From Mine Rescue Contest Procedures
to
Emergency Response Decision Making
for
Actual Mine Rescue Use

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3rd. International
Mine Rescue Conference

August 29th – September 1st, 2007

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Emergency Response Decision Making

- To help ensure the safety of our nation's miners, mine rescue teams are required by law to train at least 40 hours per year. These regulations were mandated by the Federal Mine Safety and Health Amendments Act of 1977, Section 115(e), and are spelled out in 30 CFR Part 49.

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Emergency Response Decision Making

- However, many of the nation's mining companies allow their mine rescue teams to train many more hours than required and to participate in an excellent training tool "Mine Rescue Contests".
- To paraphrase the mission statement from the 2006 Metal and Nonmetal National Mine Rescue Contest Rules book

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- "*contests serve as a training tool to improve the skills required to respond to a mine emergency. The National Contest Rule Book establishes procedures and rules that serve to guide the rescue teams in actual situations. This competition serves to strengthen cooperation between mining companies, equipment manufactures, Federal and State agencies to enhance mine rescue preparedness*."
- And of course this also holds true for coal mine rescue contests.

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Emergency Response Decision Making

- As a former member and trainer for both coal and metal and nonmetal mine rescue teams I know the value of training for these mine rescue contests.
- Team safety is emphasized and is their number 1 priority.
- Teamwork and team bonding are also strengthened.

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Emergency Response Decision Making

- Mine gases
- Ventilation
- Exploration
- Fires, firefighting, and explosions
- Rescue of survivors & recovery of bodies
- Mine recovery
  - Are all taught in mine rescue contests.

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Emergency Response Decision Making

- **However as in all contests, there must be hard, inflexible, and concrete rules and that is simply not the case in reality.**

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Emergency Response Decision Making

- The next step in preparing our nations coal and metal and non metal mine rescue teams for their regulated purpose of protecting and rescuing our nations miners is for them to become

  emergency response decision makers

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- What I mean by this, is for teams to build on the foundation that contests develop and to know when it is within acceptable risk for a team to bend a 25 foot contest rule or to fully understand what happens when a gas is just over the irrespirable range, again according to contest rules.

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Emergency Response Decision Making

- The questions, decisions, and discussions that will be raised through more realistic mine rescue scenarios will be key to enhancing the emergency response decision making skills of not only our nations mine rescue teams, but to those who support and direct them. More realistic mine rescue scenarios must become a part of the required training, just like contests, of our nations mine rescue teams training techniques.

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Emergency Response Decision Making

Section 4 of the MINER ACT

MINE RESCUE TEAMS

- Make available two certified mine rescue teams whose members--
  - (AA) Are familiar with the operations of such coal mine. (good)
  - (DD) Are available at the mine within one hour ground travel time from the mine rescue station. (good)

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Emergency Response Decision Making

- (BB)
  - Participate at least annually in two local mine rescue contests.
    - This is also a **very good start**.
      - Contests build an excellent foundation for mine rescue teams.

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Emergency Response Decision Making

- (CC)
  - Participate at least annually in mine rescue training at the underground coal mine covered by the mine rescue team.
    - What does this “training” mean?
      - Normally setting up a contest problem in the mine? (good)
      - Tour of mine? (good)
      - Walk into and out of mine? (?)

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Emergency Response Decision Making

- But what the MINER Act does not cover is it's opportunity to strongly encourage **"more frequent and realistic training focusing on key principals"**
  - (this is a recommendation from the Mine Safety Technology and Training Commission's December 5th, 2006 report)
- Training in smoke is also not covered in the proposed MINER ACT.
- Training with company officials and MSHA is not covered in the proposed MINER ACT.

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- Because the actuality of most real rescue scenarios is that all of the decisions are not made by the mine rescue team they are made by the command center which is made up of company, state, union, and MSHA officials.
- Then any plan that is made must be approved by MSHA.

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- The training required for contests demands that teams do certain tasks the same way every time, almost automatically.

- So here are a few contest rules that with proper consideration and risk analysis could or should be bent in reality.

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- Exploration for contests is pretty clear cut
  - Tie across and behind
  - Max allowed unexplored area before tieing back and behind is two crosscuts.
  - Then a team must airlock through a stopping or go around and up the next entry.
    - Unless the area, is deemed contest inaccessible?
      - Unsafe roof ???
      - Water over knee deep ???
      - Caved ???

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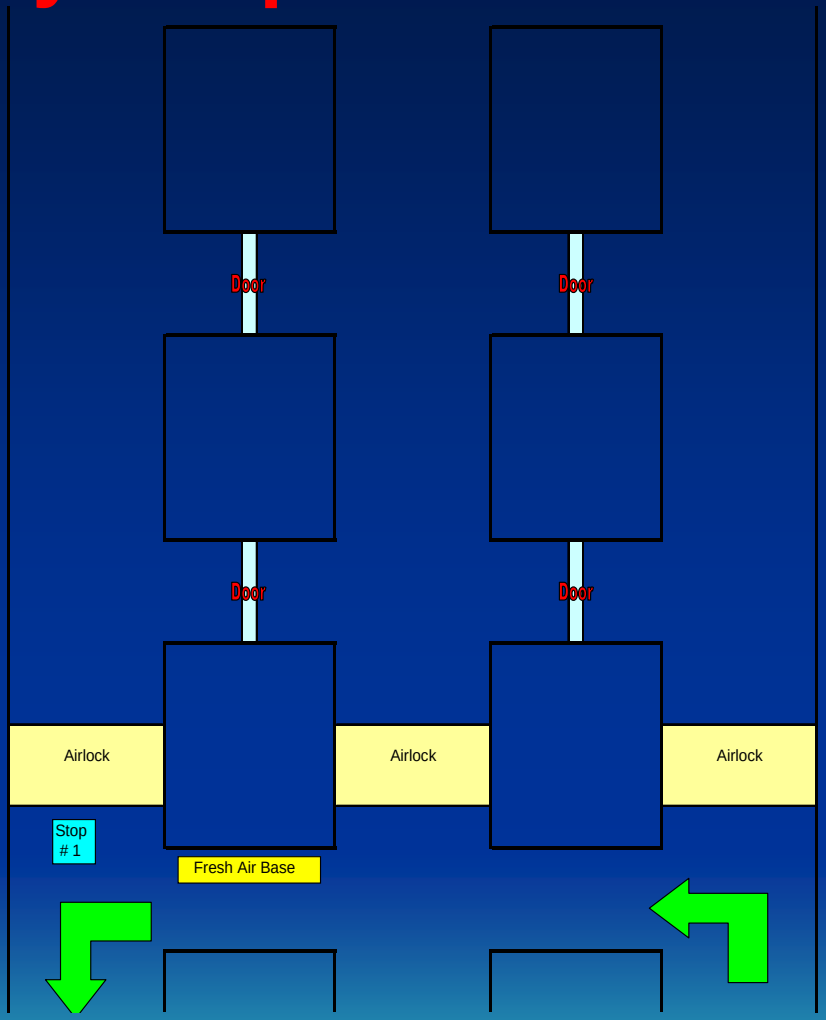
Emergency Response Decision Making



