



# MSHA



## WELCOME TO THE APPROVAL & CERTIFICATION CENTER



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# MINE SAFETY AND HEALTH ADMINISTRATION

## “THE GREAT ESCAPE”

### ESCAPE PIPING SYSTEM CONCEPT

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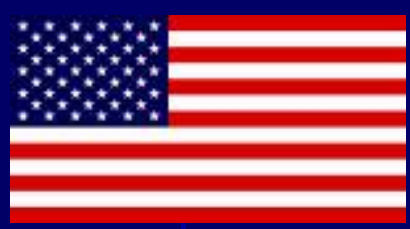


# “THE GREAT ESCAPE”

Today we are proud to discuss and demonstrate a system which:

1. Provides a constant, uncontaminated, positive pressure supply of breathable air independent of whatever is taking place in the mine.
2. Provides all the benefits of a refuge chamber and self contained self rescuers (scsr's) and also provides safe means of egress through an isolated/uncontaminated/structurally protected escape path.
3. Safely protect communications and tracking systems from fire and explosive forces.





# MINING EVOLUTION



## Atmospheric Monitoring

canaries    flame safety lamps    gas chromatographs    digital multi-gas detectors

## Roof Control

narrow entries    timbers    fully grouted resin bolts    combination roof bolts

## Mine Rescue

crude barricades    W65 rescuer    1969 MINE Act (escapeways)    SCSR



# MINING EVOLUTION



The mining industry has recently made great strides in Mine Rescue and disaster prevention including:

- portable refuge chambers
- communication and tracking
- mine emergency response plans (ERP's)

