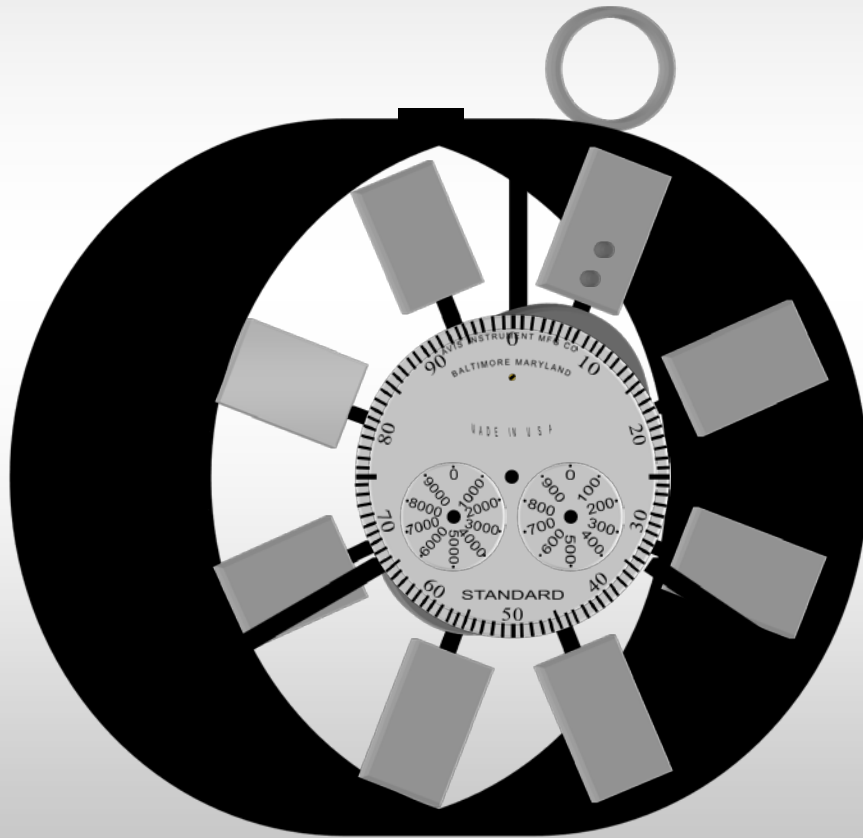


Ventilation Section

Introduction

- Face Ventilation
 - Stoppings
 - Check Curtains
 - Air Measurements
- Principals of Airflow
- Respirable Dust Control
- Use of Scrubbers
- Actions for Excessive Methane
- Rock Dusting
- Permissibility

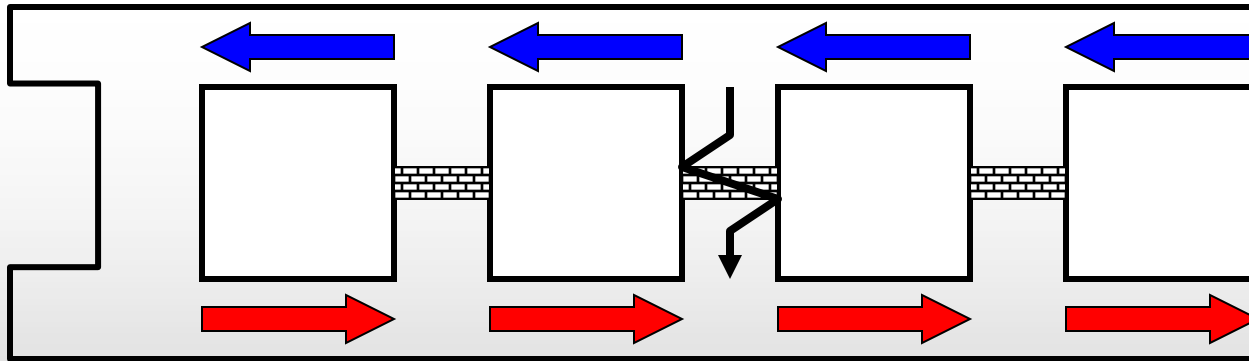
The principal mechanism for taking medium air velocity measurement is the Anemometer.



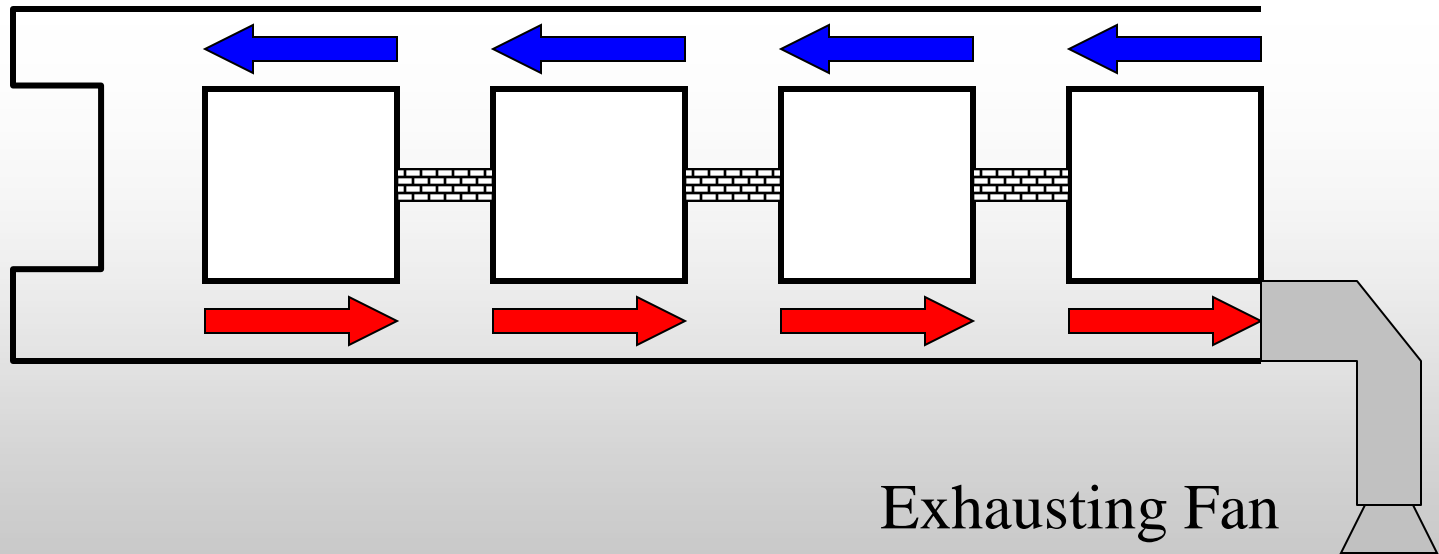
A high speed anemometer is most often used for high velocity air measurements!

Principals of Airflow

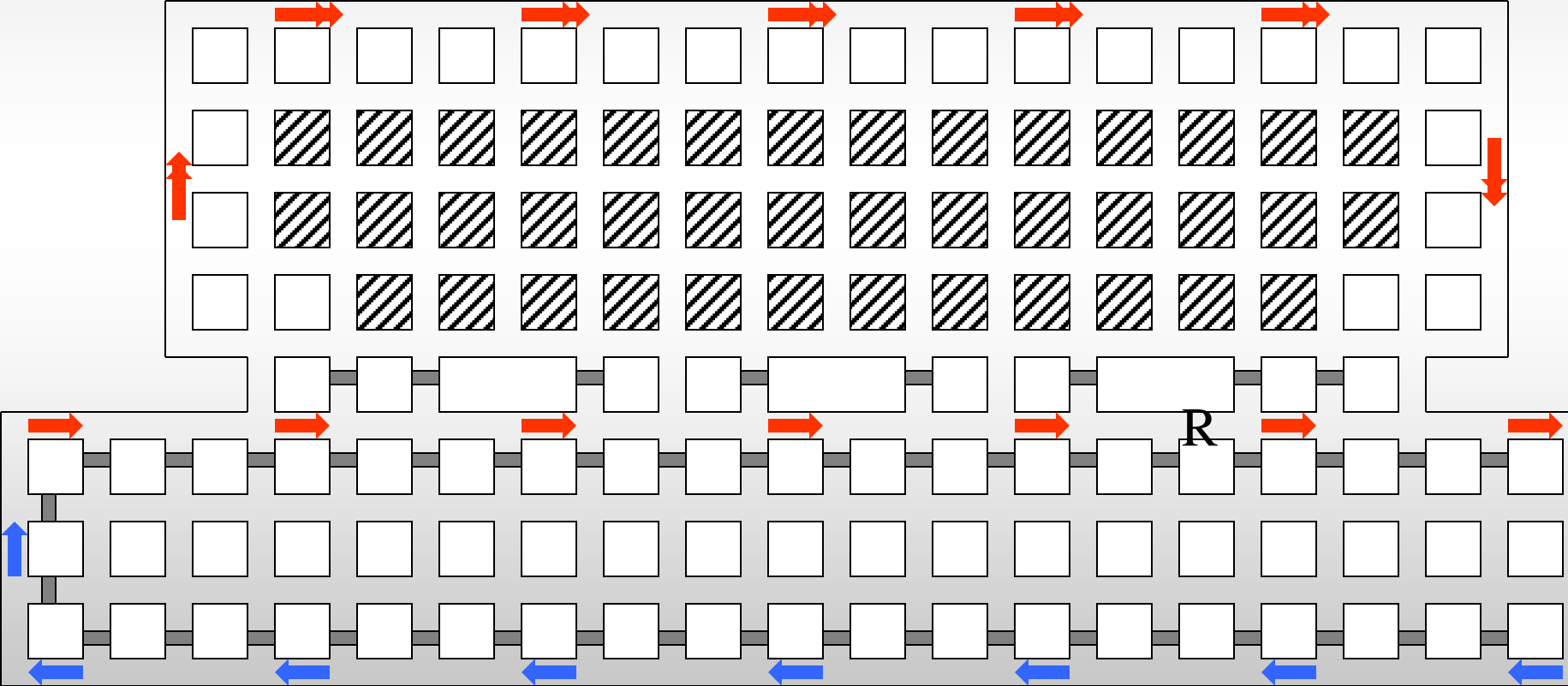
Airflow in a mine is induced by pressure differences between intake and exhaust openings.



