipment maintenance and general upkeep. The limestone is drilled, blasted, and loaded from the faces using diesel-powered Front End Loaders (FEL's). The limestone is then transported via haul trucks to the crusher on each work level and then to the bunker via conveyor belts that feed the Production Shaft. The Limestone is then hoisted to the surface via the production skips.

Gas:

In accordance with Title 30 CFR 57.22003, the mine is classified as a Category IV mine, that is, any methane concentrations liberated are not explosive and are not capable of forming explosive mixtures with air, based on the geological area in which the mine is located.

Ventilation:

Air enters the mine through the Service Shafts and exhausts through the Production shaft. The Service Shaft is downcast and the Service Shaft is designated as the primary escape way for the mine. The main fan is located on the surface at the Production shaft and is not reversible. The Production Shaft is upcast and is used as the secondary escape way. Air is directed to the faces using permanent (concrete block) stoppings that cannot be re-moved or breached and also temporary (brattice cloth) ventilation controls.

The main fan had been pulling approximately 300,000 cfm of intake air into the mine. When the fan shut down, the fan chart shows that they were operating in a stable portion of their performance curve. The main fan has been restarted.

Water:

The mine has a history of water problems in the active workings.

MINE INFORMATION SHEET (cont.)

Pumps:

Each shaft is equipped with a ten-foot deep sump. The main water pumps, located on the surface, can easily handle the volume of water produced in the shafts. The main water pumps have been activated along with the power to the shafts. Additional 6x6 electric pumps are located in various places in the mine as needed.

Electric Power:

A 4,160-volt power feeder cable supplies power to the main power center, located in the first crosscut off of the Intake Shaft. The power is then distributed to power centers located on each panel. The face drills and roof bolters are supplied with 440-480 volt power from the power centers.

The electrical power to the shafts and main sump pumps has been restored; however, all the unexplored areas have been de-energized, locked out, and guarded.

Airlines:
There is a 4-inch diameter airline down the Production Shaft. There are manifolds at the shaft station and in the shop. The airlines are charged by a surface compressor that produces 2,000 cfm at 120 psi.

Ground/Rib and Roof Control:

The immediate roof or back is supported by 8-foot long fully grouted resin bolts, installed on 5-foot centers. The mine has a history of geological issues; however, wooden timbers, or wooden crib blocks are available for additional support in problem areas.

Recovery:

No benching work (or second mining) has been performed.

Mine Map:

The mine map was updated two weeks ago.

Other Mines:

There is an old coal mine located in the area. However, the Bluegrass Region Mine does not connect to the abandoned mine.

MINE INFORMATION SHEET (cont.)

Hoists:

The hoists in both shafts have been checked out and are working properly.

Explosives:

Explosives are available and stored on the surface. They are used during the mining cycle and blasting is conducted at the end of each shift while all persons are out of the mine. Only enough explosives for a day's use are stored underground on the powder wagon for each active panel.

Materials:

Most available equipment and materials to work the problem are located in the mine and are identified with placards. The materials are stored in several areas underground and can be readily located if needed. If there is something else deemed necessary by the team, upon request, it can be delivered in a reasonable amount of time.

Communications:

Pager phones are available in the mine and normally have contact with the surface. The current phone locations are marked on the Team and Fresh Air Base Maps. At this time, there has been no contact with the missing miners on the Zanes Trace panel.

JUDGE'S PROBLEM SOLUTION

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

Each team will receive a pre-briefing (presentation in isolation with all teams present) prior to arriving at the fresh air base, including:

a) a review of the details surrounding the mine and today's problem (provide a copy of the Mine Information Sheet and Team Briefing Statement to each team); and
b) a review of the Team and Fresh Air Base Instructions (provide a copy to each team).

Upon arrival to 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.

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. Because of the presence of methane in the mine (as found during previous exploration outlined in the Team Briefing Statement), the team must use non-sparking tools to work the problem. If the team does not have non-sparking tools and requests them from the official in charge, the tools that they brought with them will be deemed non-sparking.

*NOTE: the lifeline signals must be presented to the lifeline judge.

When ready, the team must re-examine the panel openings along the FPA line of previous team. This examination must include gas tests (GT) at all three entries/headings Nos. 3, 2, and 1. For the first three heading, the team will be in intake or "clear air" and will not need to take any special precautions or perform any additional actions to complete this task. The No. 2 drift has a permanent stopping that cannot be breached or removed and the captain must D&I the permanent stopping. The team will also find the Gas Test Station and will have to "hood" the detector and put the gas on the detector. The captain will give the readings from the detector to the judges who will write the individual gas readings down on the judge's map. The team will also find

brattice material with frame in the #3 heading/entry.