now, we are pleased to introduce the next step **"THE GREAT ESCAPE"**

**MINE ESCAPE SYSTEM**



# OVERVIEW OF “THE GREAT ESCAPE”

## POINTS OF DISCUSSION:

- Design And Layout
- Benefits
- Potential Issues And Solutions





# GREAT ESCAPE



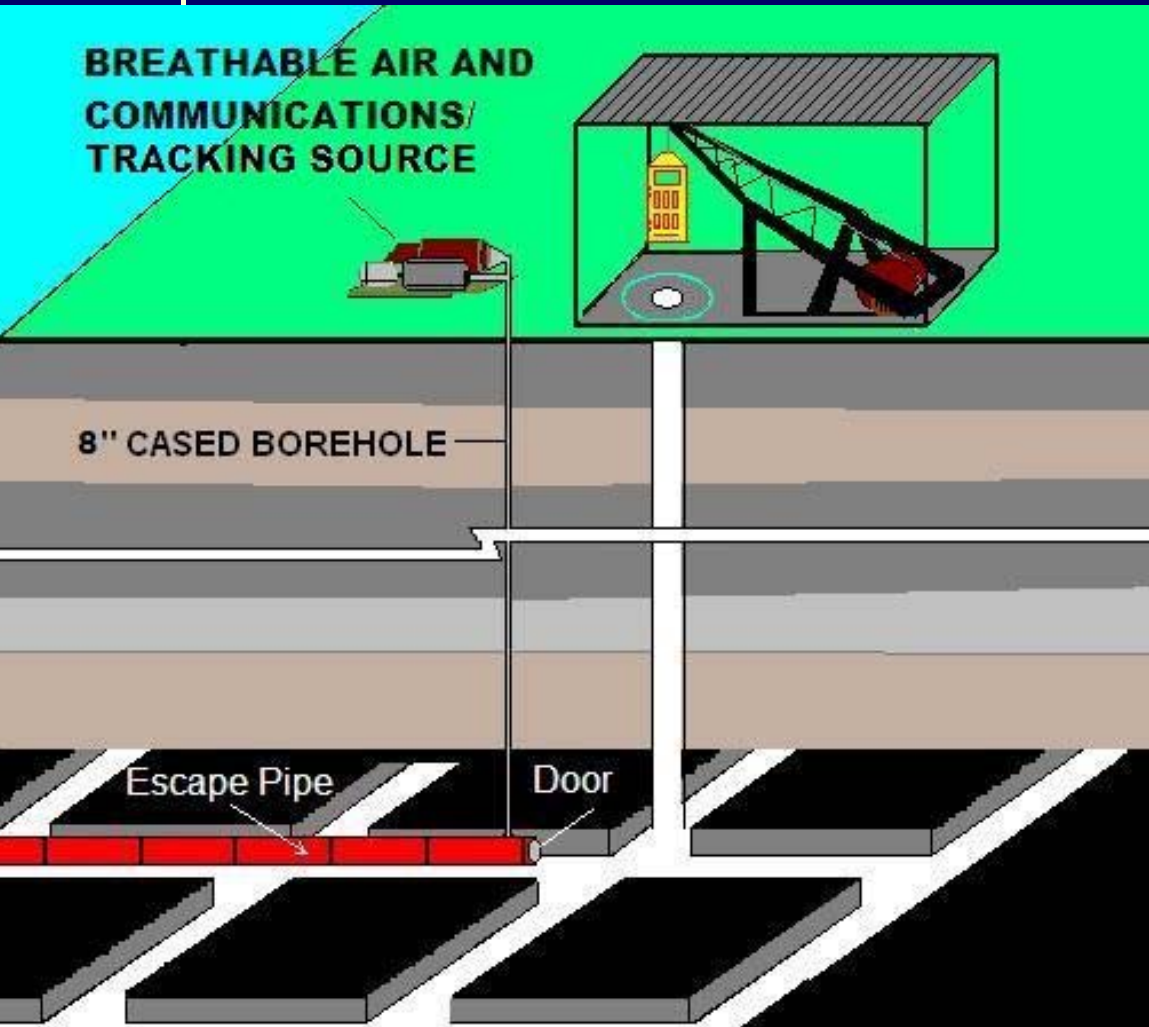




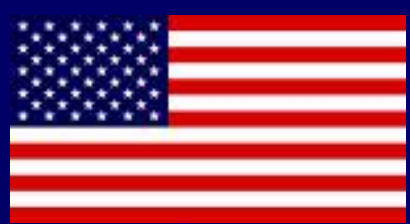
# DESIGN AND LAYOUT



## ESCAPE SYSTEM



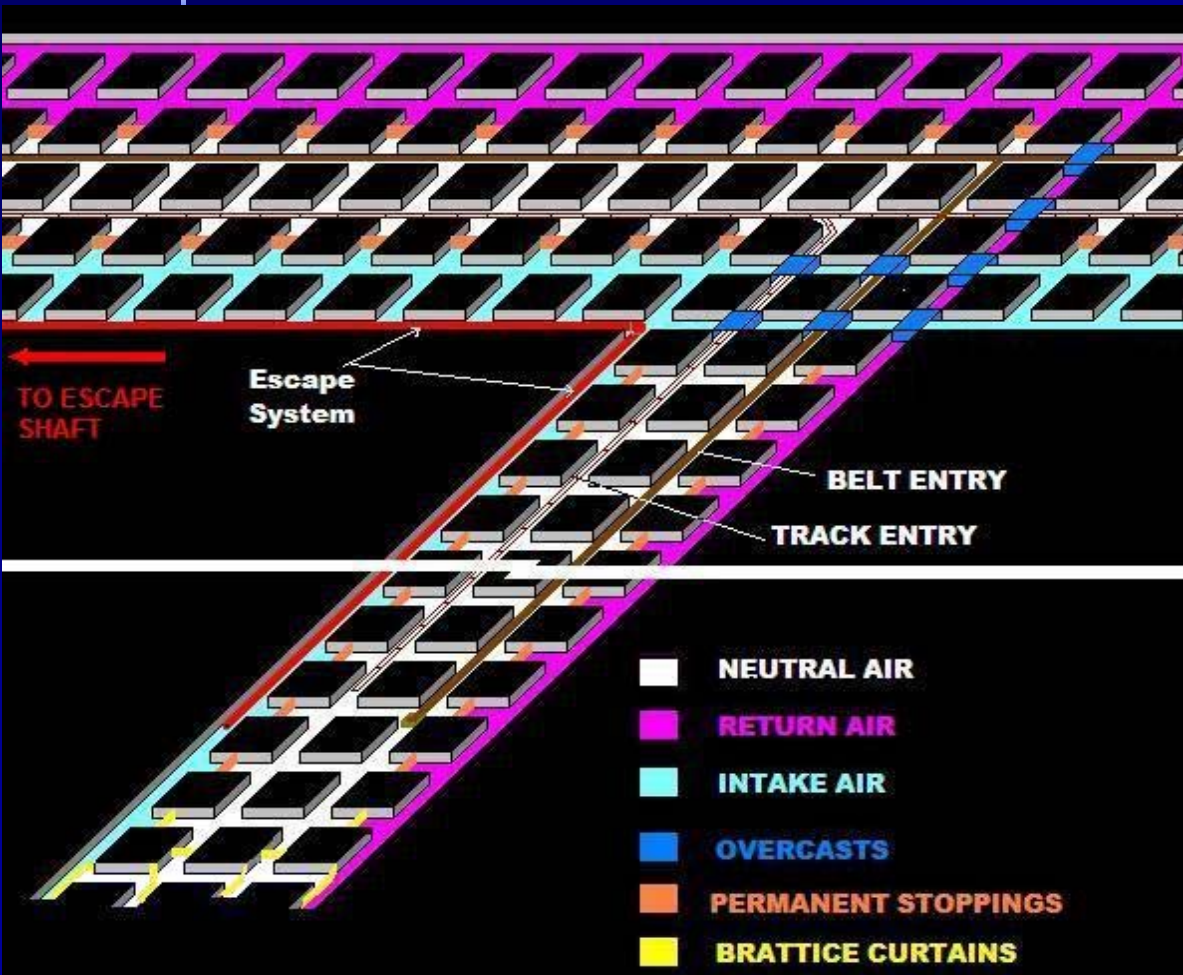
- Separate isolated escapeway ventilated from the surface by a blowing fan.
- Doors and vents are provided in the end caps.
- The system requires minimal ventilation and provides an unimpeded escapeway to the surface.