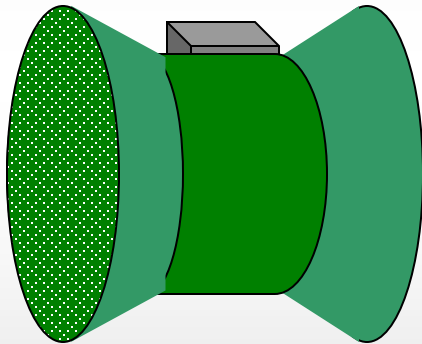
The pressure difference is caused by imposing some form of pressure at one point or a series of points in the ventilating system.



Passageways, both intake and returns must be provided to conduct airflow

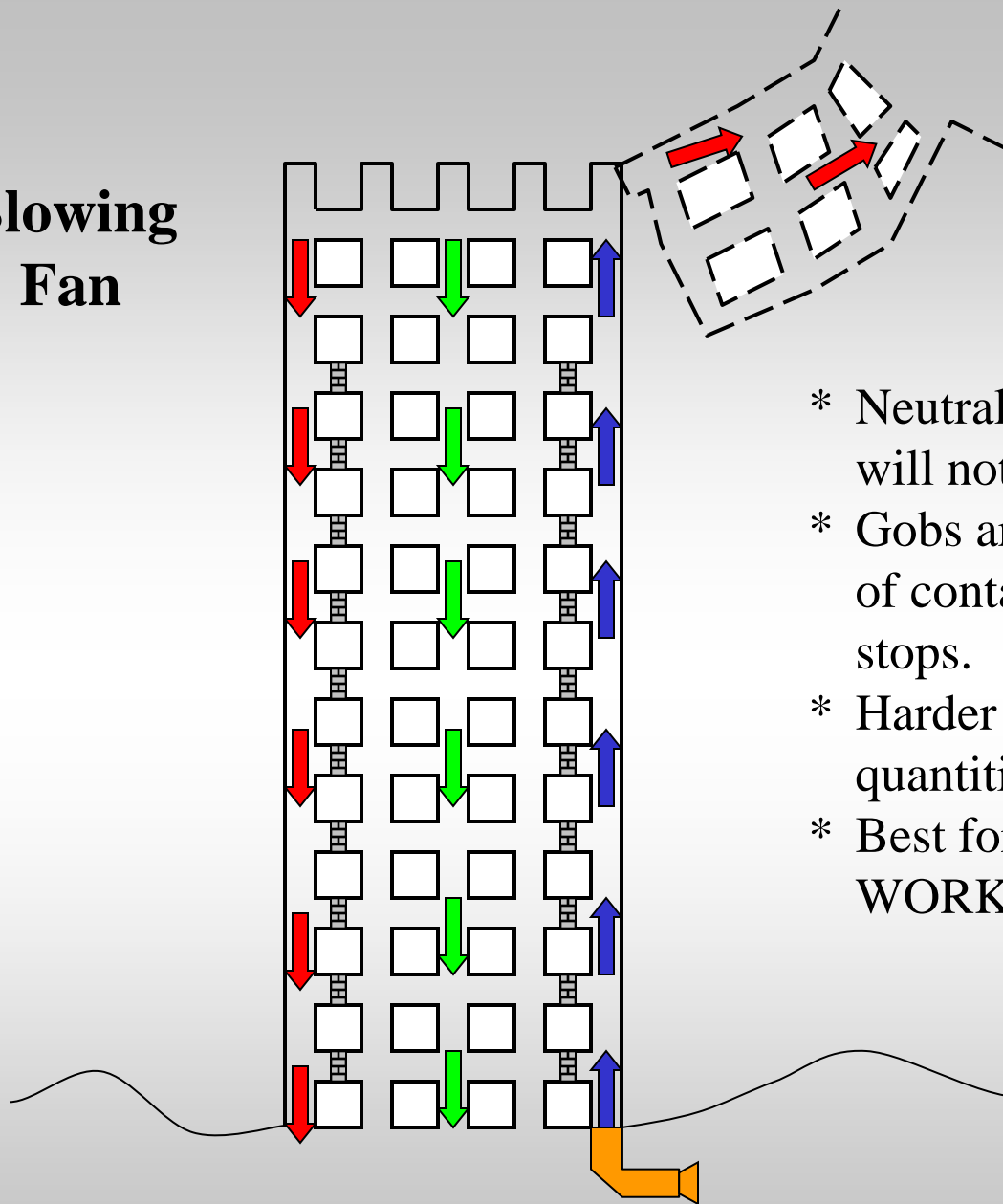


Air always flows from a point of higher to lower pressure.



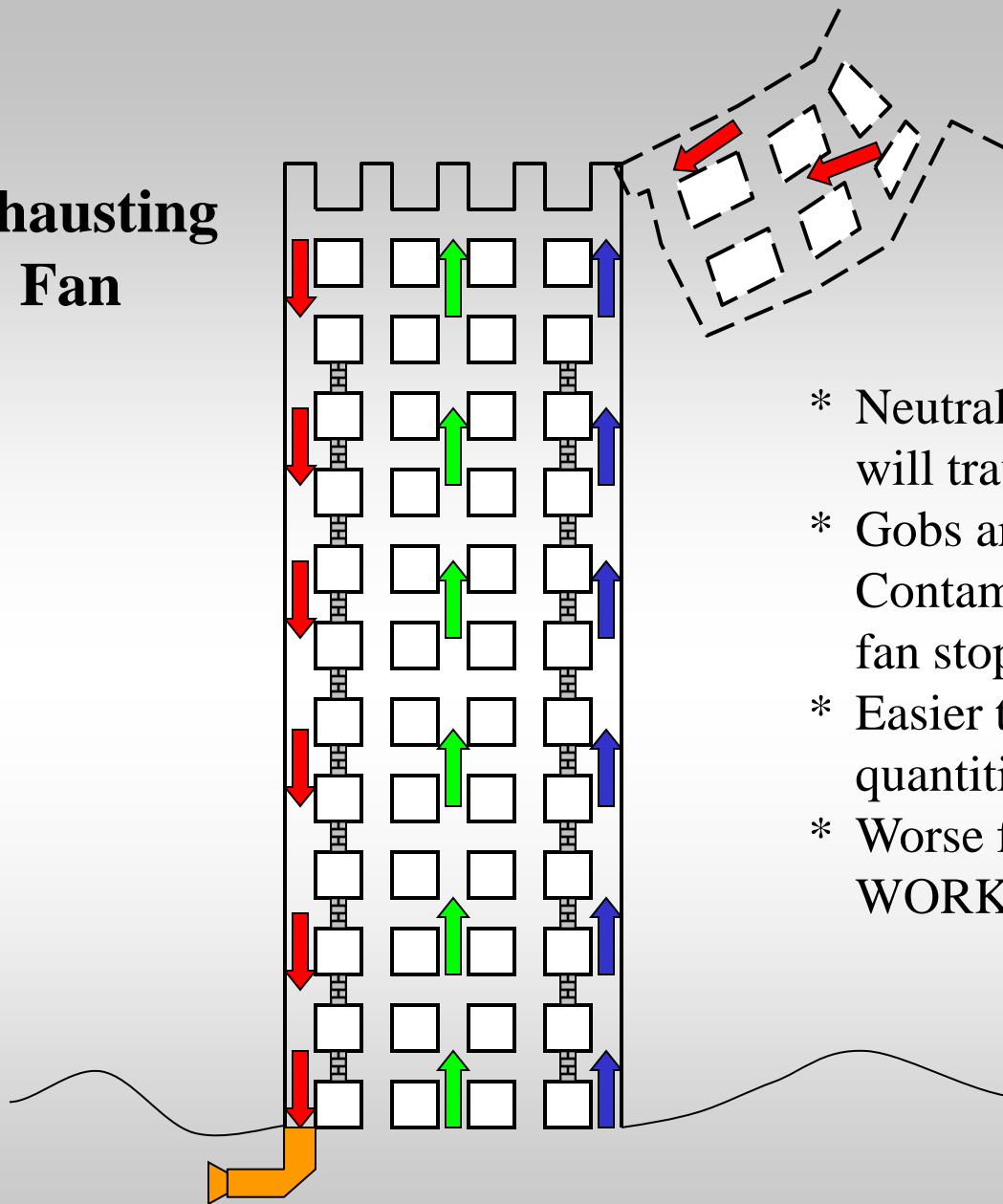
- * Blowing fans create a high pressure point immediately in by the fan. Air travels from this high point through the mine to the surface.
- * Exhausting fans create a low pressure point immediately in by the fan. Air travels from the surface through the mine to this low pressure point.

Blowing Fan



- * Neutral flows to outside. Smoke will not travel to face area.
- * Gobs are “pressurized”. Less influx of contaminants from gobs until fan stops.
- * Harder to maintain required LOC quantities.
- * Best for mining near OLD WORKS.