TEAM STOP NO. 1

The team may advance through the temporary stopping in Heading No. 3 without making a ventilation change. **In order to accomplish this, they will need to erect a temporary stopping "air lock" before breaching the existing temporary stopping.** The captain must R&R the area to build the airlock and D&I the build. After passing through the temporary stopping *the captain must test for gas and examines the roof or back. The team will find water over knee deep.* The captain must *D&I* this furthest point of advance at the water over knee deep. ***Should the captain request a pump, the Mine Manager will say "There is a pump already in the area, but you will have to physically start the pump down there. Power can be restored to the pump when you're ready"*** *The start switch is located inby the over knee deep water so they will have return back through the air lock to the fresh air base*.

TEAM STOP NO. 2

The team may advance through the temporary stopping in Heading No. 1 without making a ventilation change. **In order to accomplish this, they will need to erect a temporary stopping "air lock" before breaching the existing temporary stopping.** The captain will R&R the area to build the airlock and D&I the build. After passing through the temporary stopping *the captain must test for gas and examines the roof or back.* The team may breach the temporary stopping and must *test for gas and examine the roof or back.*

TEAM STOP NO. 3

The team may advance to A1 intersection. The team will find **O2=17%, CH4=0.1%, H_2S=25 ppm, CO=1,200 ppm**. Stretching north the team will conduct necessary gas tests and to the east the captain will find a permanent stopping and must *D&I* & GT the permanent stopping.

TEAM STOP NO. 4

The team will advance to B1 intersection. As they approach the intersection they will find a 16 foot vent shaft (up to surface.) The team must stay clear of the shaft. At the intersection, the captain will conduct roof or back checks and the team will take necessary gas tests. The team will find **O2=17%, CH4=0.1%, H_2S=25 ppm, CO=1,200 ppm**. The captain will find unsafe roof to the north. After making roof or back checks and taking necessary gas tests, the captain must *D&I* the unsafe roof.

Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them. The captain will find an open crosscut to the east. The team must advance to B2.

TEAM STOP NO. 5

The team will advance to B2 intersection. At the intersection, the captain will conduct roof or back checks and the team will take necessary gas tests. The team will find **O2=17%, CH4=0.1%, H_2S=25 ppm, CO=1,200 ppm**.
Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them. (2X3 systematic Rule)
The captain will find caved air tight to the south and must *D&I* the caved air tight. They will find an open crosscut to the east.

TEAM STOP NO. 6
As the team advances toward B3 they will encounter unsafe ribs on the southwest corner and B3 intersection. The captain will identify the unsafe ribs and tell the team to stay clear. At the intersection the captain will conduct roof or back checks and the team will take necessary gas tests. The team will find **O_2=17%, CH4=0.1%, H_2S=25 ppm, CO=1,200 ppm**. The captain will find a permanent stopping to the north and will *D&I* the permanent stopping. GT's will be taken as shown on the map. Stretching south the captain will find the northern extent of the water over knee deep and a pump start switch. The captain will request the FAB to have power to the pump restored and he will be able to start the pump. The water over knee deep placard will change (flipped over) to water ankle deep. (All the 3 of the water over knee deep placards will be flipped over to read "Water ankle deep") The team must travel south to A3.

TEAM STOP NO. 7
The team will advance to A3 and the team will find **O_2=17%, CH4=0.1%, H_2S=25 ppm, CO=1,200 ppm,** and a sump pump. The captain will conduct roof or back checks and the team will take necessary gas tests. Stretching south the captain will find the southern extent of the water (over knee deep which has changed to water knee deep) and then the back of the temporary stopping, the captain must *D&I* the temporary stopping. Stretching west they will find an open crosscut. The team must advance to A2 intersection.

TEAM STOP NO. 8
As they approach the intersection they will find the western extent of water ankle deep. At the intersection they will find **clear air**. The captain will conduct roof or back checks and the team will take necessary gas tests (north, west & south). Stretching south the captain will find the back of the permanent stopping, the captain must *D&I* the permanent stopping. To the west the captain will find a permanent stopping with door closed, the captain must *D&I* the permanent stopping with door closed. The team can airlock into the permanent stopping with door closed, but they will have to build a stopping (airlock) in the crosscut between A2 and A3. **Note: if the team has not taken brattice material with them, they will need to retrieve it from drift #1.** The captain must conduct roof or back checks before the temporary stopping is built and D&I the air-lock. Then they can air-lock and open the door in the permanent stopping.

TEAM STOP NO. 9

When they open the door, the captain will conduct roof or back checks and the team take necessary gas tests. As they do this, they will find the first missing miner (William Harsha, ID# 2001). The team captain must D&I and R&R over the miner. After a primary and assessment, the Judge will hand the team member a placard which reads: ***"The miner exhibits no vital signs." "The miner is dead".*** They will also find a 12 INCH BORE HOLE WITH FAN EXHAUSTING UP TO SURFACE, and the backside of the permanent stopping, the captain must *D&I* the permanent stopping. ***Now that the team has completely tied in the first two crosscuts, the team may advance to C2.***

TEAM STOP NO. 10

The team will retreat and then advance toward C2 intersection through a check curtain and will immediately encounter **heavy smoke**. **Note: the team must conduct a team check before entering the smoke. They must also be attached to a lifeline at all times in smoke. If the team asks for additional gas detectors, the Mine Manager can supply Dräger stain tubes for higher concentrations of the gases encountered.**

They will find brattice material with frame on the right rib. At the intersection, the captain will conduct roof or back checks and the team will take necessary gas tests. The team will find **O_2=14%, CH_4=0.1%, H_2S=10 ppm, CO=1,250 ppm.** Stretching west the captain will find unsafe roof, midway thru the crosscut, the captain must *D&I* the unsafe roof. To the north the captain will find a permanent stopping and must *D&I* the permanent stopping. To the east they will find an open crosscut and proceed to C3 intersection.