# DESIGN AND LAYOUT



## ESCAPE SYSTEM OVERVIEW – SECTION TO MAIN



- The system is accessible near the working section and at points along the pipe no more than 2000 feet intervals.



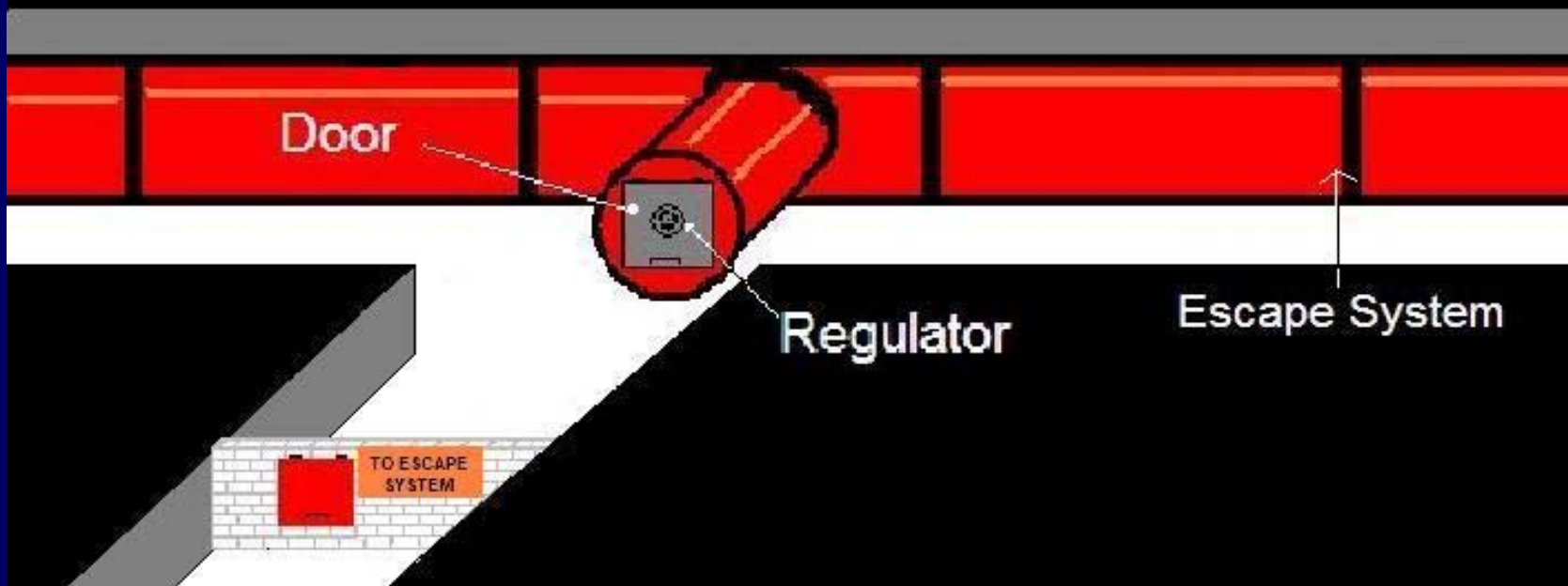
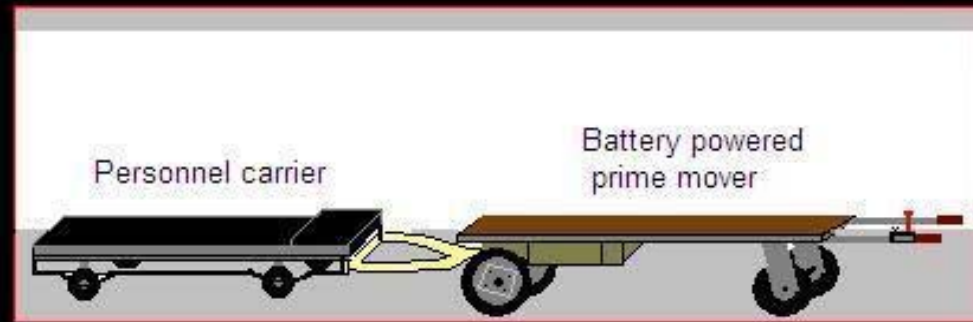
# DESIGN AND LAYOUT