Exhausting Fan

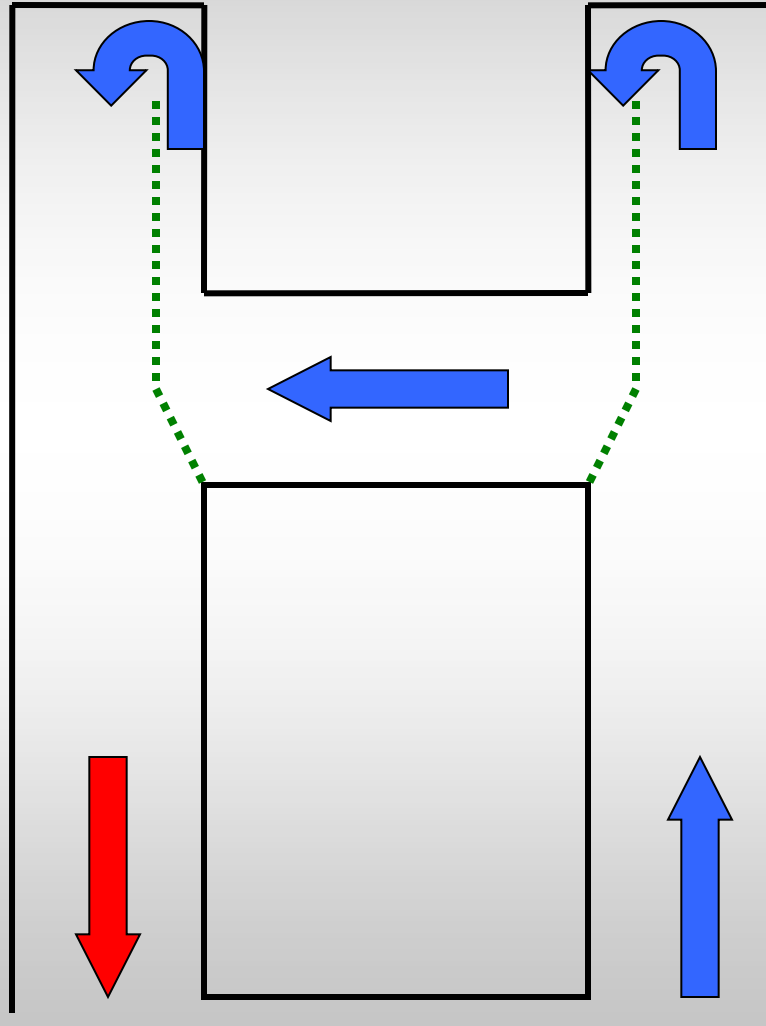


- * Neutral flows toward face. Smoke will travel toward face area.
- * Gobs are “under suction”.
- Contaminants flow from gobs until fan stops.
- * Easier to maintain required LOC quantities.
- * Worse for mining near OLD WORKS.

Face Ventilation

Blowing

Exhausting



- Higher velocity at face.
- Best for gas.
- Worse for dust.

- Lower velocity at face.
- Worse for Gas.
- Good for Dust.

Check Curtains

- **A great deal of air leakage occurs on working sections.**
- **Properly installed and maintained check curtains are very important to prevent loss of large quantities of air between the last permanent stopping(s) and the working face.**

Check Curtains

- **Before installing a check curtain , the entire entry should be thoroughly inspected for uneven loose roof, haulage hazards, ribs or protruding brows.**
- **Equipment or other obstacles should never be parked or placed close to check curtains.**

Face Ventilation

Get the air where you need it!

- **Ensure check curtains are tight**
- **Good Run Through Curtains**
- **Do not Park Equipment in Last Open Entries**
- **Keep curtains close to the face**

Proper installation procedures

- **Curtain needs to remain free of holes and rips**
- **Adequate length and width are imperative**
- **Overlap curtains when more than one piece is required**

When using line brattice systems, exhausting line brattice may not deliver quite as much air to the face as blowing line brattice.

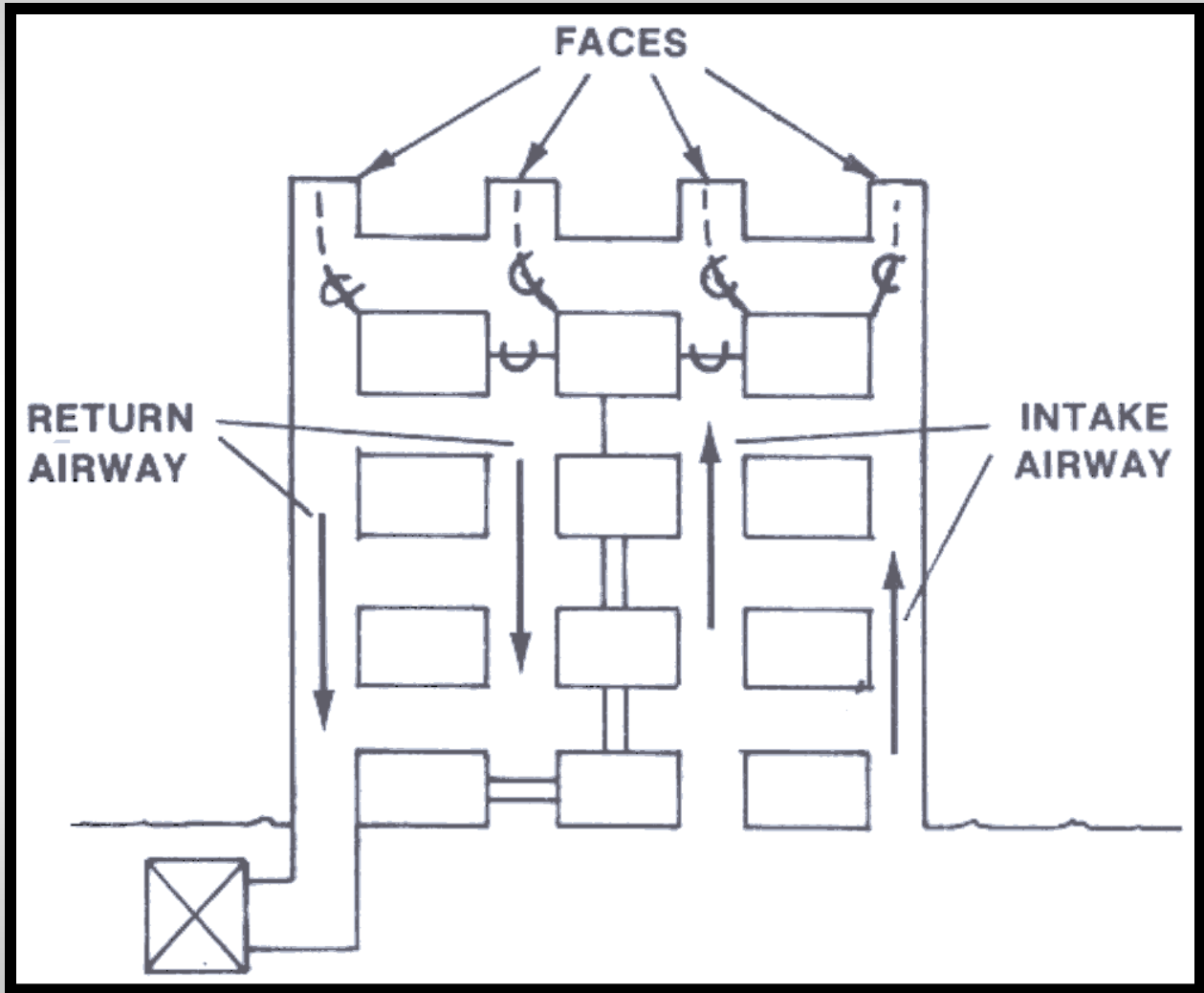
Question: Why does this happen?

Answer: Air always flows from a higher pressure to a lower pressure.

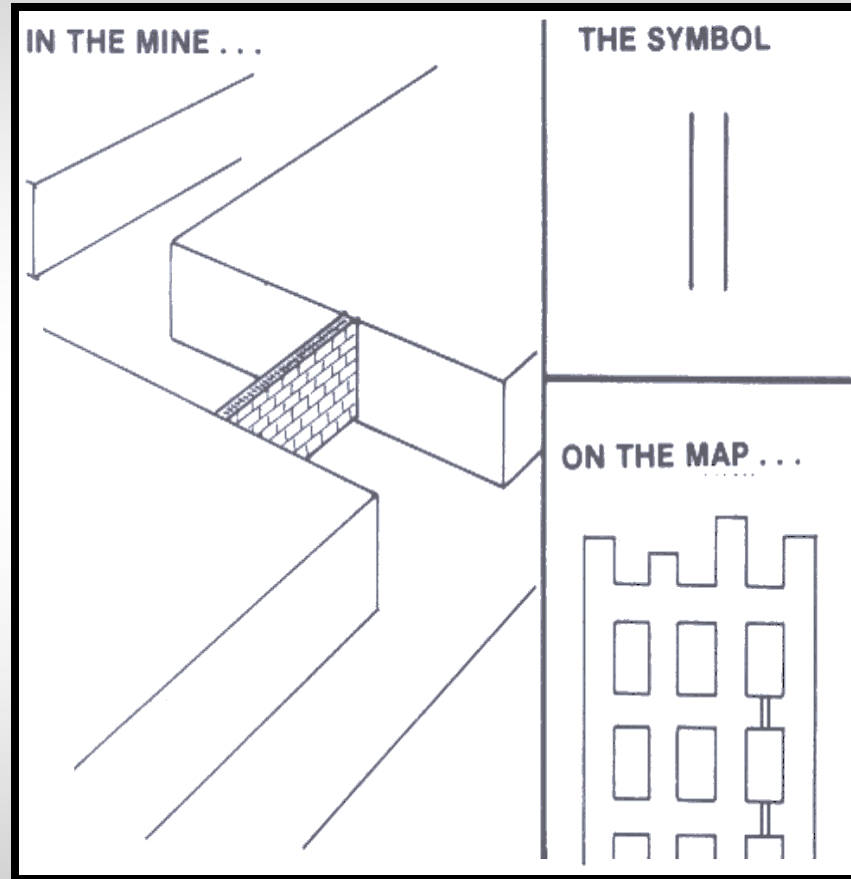
When exhausting line brattice is used, the area behind the brattice (or curtain) is on the downstream (low pressure) side.

This causes the curtain to belly (balloon) in toward the rib - because air is trying to get from the wide (high pressure) side of the entry to the tight (low pressure) side of the entry behind the curtain.