TEAM STOP NO. 11

At the intersection of C3, the captain will conduct roof or back checks and the team will take necessary gas tests. To the south the captain will find clear air and a permanent stopping with door closed, the captain must *D&I* the permanent stopping with door closed. **In order advance through the door, they will need to erect a temporary stopping "air lock" before opening the door.**

TEAM STOP NO. 12

Note: if the team has not taken brattice material (temporary stopping) they used as an air-lock between A2 and A3 in drift #1, they will need to retrieve it from drift #1. After passing through the permanent stopping with door closed *the captain must test for gas and examines the roof or back.*

The team will find a 10 foot Diameter Vent Shaft (Up to Surface) and the back side of the permanent stopping, the captain must D&I the permanent stopping. The team can retreat back through the air lock and advance to D3. The team must close the door to maintain separation from the shaft to the UG area before removing the airlock.

TEAM STOP NO. 13

As the team advances toward D3 they will find brattice material (wing curtain) located on the east rib just before the D3 intersection. At the D3 intersection the team will find

O_2=14%, CH_4=0.1%, H_2S=10 ppm, CO=1,250 ppm. The captain will conduct roof or back checks and the team will take necessary gas tests. **Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them.** They cannot put the fire out on the rock drill. They can advance west toward D2.

TEAM STOP NO. 14

As the team advances toward D2 they will find 14 timbers on the south rib. With the 14 timbers the team may continue to advance or may elect to retreat to B1 intersection and set the timbers in the unsafe roof and explore north to the caved air tight.
For this scenario they will continue west to D2. At the intersection the captain will conduct roof or back checks and the team will take necessary gas tests. **Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them.** The team will find two haul trucks parked on the south corners of the intersection. Stretching south the team will find **O_2=14%, CH_4=0.1%, H_2S=10 ppm, CO=1,250 ppm** and a barricade. The captain will knock on the barricade and the miner will answer "HELP" "HELP" "Get me out." The team can advance west toward D1.

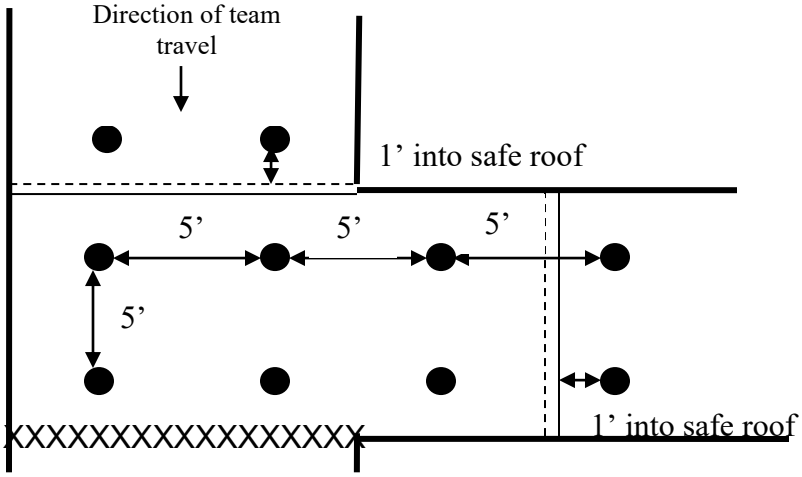
TEAM STOP NO. 15

At the D1 intersection the captain will conduct roof or back checks and the team will take necessary gas tests. **Note: the team cannot advance beyond 3 feet past the intersection to the north, because they have not tied in the entries behind them.** The team will advance south to C1.

TEAM STOP NO. 16

As the team approaches C1 they will encounter unsafe roof and will set the timbers to continue into the intersection. They must set the timbers as shown below.