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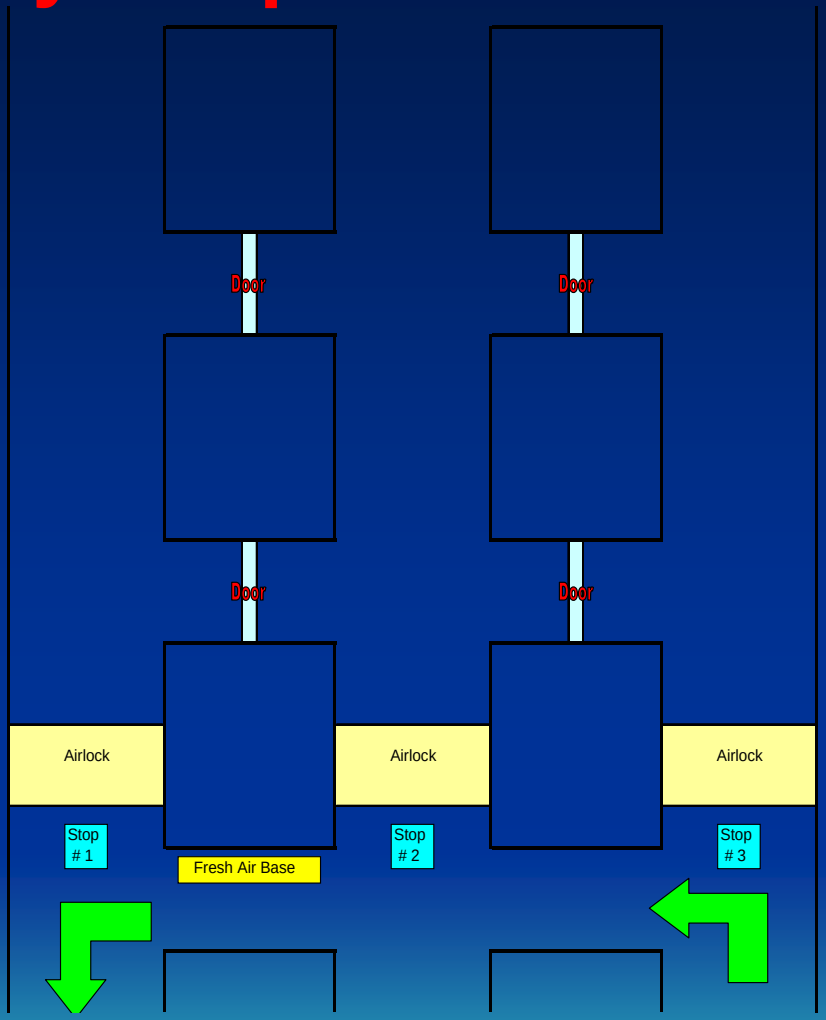

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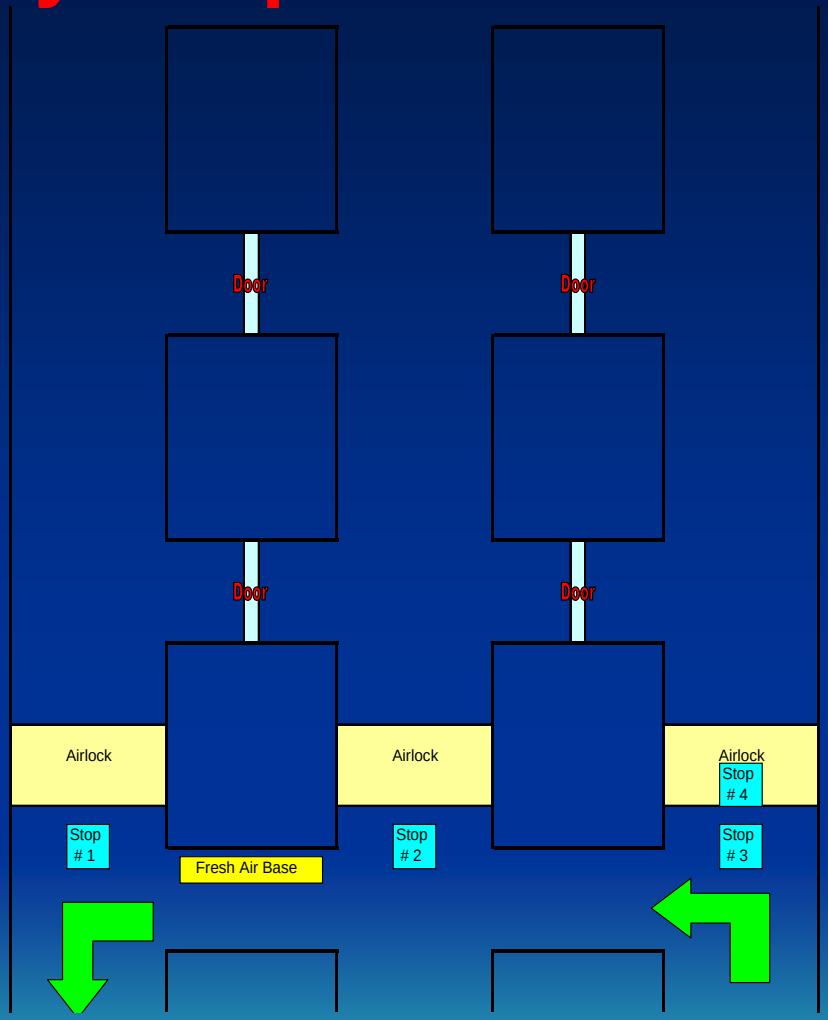