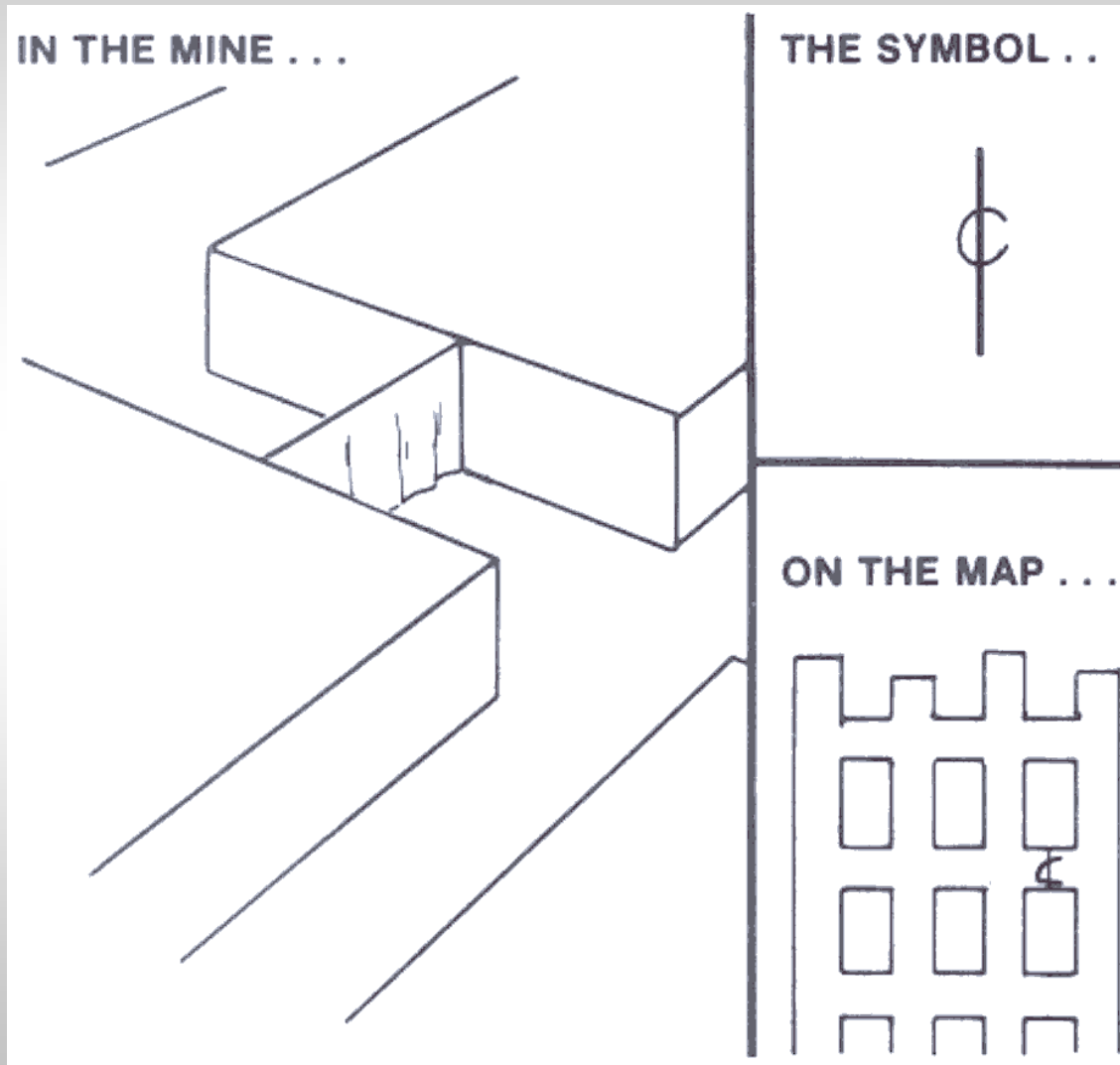
Reducing the ventilation area behind the line curtain.