C

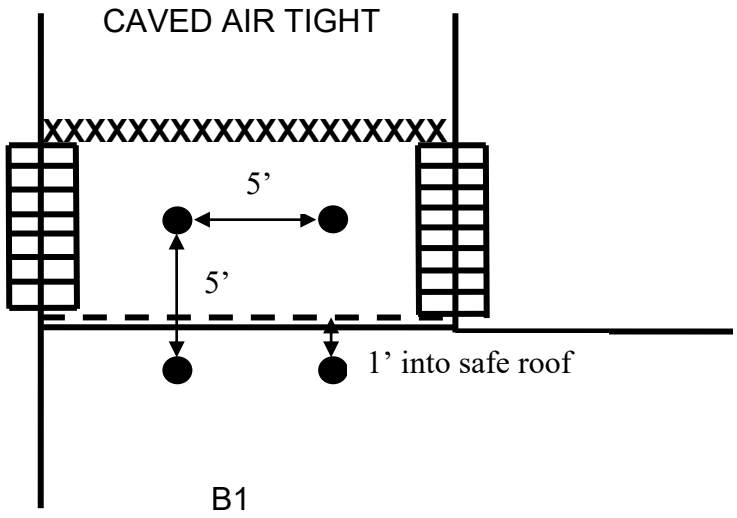


At the intersection of C1, the captain will conduct roof or back checks and the team will take necessary gas tests and the team will find **O_2=14%, CH_4=0.1%, H_2S=10 ppm, CO=1,250 ppm.** Stretching south the captain will find caved air tight, the captain must

D&I this furthest point of advance at the caved air tight. In order to tie in, the team will retreat to B1 intersection and set the timbers in the unsafe roof north of B1 intersection.

TEAM STOP NO. 17

As the team approaches the unexplored area between B1 and C1 they will encounter unsafe roof with unsafe rib on both side of the drift and will set the timbers to continue. They must set the timber as shown below because of the unsafe rib on both sides of the drift.



After they have set the timbers the captain will find the unsafe rib on both sides of the drift and caved air tight. The captain must *D&I* this furthest point of advance at the caved air tight.

TEAM STOP NO. 18

The team may now advance to the #3 face. **Note: the team must conduct a team check before entering the smoke. They must also be attached to a lifeline.** At the #3 face the team will find a rock drill on fire. The team will extinguish the fire and the captain will conduct roof or back checks over the fire area, the team will take necessary gas tests. The captain will find the face and must *D&I* the face.

TEAM STOP NO. 19

The team will advance to the #2 face and the captain will conduct roof or back checks and the team will take necessary gas tests. The captain will find the face and must *D&I* the face.

TEAM STOP NO. 20

The team will advance to the #1 face and the captain will conduct roof or back checks and the team will find **O_2=14%, CH_4=0.1%, H_2S=10 ppm, CO=1,250 ppm.** The captain will find a barricade and must *D&I* the barricade. The captain will knock on the barricade and the miner behind the barricade will answer "Help" Help" "Get me out of here."

Now, the team has explored all accessible areas of the panel

PROBLEM COMPLETION/VENTILATION

To complete this problem, a ventilation change is required to move the high concentrations of CO and H_2S and low O_2 from the mine, including the area directly in front of the barricades.

Note: Now, they must propose to ventilate the mine to remove the toxic gas concentrations, so that the barricades can be safely entered. The team must confer with the mine manager and judges or they must have the fresh air base attendant confer with the mine manager and explain these necessary ventilation changes prior to implementing them.

They outline the following changes: construct a temporary stopping between B1 and B2; construct a temporary stopping between C2 and C3; open the door in the permanent stopping at the **10 foot diameter vent shaft to surface.** Once these preparatory activities have been completed, the temporary stopping in the drift #3 can be removed. As the air comes down the 10 foot vent shaft and up the #3 heading and across to the west down thru the unsafe roof and sweeps through the area and out the # 3 heading, the concentrations will quickly revert to clear air. Note: Refer to the Ventilation Changes Map 1 and 2.