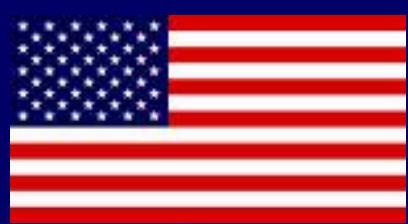


## CLOSE UP VIEW OF AN ENTRANCE TO ESCAPE SYSTEM

The escape system will contain:

- battery powered prime mover
- personnel carriers
- communication / tracking





# DESIGN AND LAYOUT



## SAMPLE CALCULATION FOR FAN / BLOWER REQUIREMENT

### ESCAPE SYSTEM

42" ESCAPE CONCRETE  
PIPE 1,000 CFM AIR  
15,000 OF PIPE

30" ESCAPE CONCRETE  
PIPE 1,000 CFM AIR  
15,000 OF PIPE

PRESSURE DROP IS 0.18"  
W.G.

PRESSURE DROP IS 0.96"  
W.G.

**Conclusion :** There is very little pressure loss in the escape system, regardless of whether the pipe is 42" or 30" inside diameter. It is critical to ensure the pressure in the system is always higher than that in the entry. This keeps bad air out of the pipe.



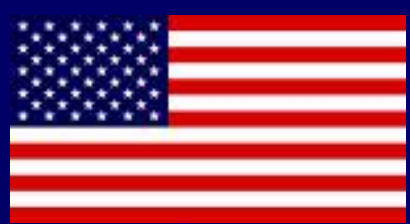


# BENEFITS



## WHY IS THIS IMPORTANT?

- The most precious resource (the miner) deserves this consideration and effort.
- Escaping a disaster is preferred over barricading, this system enhances the chances of a successful escape.
- Eliminates confusion during escape by providing a direct escape path.
- Once inside the system the miner has protection from fire and smoke.
- The system provides latitude on where a bore hole can be drilled from the surface.



# BENEFITS



## COMMUNICATION / TRACKING

- Ensures protected communication and tracking to the surface
- Allows added flexibility for methods of providing communication and tracking
- Steel reinforcing in escape system may serve as a medium frequency antenna

## MINE RECOVERY

- Significantly shortens mine recovery time by providing a protected / isolated path to reach deep into the mine.



# BENEFITS



## INSPECTION

- Relatively easy inspection criteria for system

## EMOTIONAL

- Gives miners added psychological confidence of assured escape



# BENEFITS



## LOGISTICAL ADVANTAGES

- Delivery times / availability for chambers and replacement supplies are problematic.
- Everything needed to install an escape system is commercially available in sufficient volume for the industry.
- The system can provide breathable air requirements as an alternative to outby refuge chambers or refuge locations.
- Provides a prime opportunity to consider the use of rebreathers in outby applications.