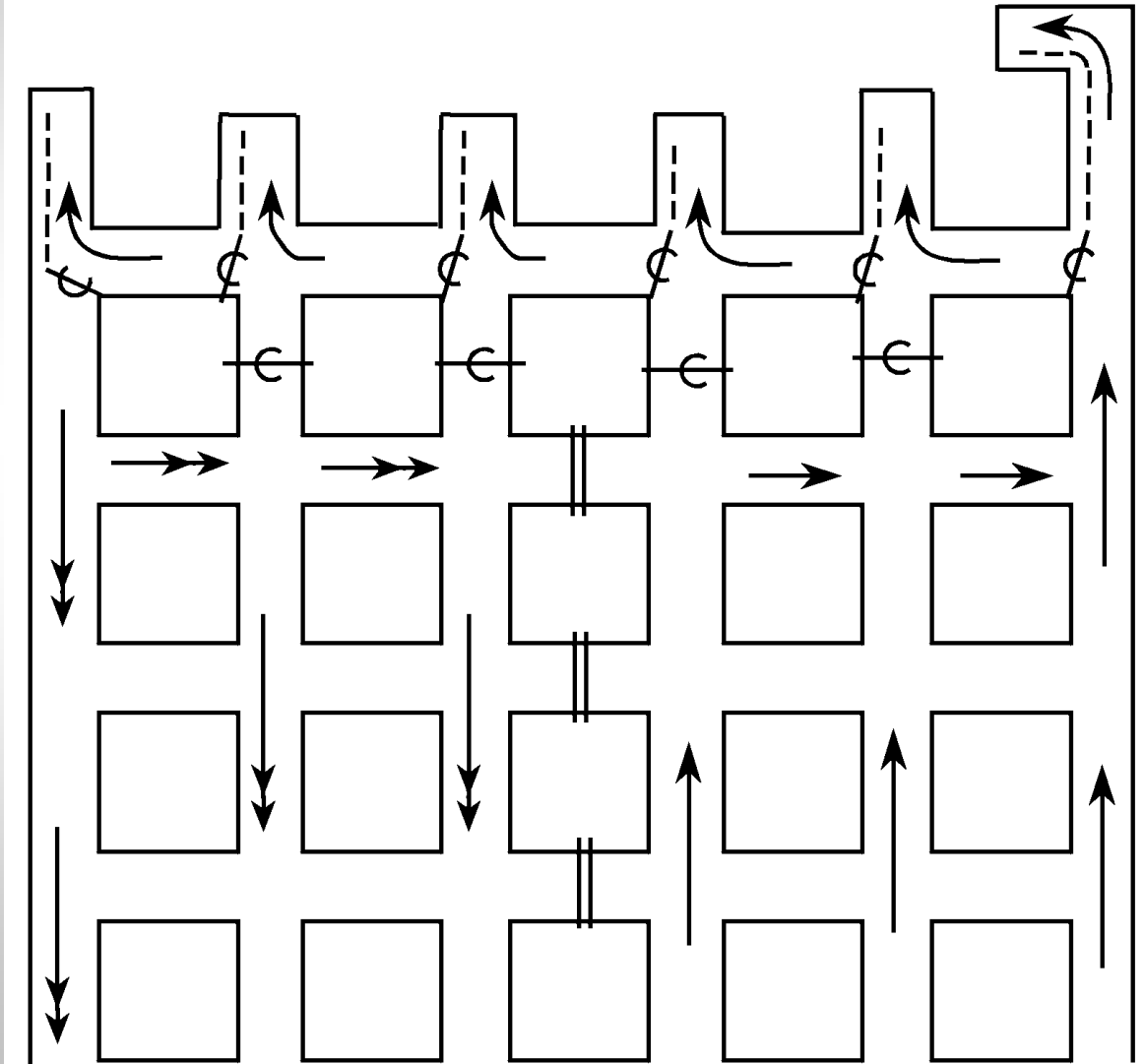
Permanent Stopping



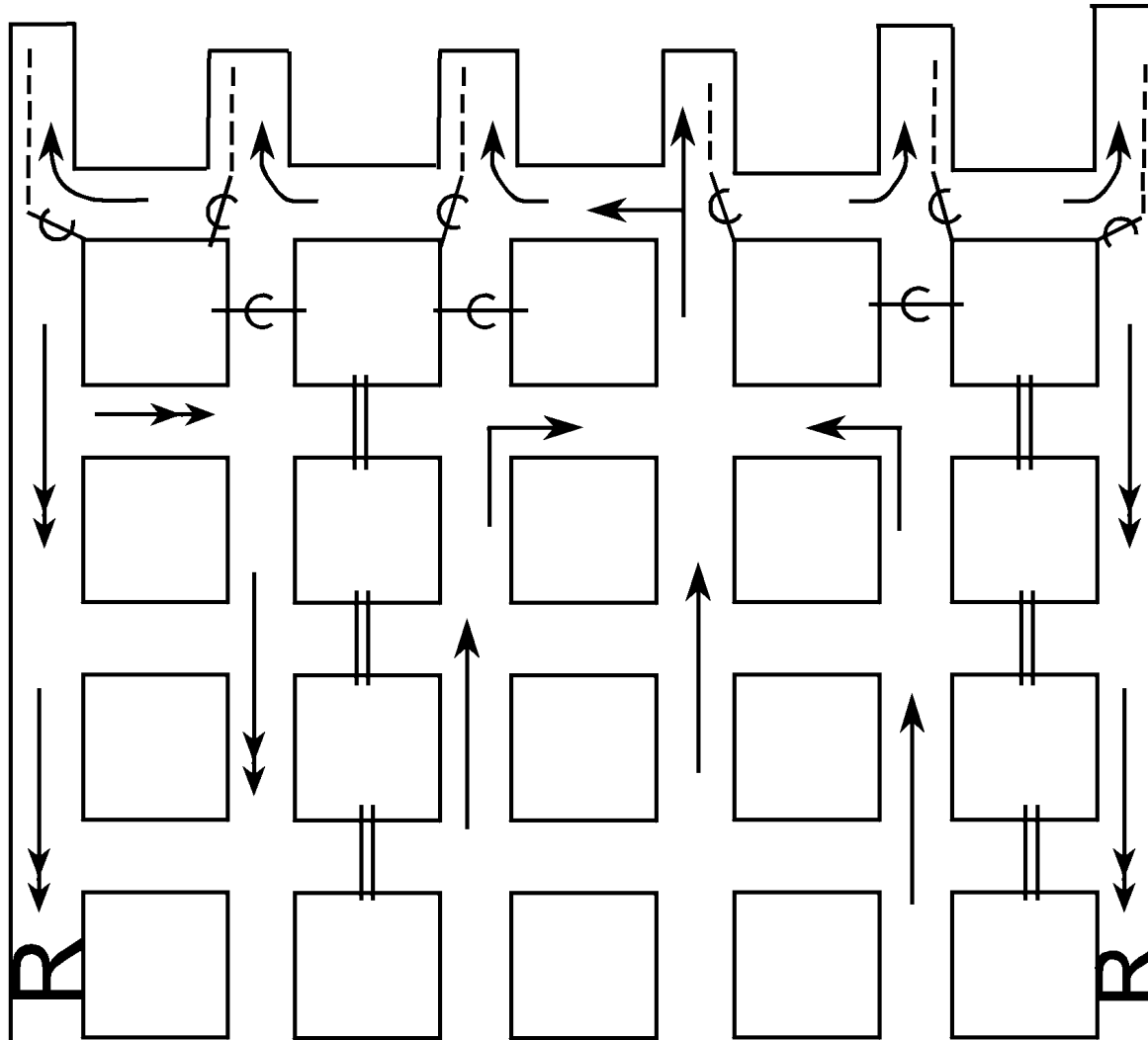
Check Curtain

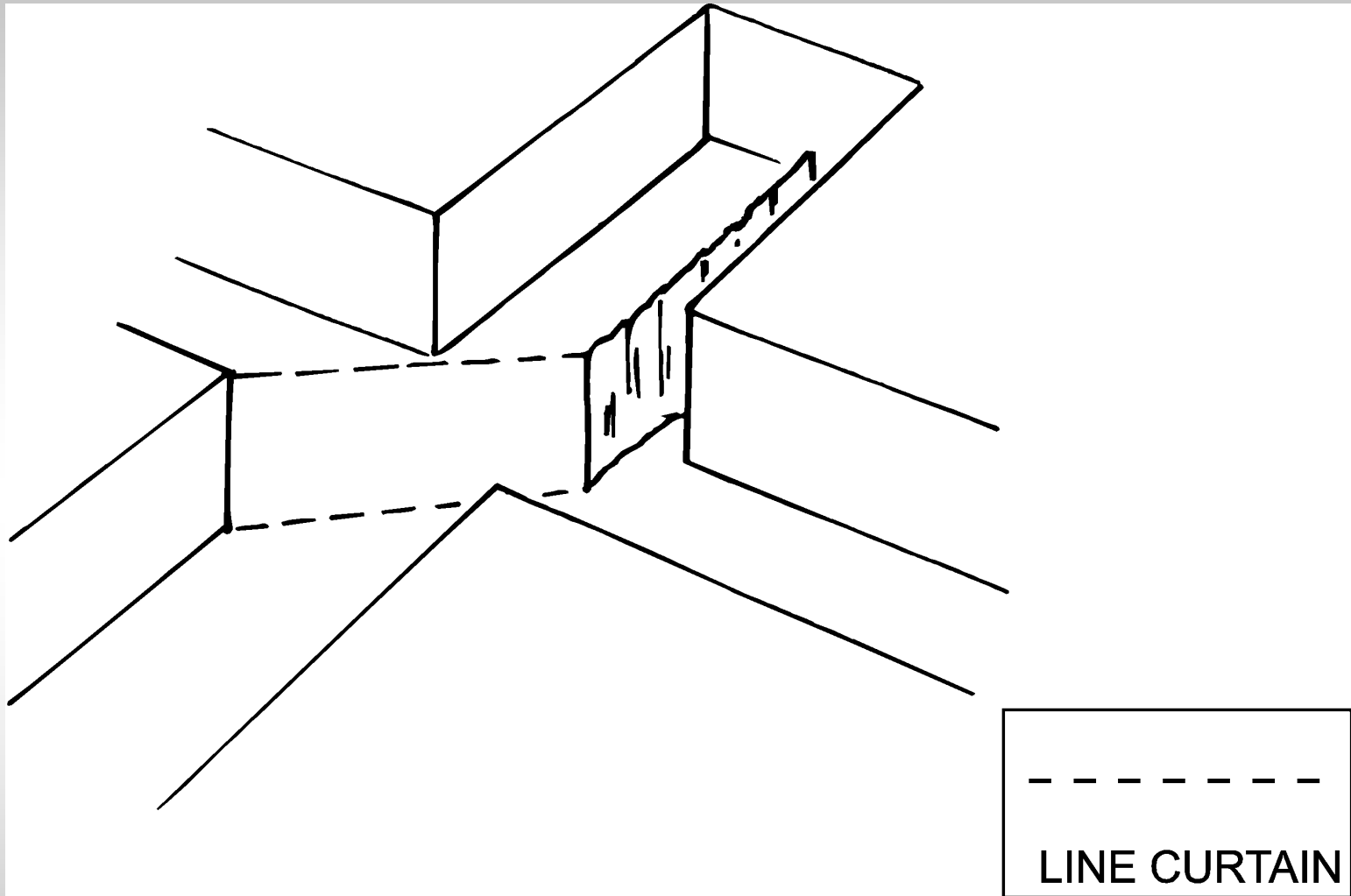


Single Split System

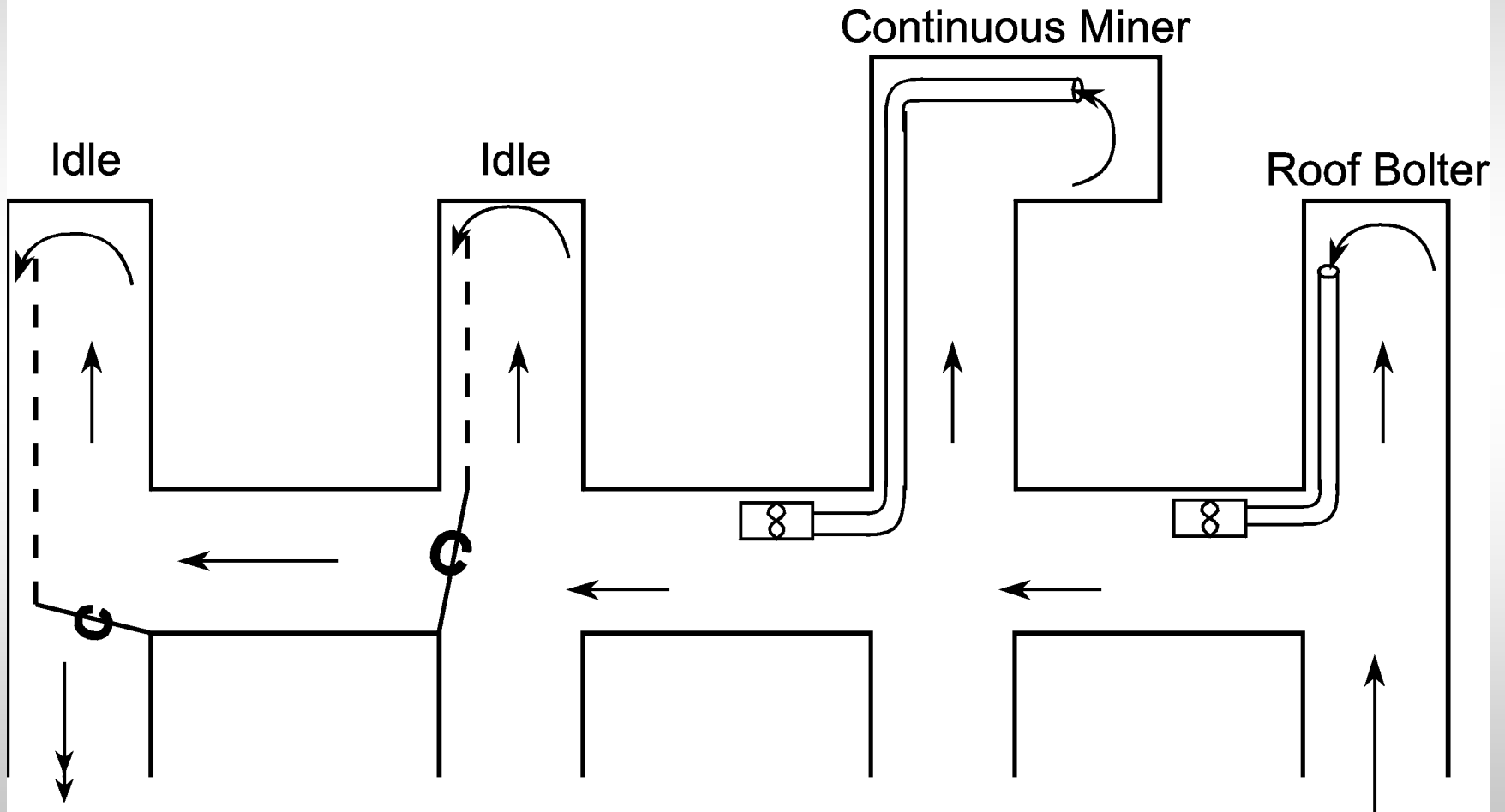


Double Split System



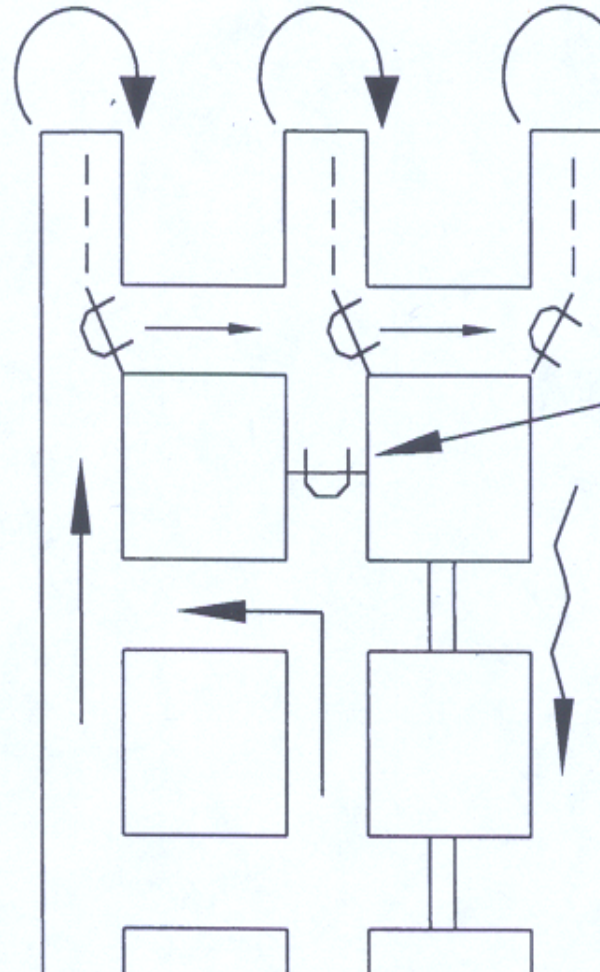


Ventilation of Idle Working Places with Line Brattice



Sweep Ventilation

Show the direction of air-flow in each working face and the direction of air flow in the last open crosscut.