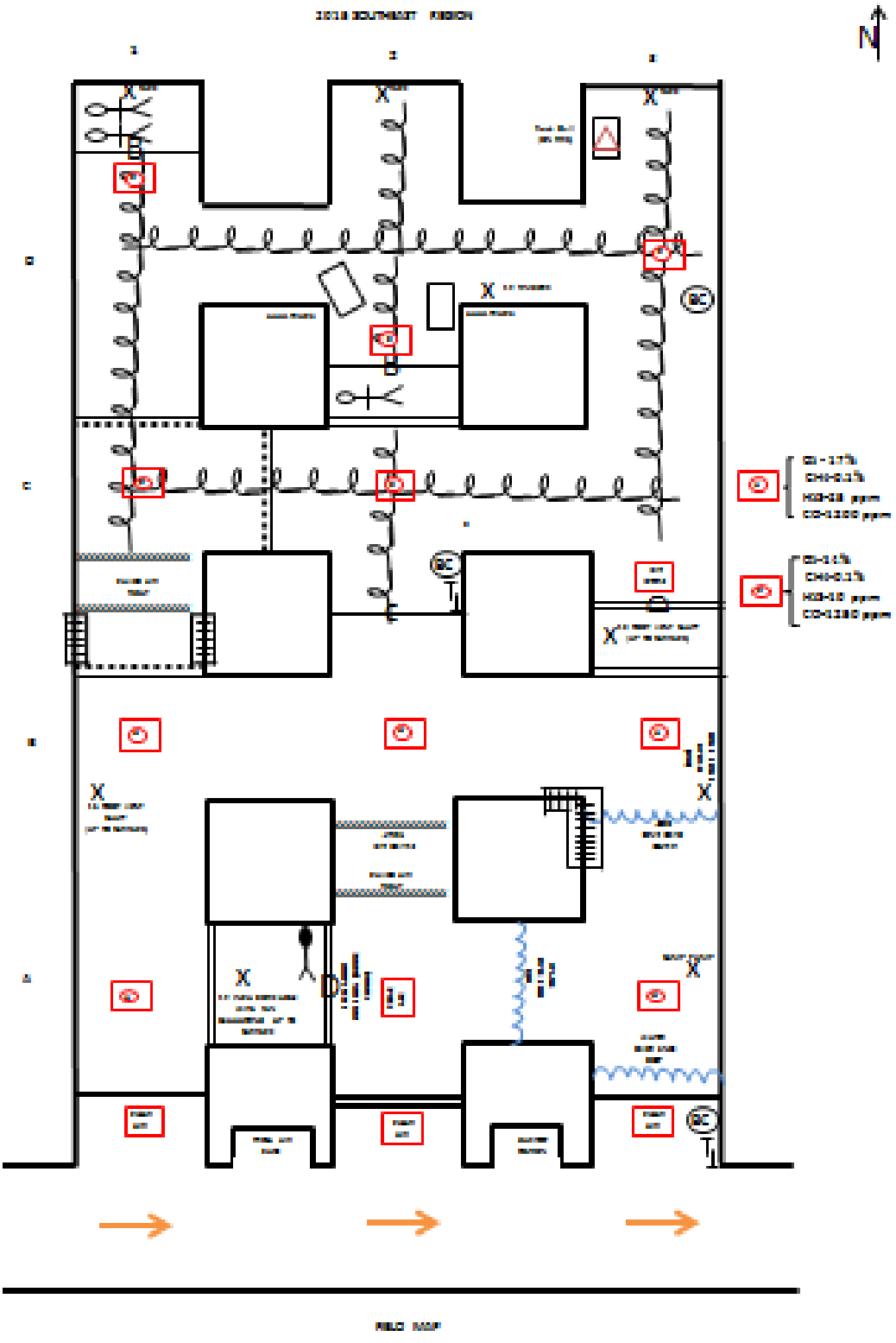
After the gas concentrations are swept from the mine, the judges will turn over the placards where the ventilation has cleared the gases. The team can return to the barricade south of D2 intersection. Since conditions behind the barricade are unknown, the team must erect a temporary airlock outside of the barricade south of D2 intersection. They can then open the barricade. Inside they will find the miner (Don Adams, ID – 0975). Who is standing and talking. The judge will lay a placard that tells the team the "miner has no apparent injuries." The miner must be given lifeline signals and told to stay on the lifeline. Before leaving the area, gas tests must be taken inside the barricade and the captain must D&I the permanent stopping and the location of the live miner. The team will take the miner to the FAB. Depending which route they travel, the miner may need a breathing apparatus. When they arrive at the FAB they will deliver the miner to the mine manager and proceed back into the mine.