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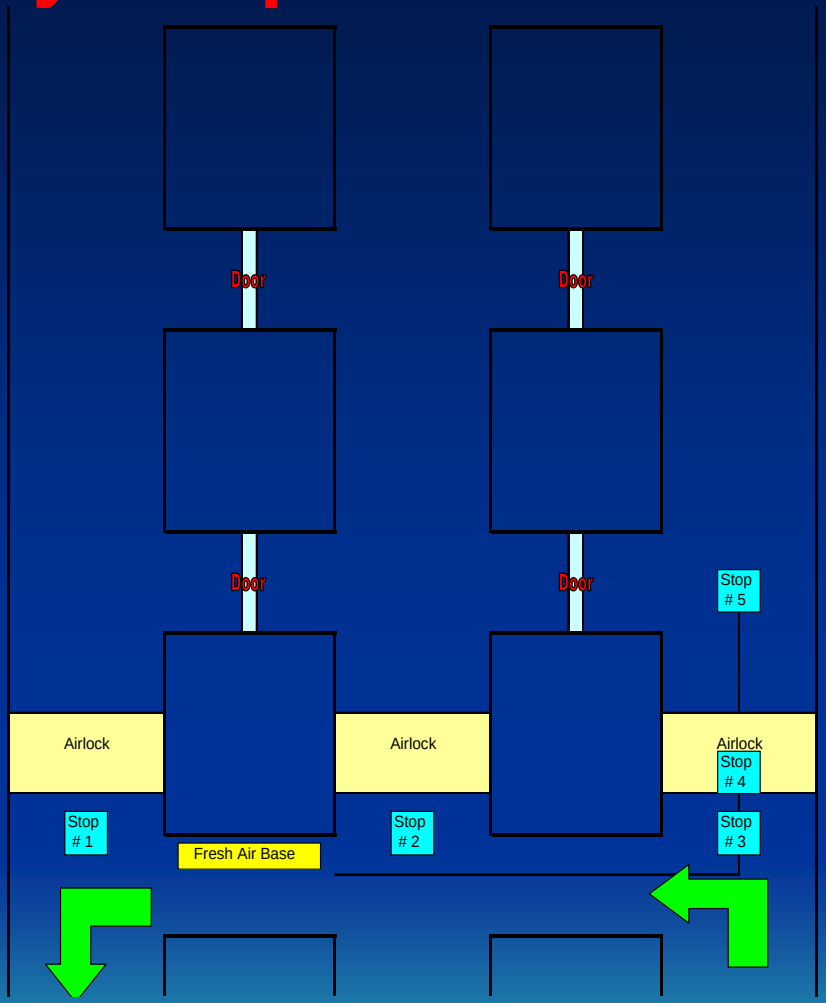

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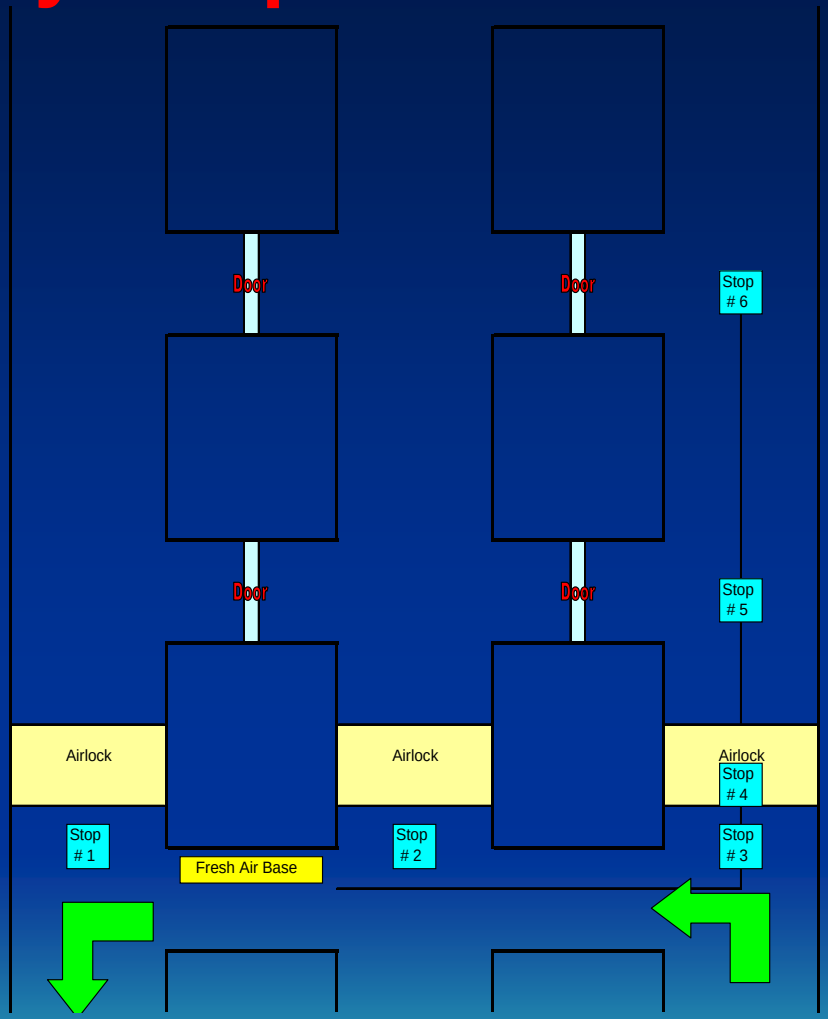