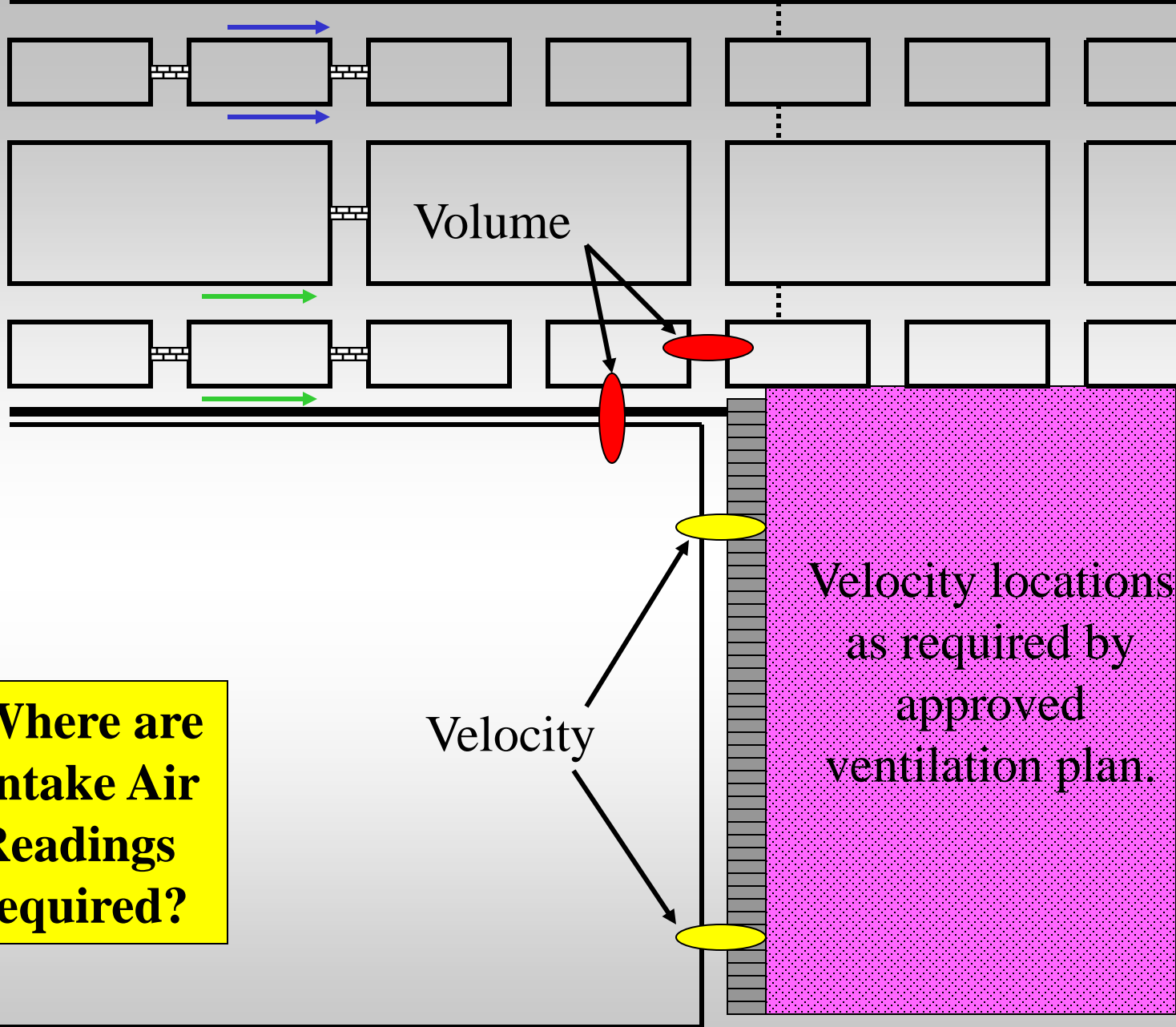


Use a line curtain to direct the air into the face. This should be within 10 feet of the working face.

Place this check curtain to deflect the air into the #1 entry.

Section 75. 325. Volume of Air.

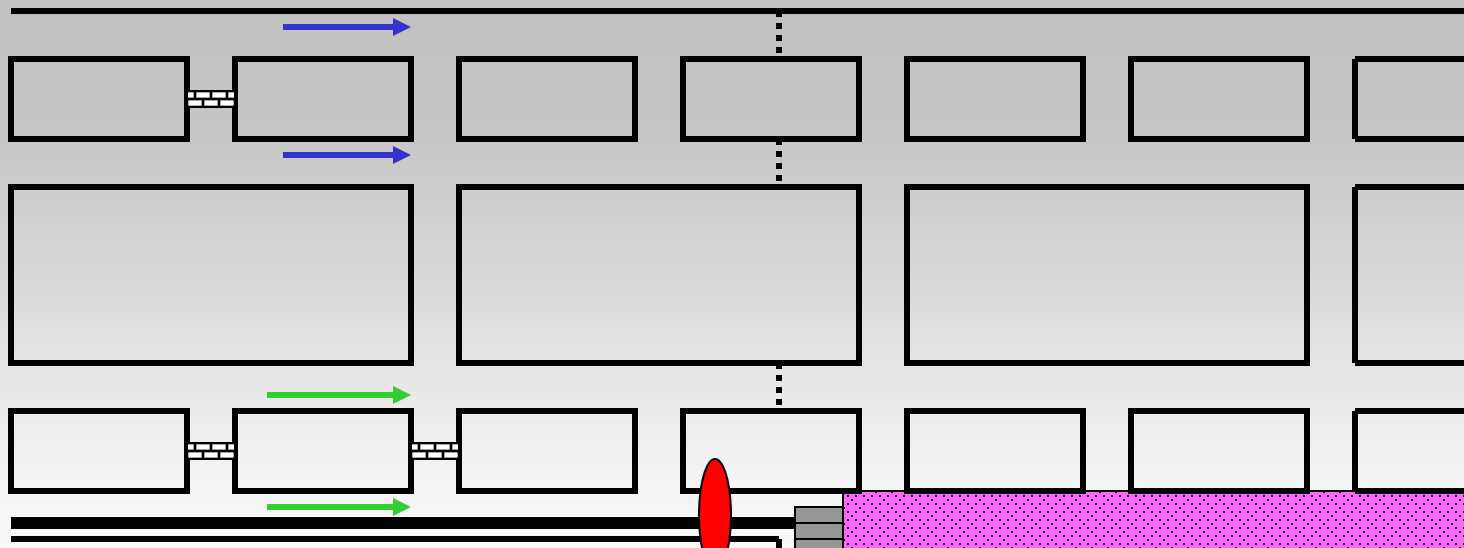
- The quantity of air reaching each working face where coal is being cut, mined, drilled for blasting, or loaded shall be at least 3,000 cubic feet per minute unless a greater quantity is required in the approved ventilation plan.
- The quantity of air passing through the last open crosscut shall be at least 9,000 cubic feet per minute unless a greater quantity is required in the approved ventilation plan.
- The air current at working faces shall under all conditions have a sufficient quantity to dilute, render harmless, and carry away flammable, explosive, noxious, and harmful gasses, dusts, smoke, and fumes, this quantity shall be specified in the approved ventilation plan.



Where are Intake Air Readings required?

Velocity

Velocity locations as required by approved ventilation plan.



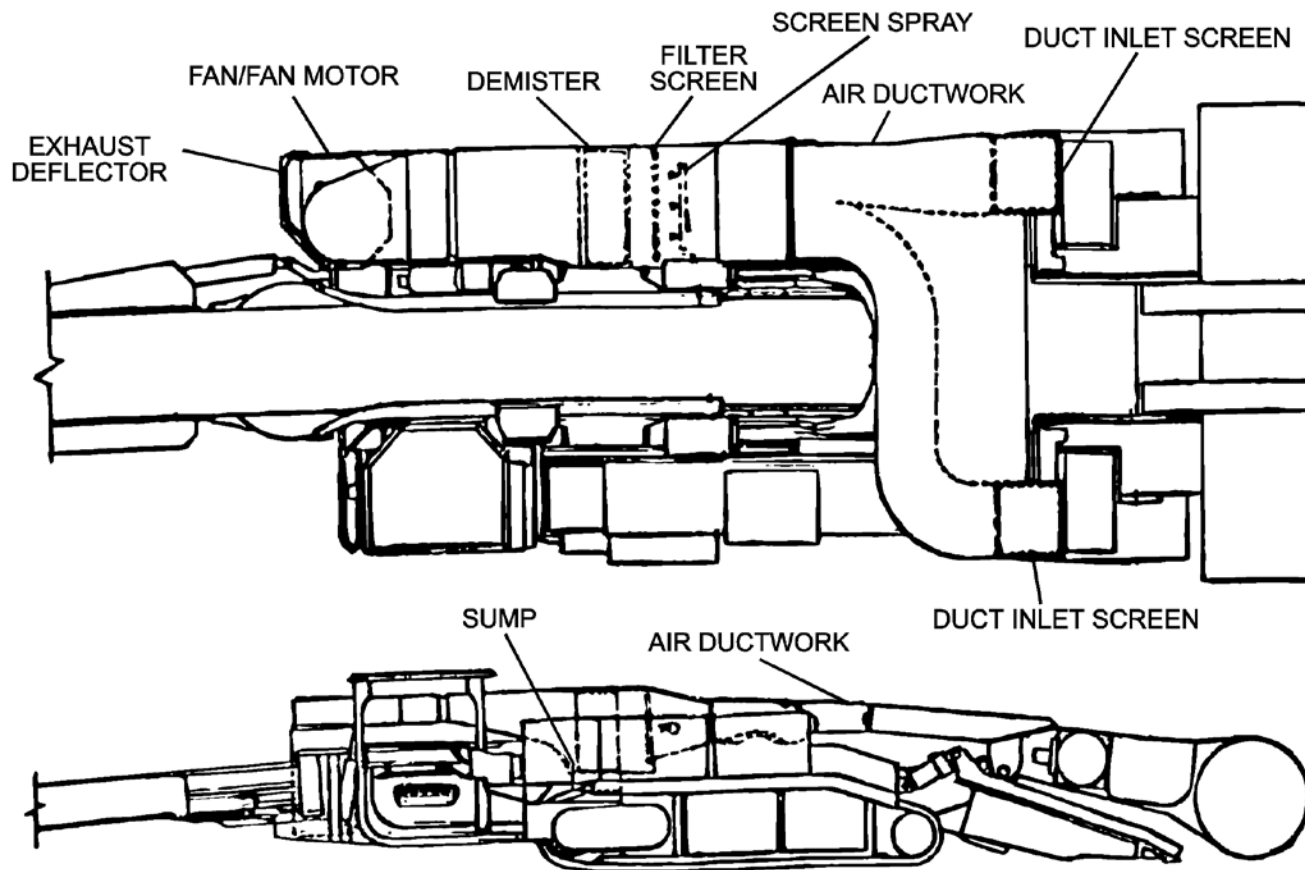
Where are Intake Air Readings required?