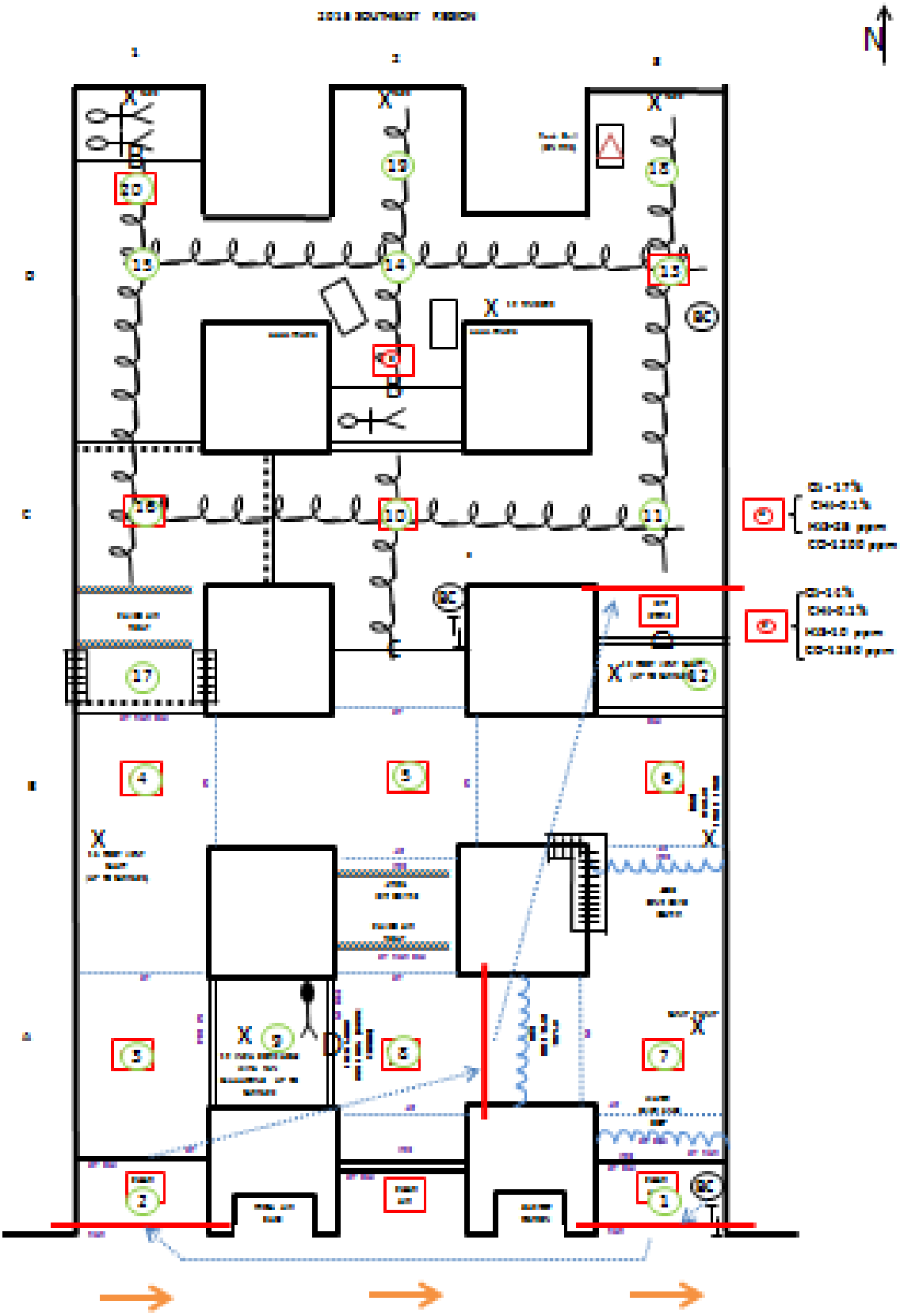
The team can return to the barricade in the #1 heading face. Since conditions behind the barricade are unknown, the team must erect a temporary airlock outside of the barricade. Inside they will find the miner (Andy Griffit, ID – 0975) and miner (Barney Fife, ID – 0975) standing and talking. The judge will hand the team placards which reads: ***"The miners have no apparent injuries".***

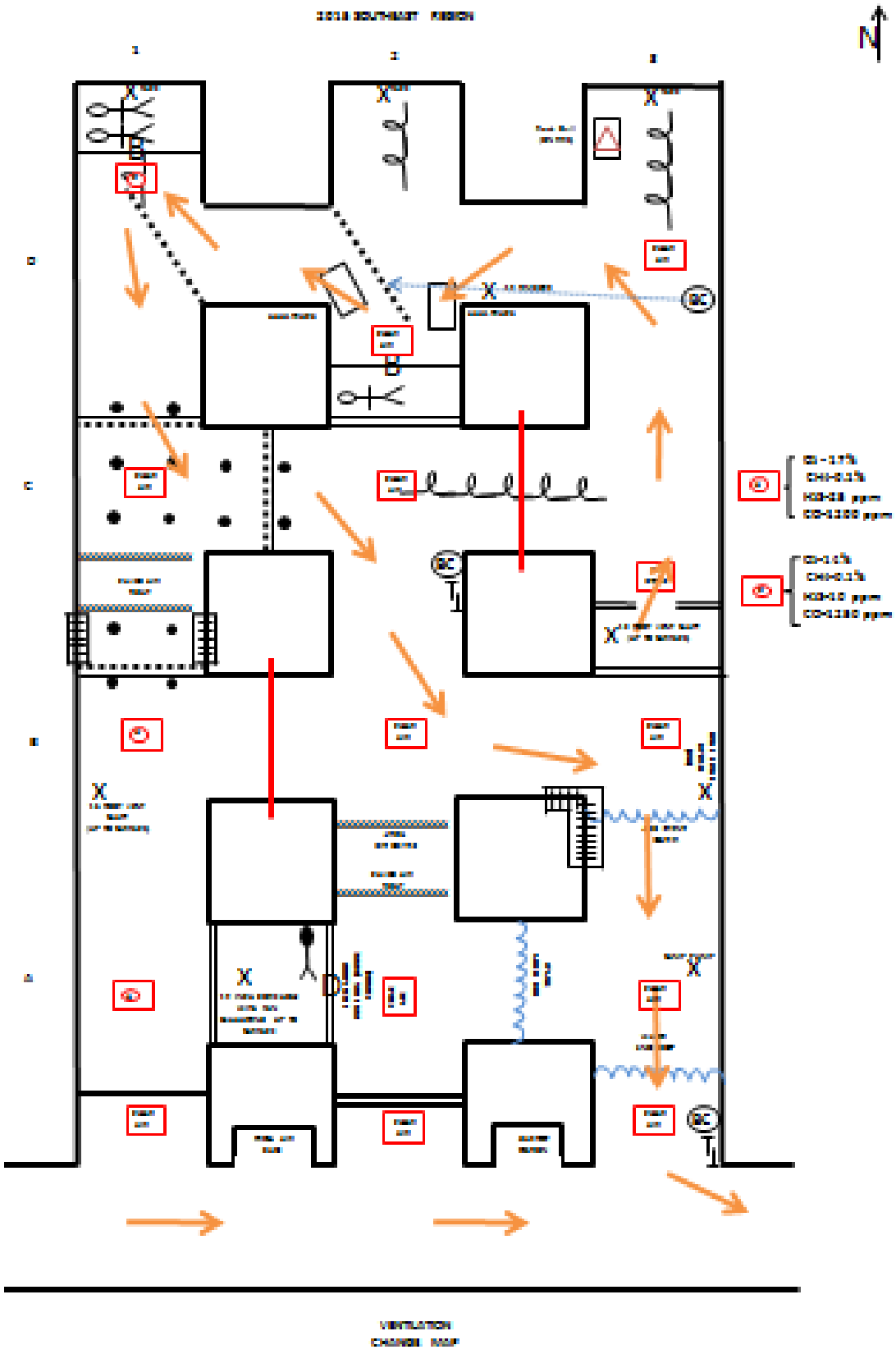
The miners must be given lifeline signals and told to stay on the lifeline. Before leaving