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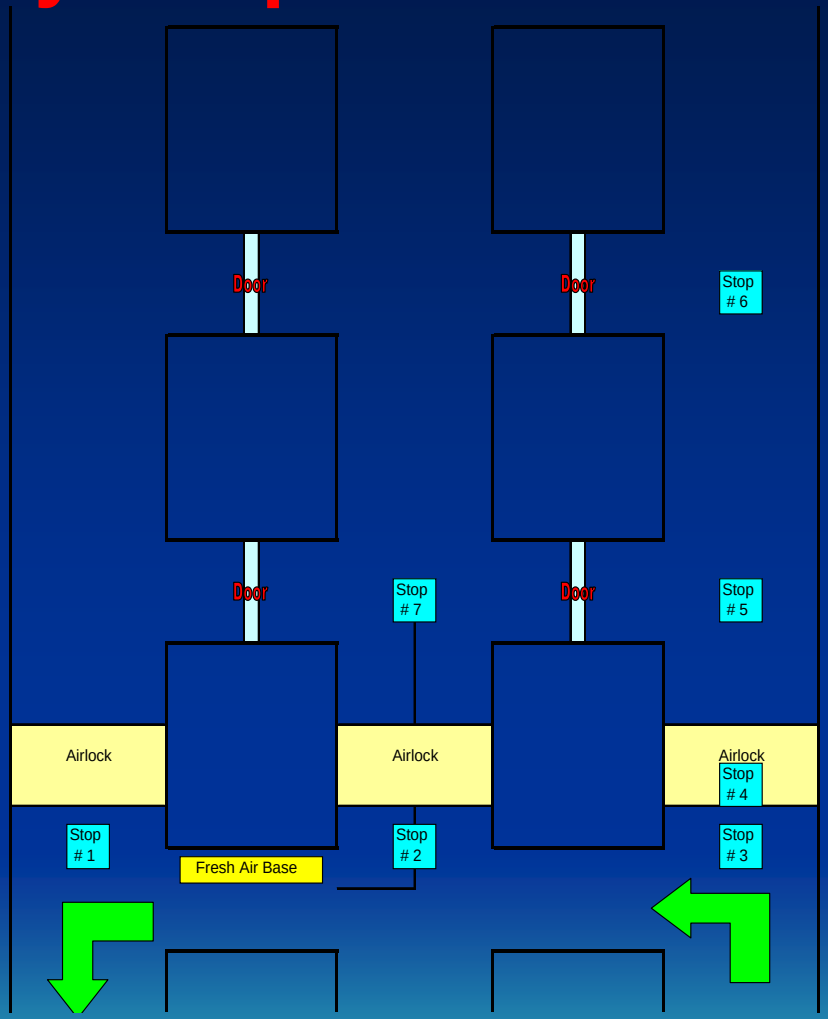

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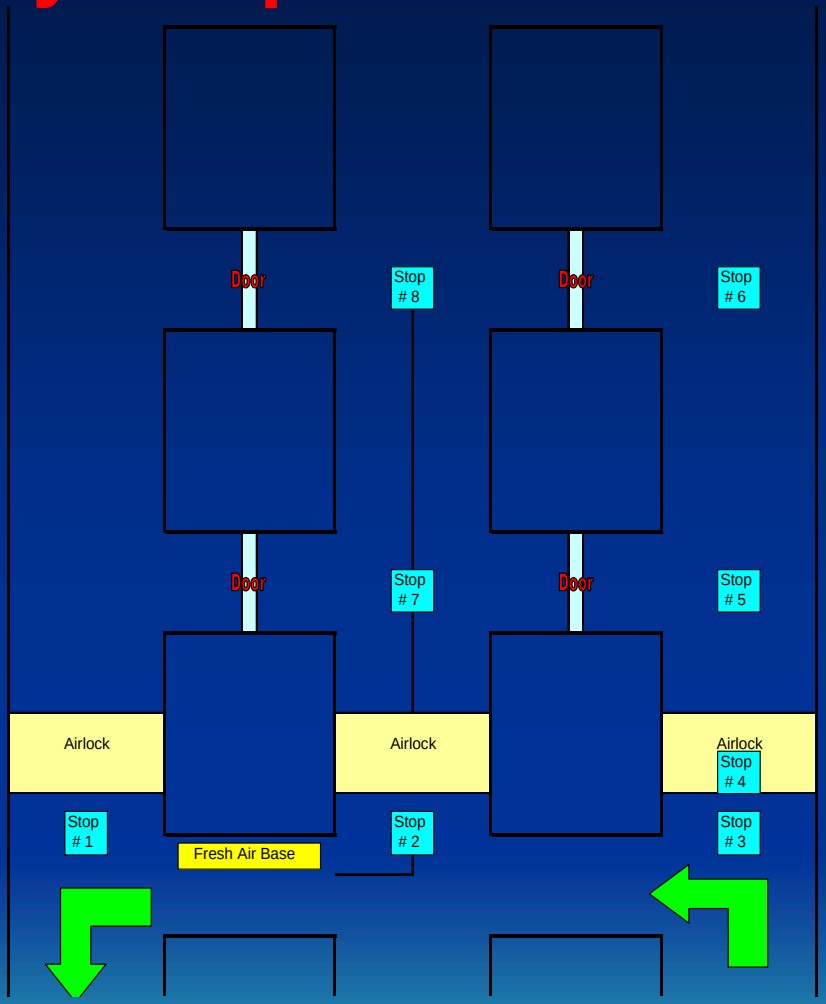