Volume

Velocity

Velocity locations as required by approved ventilation plan.

- **On shift respirable dust control parameters.**
- The examination shall include air quantity and velocities, water pressures and flow rates, excessive leakage in the water delivery system, water spray numbers and orientations, section ventilation and control device placement and any other dust suppression measures required by the ventilation plan.
- If scrubbers are used the plan shall specify the operating parameters.



Scrubbers

- Introduction of Scrubbers allowed Deeper Cuts using both Blowing and Exhausting Ventilation Systems
- 40 feet Deep Cuts became common as long as Methane and Dust was controlled

What Should Your Line Brattice Air Quantity Be?

- Balance Line Brattice Air Quantity with the Scrubber Air Quantity
- **Typically this quantity is +/- 1,000 cfm of scrubber capacity**
 - **Scrubber Capacity**
 - **Name Plate Rated Capacity (Manufacturer)**
 - » **Air Densities**
 - » **Voltages**
 - » **Power Factors**
 - » **Dry vrs. wet**
 - **Actual Capacity**
 - » **Clean**
 - » **Dirty**
 - » **Variations due to wear and tear or changes**
- **Need Proper Scrubber Air Quantity to Determine Line Brattice Air Quantity**

What Should the Line Brattice Air Quantity Be

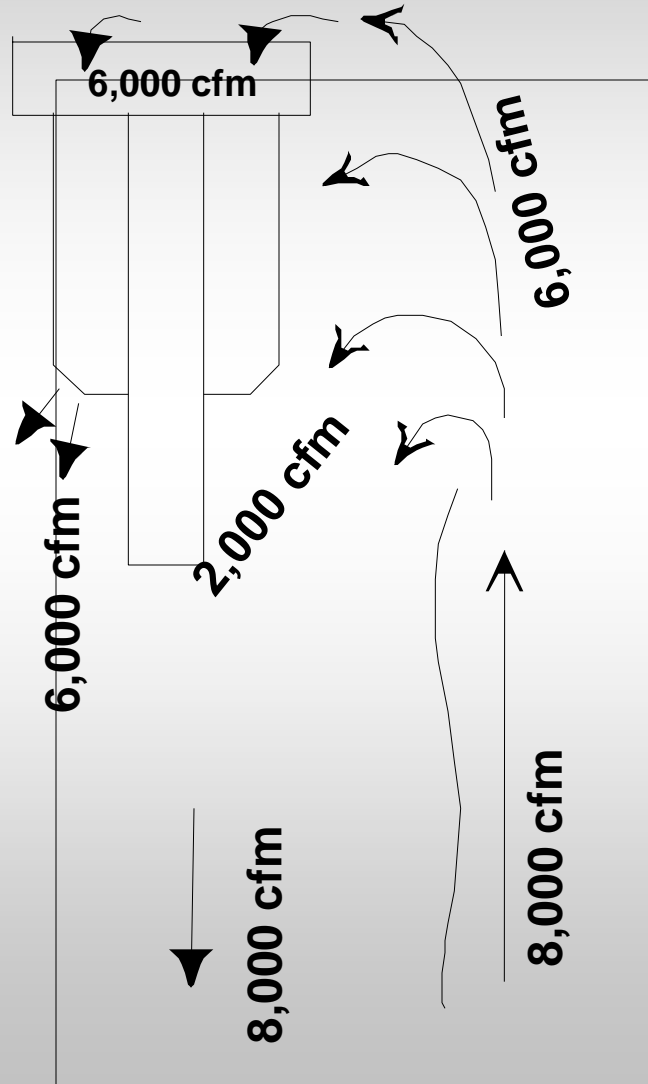
- Typically this quantity is +/- 1,000 cfm of scrubber capacity
 - Tech support advises this quantity can be greater than +1,000 cfm of scrubber capacity
 - Upper limit only if conditions exist that overpower scrubber
 - 400 fpm
 - Curtain close to the cutting face
- Take Air Reading with Scrubber Off!!!!

Brattice Air Quantity Higher than Scrubber Air Quantity

Additional Air Quantity helps to Dilute Downwind Concentrations

Keep Velocities Below 400 fpm

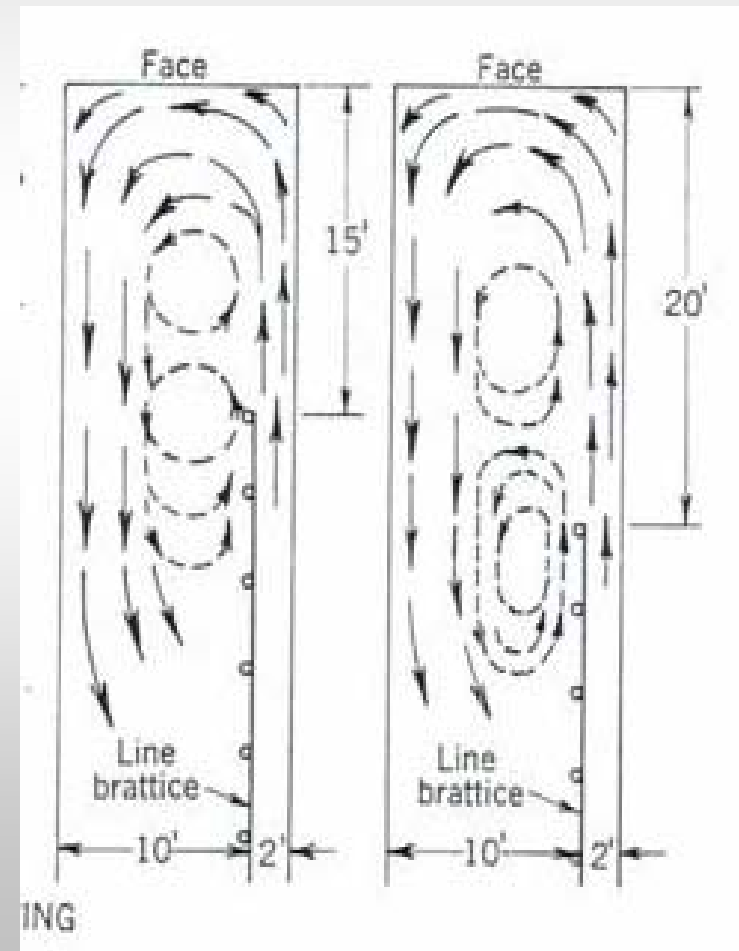
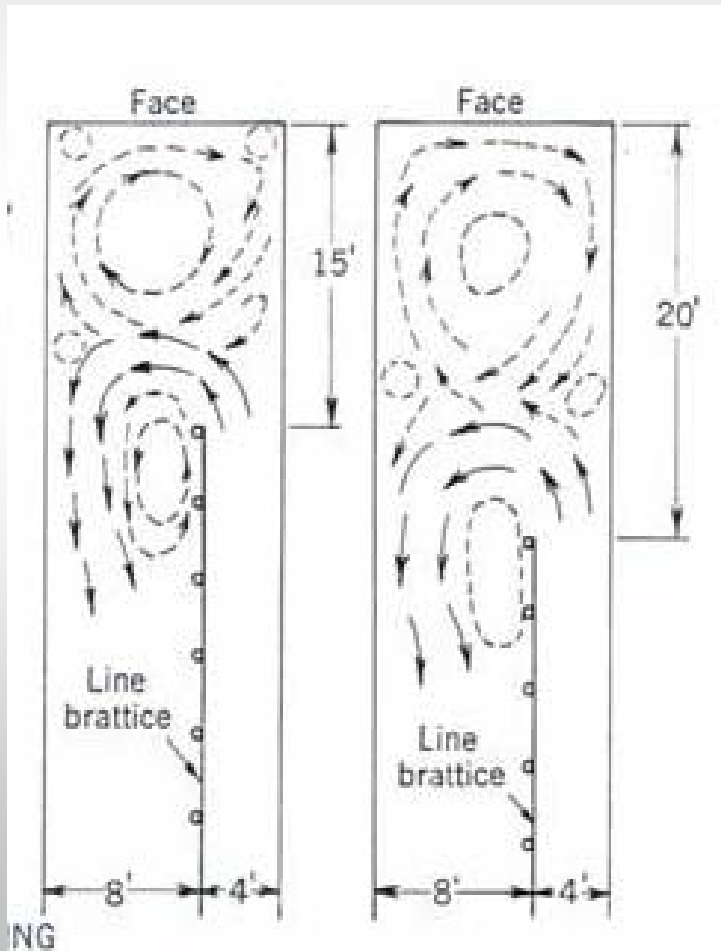
Curtain is not to close to Cutting Head