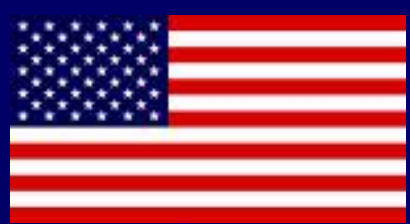


# BENEFITS



## TRAINING ADVANTAGES

- The escape system would require only minimal and simplistic training.
- The escape system minimizes the wear time for SCSR's.



## ISSUES

## SOLUTIONS

COST

- System may serve as a substitute for outby chambers and also create the opportunity for considering the use of rebreathers outby. Our most precious resource (miner) deserves this protection

HEAVY HANDLING

- Forklift on scoop or set similar to "*can cribs*"

WATER ACCUMULATION /  
INFILTRATION

- There are commercially available methods to effectively seal joints making them air and water tight

CROSSING JUNCTIONS AT  
INTERSECTIONS WITH  
ESCAPE SYSTEM

- Ramp down into bottom across entries like an undercast



## ISSUES

## SOLUTIONS

VENTILATING LOGISTICS

- Only need enough air to pressurize and move air through escape piping system.

CAN'T MAKE TIGHT BENDS

- Can angle pipe joints up to 4.5" per 8'. Also have ells commercially available in 7.5 degree increments to accommodate bends

30" PIPE IS TOO SMALL / 42" PIPE IS TOO BIG

- Pipe comes in a variety of sizes from 24" to over 100"



## ISSUES

## SOLUTIONS

PIPE CANNOT EASILY BE TRAVELED

- In other industries such as petroleum and impoundments, pipes as small as 24" in diameter have been traveled for inspection

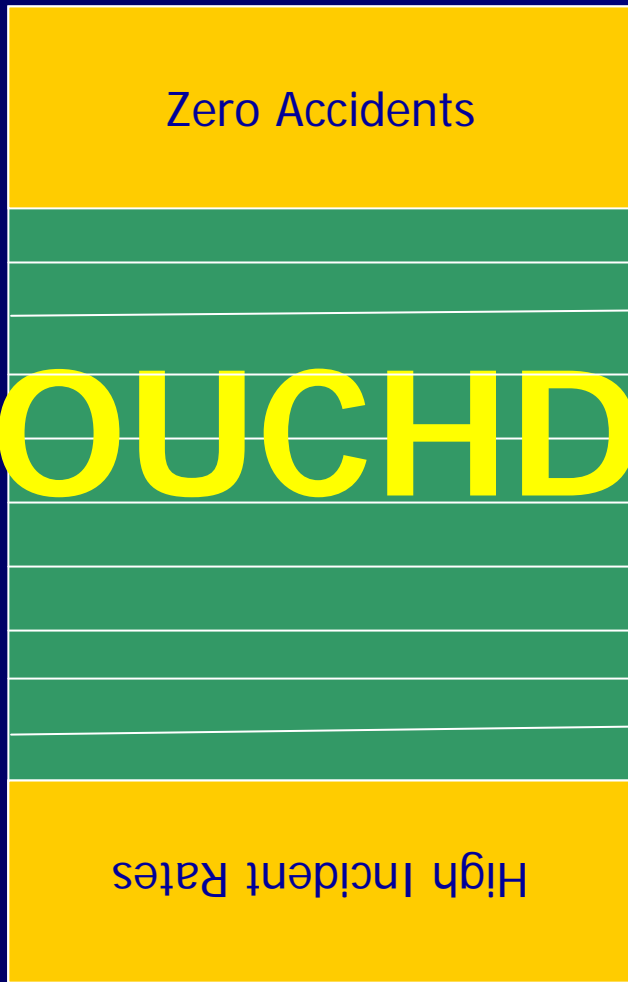
NEED TO EXAMINE WEEKLY

- Examine from outside & incorporate 6 week evacuation drills on the inside of escape system





Let's keep driving the ball down the field!!



**TOUCHDOWN!!!!!!**



**THE GREAT ESCAPE**



**REFUGE CHAMBERS**



**2006 MINER ACT**



**ADDITIONAL AIR-PACKS (CCSR's)**



**1969 MINE ACT**



**FLAME SAFETY LAMPS/W-65 RESCUER**



**USE OF CANARIES FOR GAS DETECTION**