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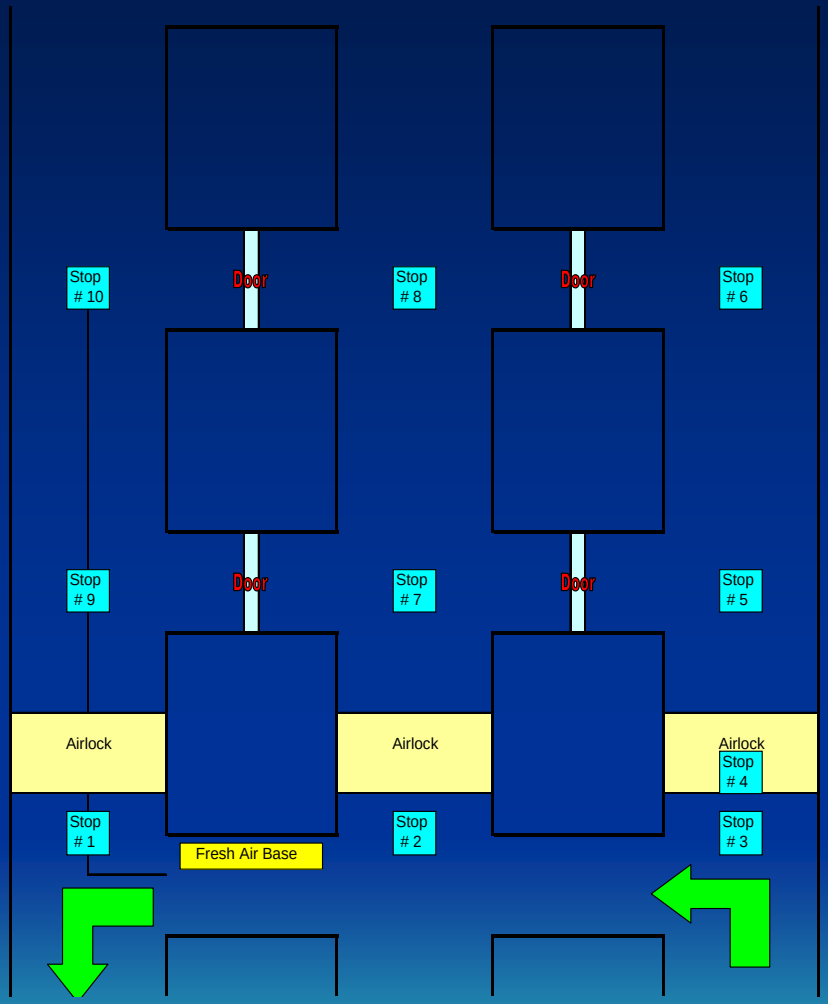

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- Now perhaps conditions are favorable for a different type of exploration??
  - The plan could be presented, the risks analyzed.
  - Then with the command centers and MSHA's approval, carried out.

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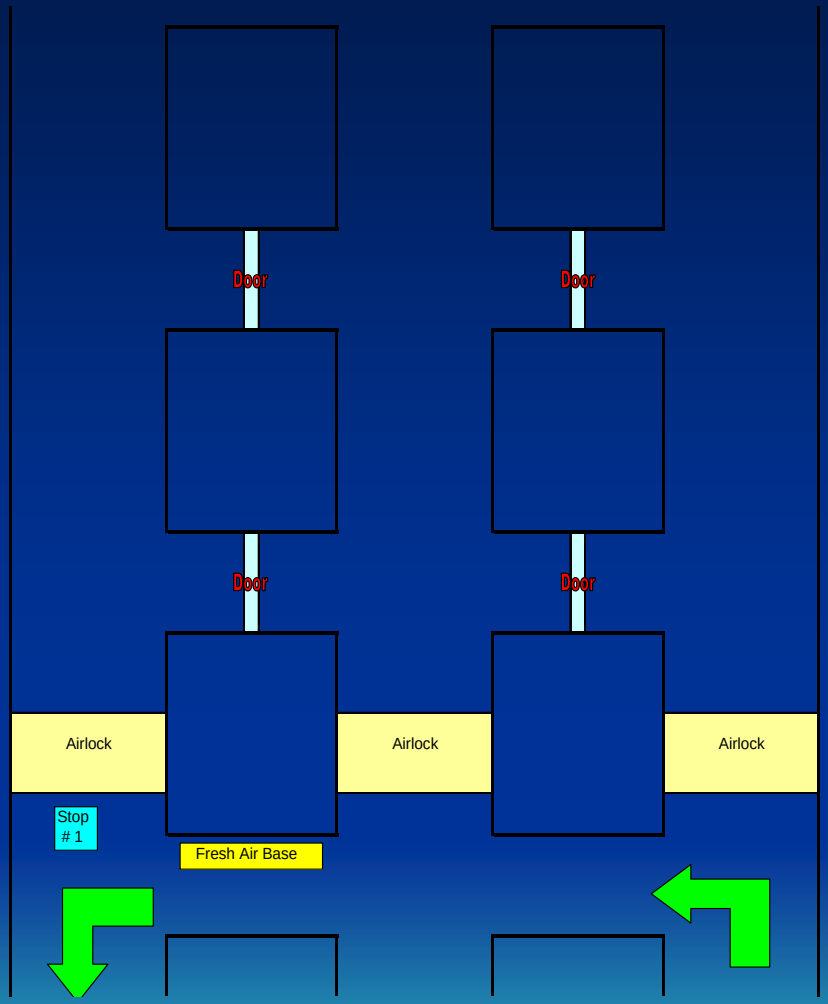