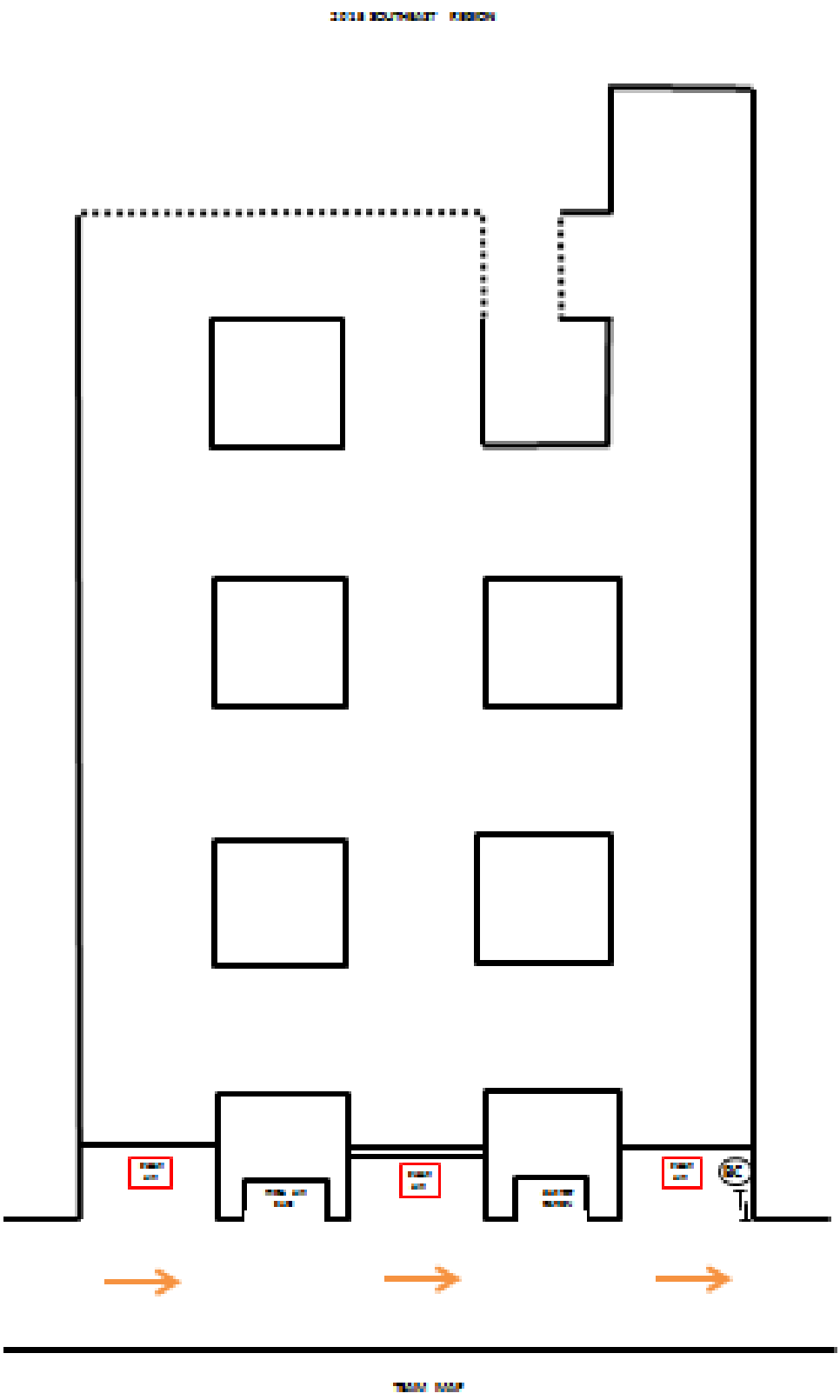
the area, gas tests must be taken inside the barricade and the captain must D&I the permanent stopping and the location of the live miners. The team will take the miners to the FAB.
Note: As the team travels to the fresh air base, all areas that they travel should be cleared of smoke or toxic or dangerous gases. Gas tested at all openings along the way.
At the fresh airbase, the team delivers the miners to the mine manager. The team will stop the clock as they have completed their mission by locating the four missing miners, bringing three of them out alive, extinguishing the fire, and exploring and mapping all accessible areas. The judges will collect all three maps. The judges will have a 5 minute look with the team to briefly explain the docks to the team.