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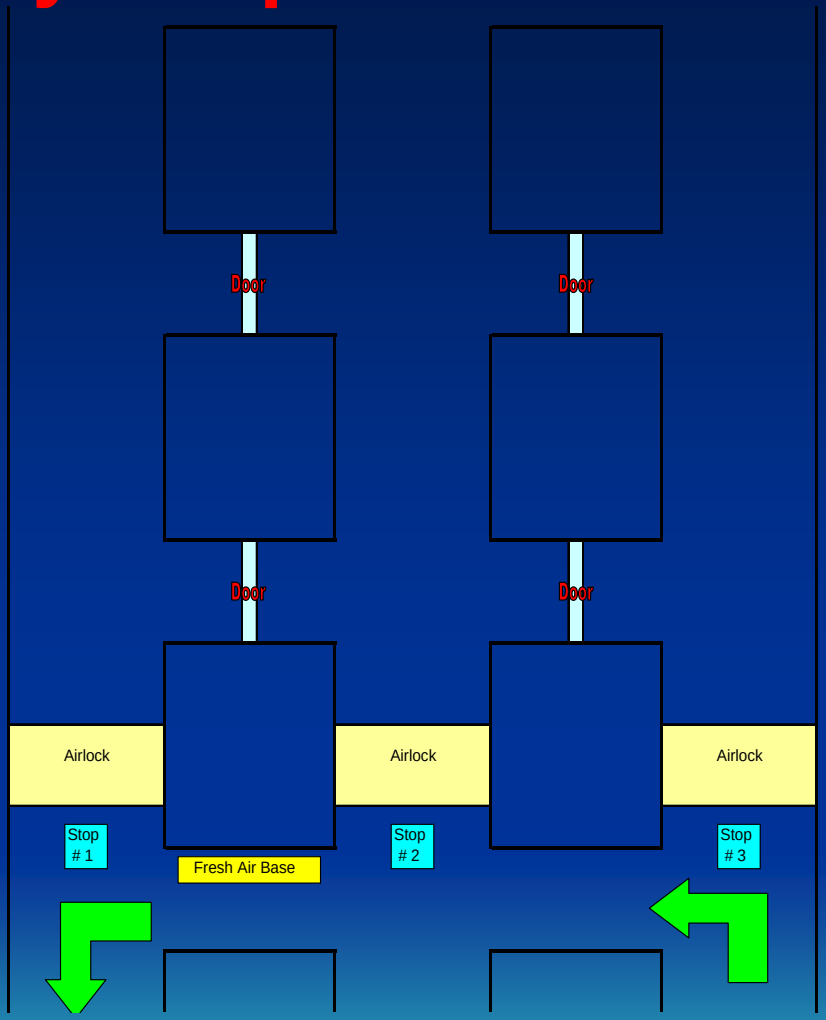

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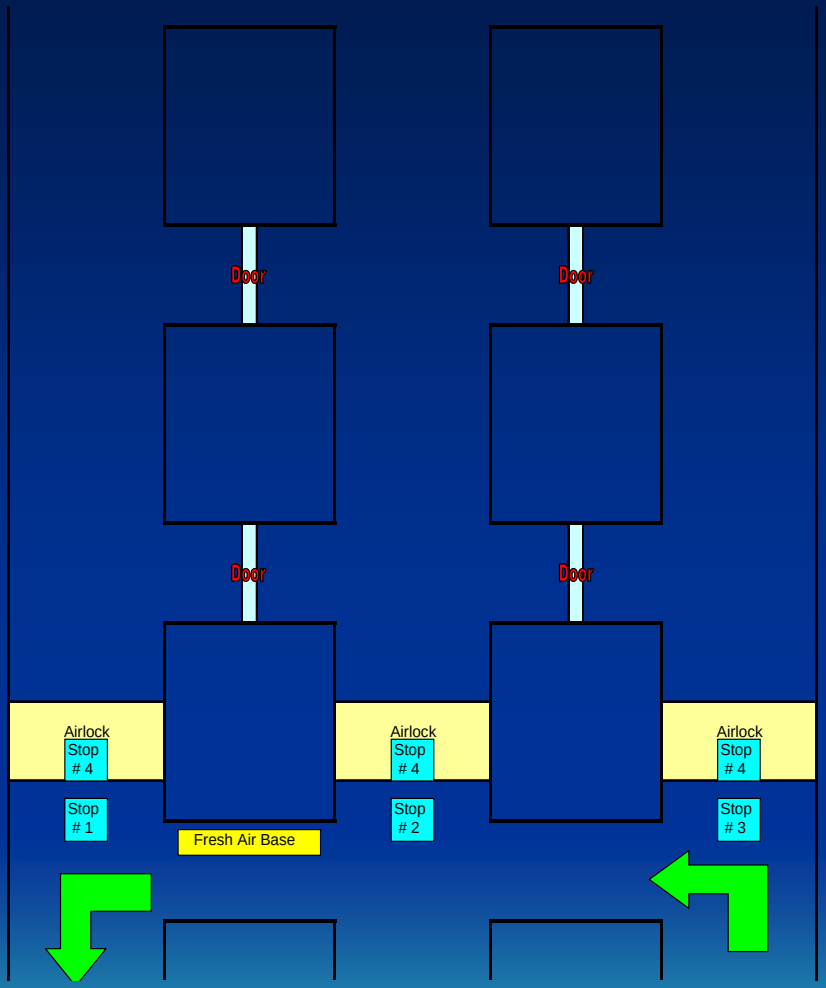

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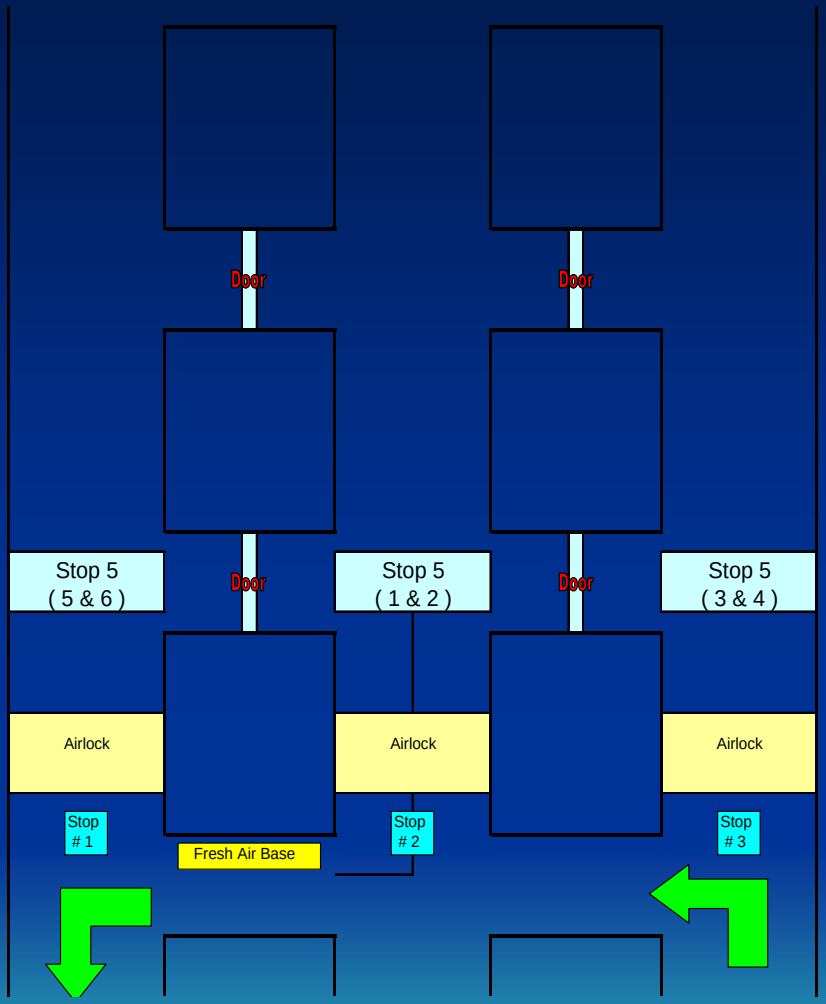

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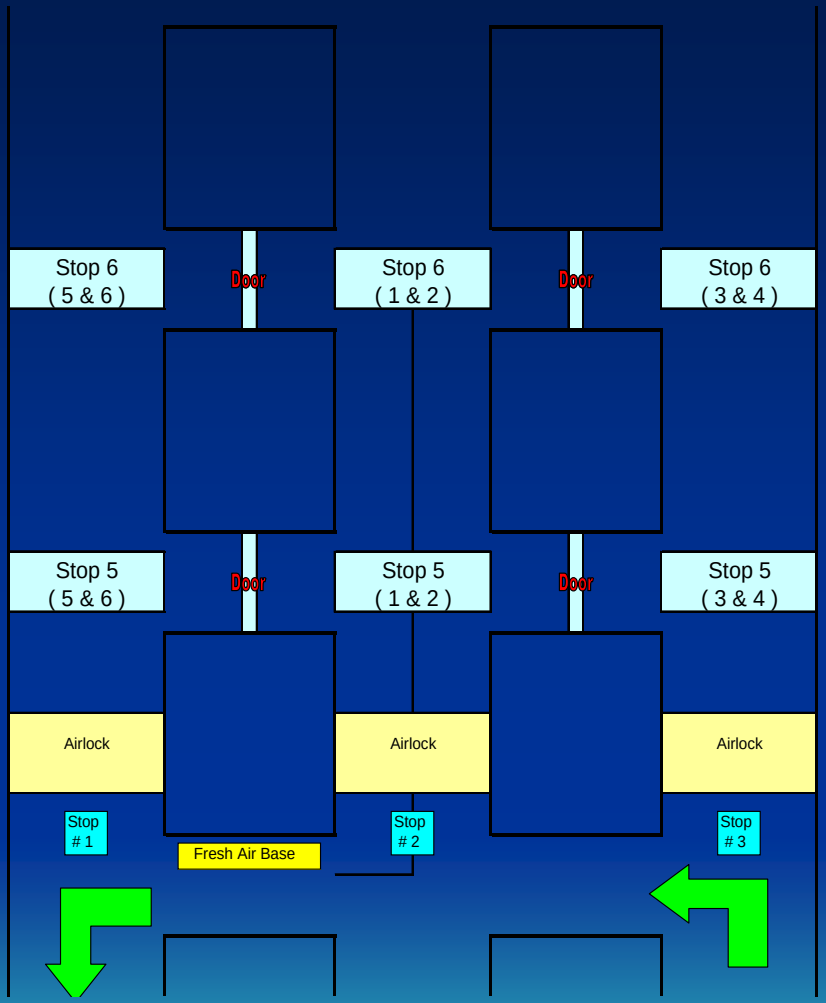

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Emergency Response Decision Making

- What if exploration were needed in a small gold mine with many drifts and stopes that had no pattern of room and pillar entries?
  - Would the mine rescue team use their communication system?
    - How would they pull their cable around the many corners or up and down the ladders, etc?

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Emergency Response Decision Making

- Radios could work.
  - Technology is greatly helping out here.
- But what could they do if the radios lost coverage???