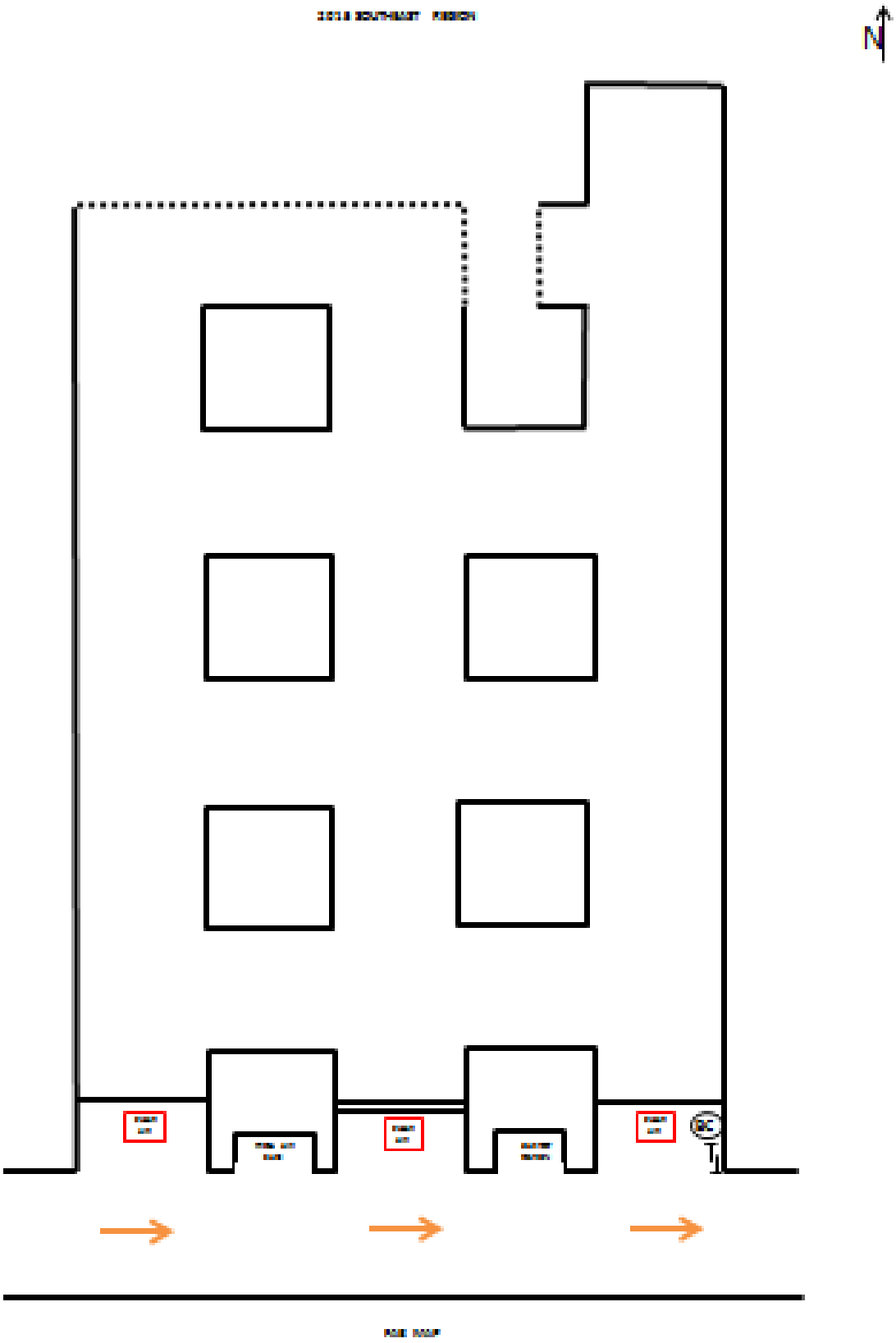
***** THE END *****




N
EXPLORATION






N