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Emergency Response Decision Making

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Emergency Response Decision Making

- Mine Rescue **Contest Gases**
  - Teams are trained for both coal and metal and non metal contests to know what a containment is and to know what is considered an irrespirable gas.
    - They want to know these ranges and limits by heart.

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Emergency Response Decision Making

- Mine Rescue **Contest Gases**
  - So realistic mine rescue training should give teams gases that are just over these numbers and make them discuss the consequences and the risks.
  - According to contest rules ventilation must be performed to remove a gas that exceeds certain limits when found outside a barricade.

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Emergency Response Decision Making

- But what should a team do in reality?
- Because remember the degree to which a toxic gas will affect us depends on three factors.
  1. How concentrated the gas is
  2. How toxic the gas is
  3. How long you're exposed to the gas

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- Mine Rescue Contests don't take into consideration, how long someone has or could be exposed to the gas.
  - So while being exposed to 500 ppm CO is dangerous, it is not necessarily fatal for a short exposure.
- I am not saying that contests should take this into consideration, but reality based mine rescue training must.

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Emergency Response Decision Making

So when going from

Mine Rescue Contest procedures to

Emergency Response Decision Making

here are some areas that can be discussed.

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Emergency Response Decision Making

- Briefing
  - A checklist of important facts that teams must know about.
  - Make the teams ask the questions.
  - How confident are you in the answers?
    - Condition of person giving answers.

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Emergency Response Decision Making

To rescue or not to rescue???

- Team Safety
- MSHA, onsite? K order? Backup team(s)
- Is ventilation On or off (use of smoke tubes)
- Gases (ranges of certain types of meters)
  - Methane and the barometer
- Explosives Roof conditions Water
- Length of time since “situation”
- Where in the mine is the “situation”
- Missing miners, how many
- Communication with missing miners
- Other techniques, drill rigs, etc

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Emergency Response Decision Making

- Portals or Shafts
  - Air flow, quantity & direction
    - Will it change, why? Consistency of readings.
  - Gas checks
    - Consistency of these readings, gases rising??
      - Receive continuous updates
  - Roof conditions or other “clues”
  - Access into mine

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Emergency Response Decision Making

- Go Barefaced or Under Oxygen
  - Consistency of these readings, gases rising??
    - Receive continuous updates.
  - At what point do you go under O2??
    - SMOKE light, heavy, source of fire?
    - CO 25 ppm how long 1,000 ppm
    - O2 19.5 % how long 15%
    - NO2 3 ppm how long 50 ppm
    - others

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Emergency Response Decision Making

- Command Center (CC)
  - Outside
  - Linked to FAB
    - How linked
- Fresh Air Base (FAB) DAB??
  - Where is it
  - How do you get there?
    - Drive, walk, shaft
  - Communication while traveling from portal to FAB
  - Constant gas readings
  - Constant ventilation

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Emergency Response Decision Making

- Exploration
  - Conditions dictate Visibility, gases, etc
  - Full team (4, 5, 6, 7 ??) on lifeline??
  - Stop at every intersection ?
  - Tie back and behind (YES)
  - 2 crosscuts plus 3 ft or 25 ft
  - 2 crosscuts YES good
    - 3 ft or 25 ft ?
      - Reasonable line of site
      - Always in twos or more

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Emergency Response Decision Making

- Branched off multiple exploration or extended exploration (sweeping a shop area)
  - Always in twos or more
  - 5 minute max tieback or communicate
    - Air horn or PASS system

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Emergency Response Decision Making

- Communication
  - Will cable be long enough (1,000 ft)
  - Will cable go around corners, over debris, around equipment
  - Radio's (small hand held, MSHA approved or not)
  - Good supply of reflective bread crumbs

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Emergency Response Decision Making

- When cable can't be pulled or is at 1,000 ft
  - Stationary CoCap – FAB – CC
  - Team goes out & reports back to CoCap
  - Do conditions allow
  - Visibility
  - Gas conditions
  - Roof conditions

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Emergency Response Decision Making

- Explosions
- Missing Miners
- Phone to phone
  - 5 minutes out 5 minutes back
  - Full team gives exact intent of travel
  - If event happens (send 2 back to report)

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- Second communication reel with a Dirty Air Base
  - Team – CoCap – DAB – FAB – CC
- Pay out other type of communication cable
  - Shot wire
    - May not be continuous communication due to no slip rings

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Emergency Response Decision Making

- Gas Checks
  - Where
  - When, continuous monitoring
  - Alarms
- Patient Handling
  - Why do we put unconscious victims on apparatus.
- And many other areas.

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Emergency Response Decision Making

TEAM EDGAR

MINE RESCUE TRAINING CENTER

Emergency Response Decision Making

The Colorado Division of Reclamation, Mining and Safety operates an underground mine rescue training facility near Denver, Colorado. This facility is called the Edgar Mine and the mine is owned by the Colorado School of Mines.

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- Here we are able to build on the foundation that mine rescue contests develop by sometimes forcing teams to make emergency response decisions on when to consciously analyze the risks and benefits and then bend contest rules.

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- We have a high degree of MSHA interaction during our mine rescue training sessions.
- And we highly emphasize team work.

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- Finally since it is a small experimental mine we can have teams actually measure and change the ventilation, build real stoppings in a real mine, and be exposed to large volumes of smoke.

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- A similar training facility in Beckley, WV is the **The Mine Simulation Laboratory** is an above-ground simulated mine that provides hands-on training for MSHA inspectors and mining industry personnel. The 48,000 square foot facility has a simulated coal mine with an indoor burn room on the lower level and a simulated metal/nonmetal mine on the second floor level. The coal mine represents a room-and-pillar setup with four (4) entries and nine (9) crosscuts.

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TEAM EDGAR

MINE RESCUE TRAINING CENTER

Harry Lovely

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