Higher Air Quantities

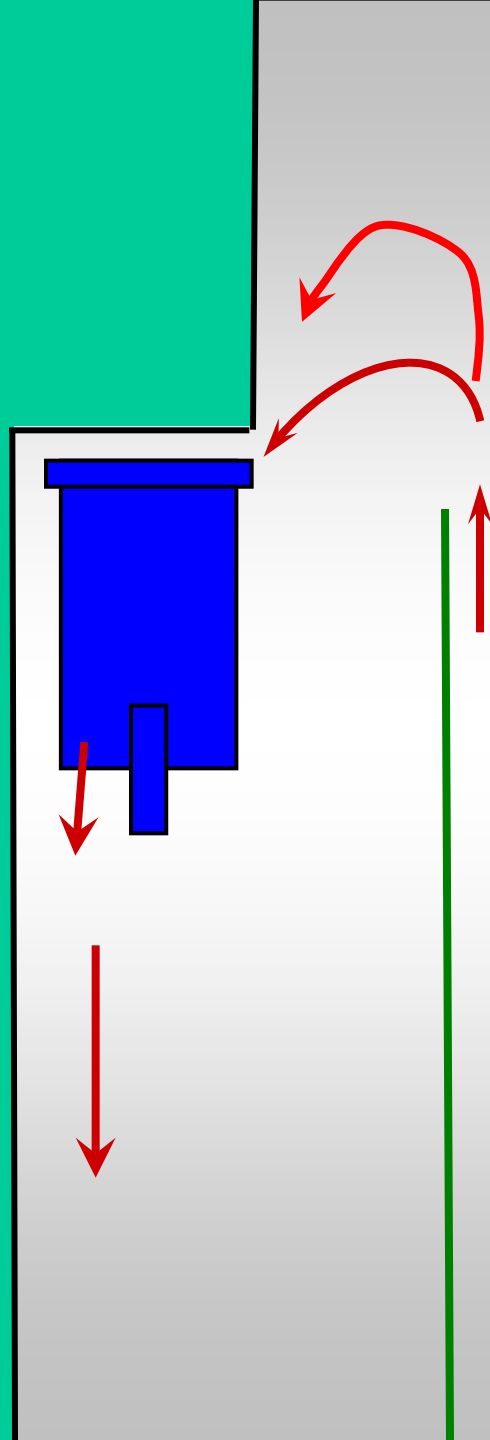
400 fpm

800 fpm



**Scrubber Over Powered if
Line Brattice Quantity
exceeds Scrubber Quantity
or
High Velocity**

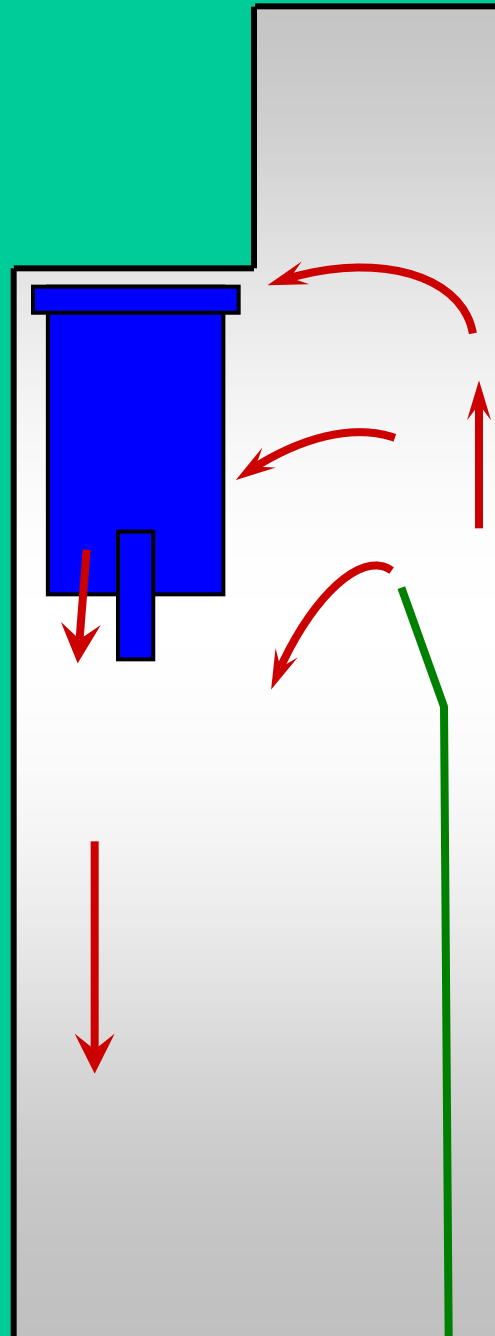
**Effects Ram Car
Operators &
Downwind
Personnel (Roof
Bolters)**



**Curtain close to
cutting head
Velocity exceeds
400 fpm**

Lower Air Velocity by
increasing curtain area

Additional Step cuts allows
curtain be held back

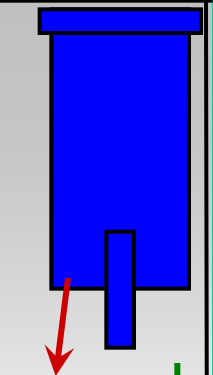


- **Air Quantity Reading should be taken with the scrubber off!!!!**

Face Airflows

Scrubber Rating
7,500 cfm

Inadequate Intake
Air



Inby End of Curtain

Scrubber Off 3,000 cfm

Scrubber On 7,500 cfm

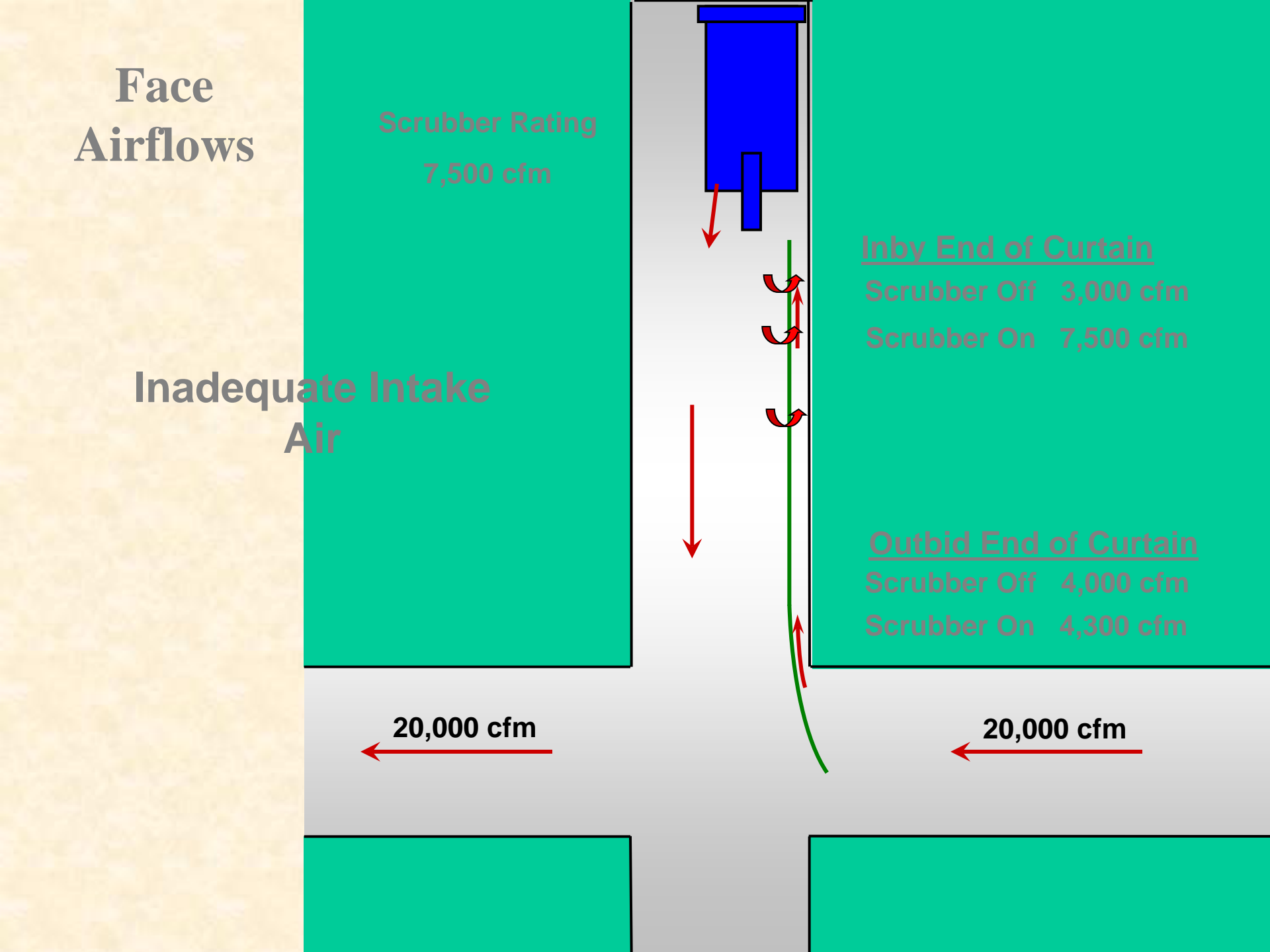
Outbid End of Curtain

Scrubber Off 4,000 cfm

Scrubber On 4,300 cfm

20,000 cfm

20,000 cfm



Other Factors Influencing Line Curtain Air Quantities

- Movement through Outby Curtains or
mandoors
- Position of other Equipment
- Movement of Outby Equipment
- Person taking the Air Reading

AUXILIARY FANS AND TUBING

§ 75.331

- Permissible
- Maintained in proper operating condition
- Deenergized when no one is present on the section
- Deficiency corrected immediately
- Deenergized for one percent or more methane

§ 75.331 (continued)

When auxiliary fan is stopped

- Ventilation to faces maintained by other means
- Electrical equipment disconnected at power source
- Mechanized equipment shut off

Auxiliary fans located and operated to avoid recirculation of air

WORKING SECTIONS AND WORKING PLACES § 75.332

Separate intake split for each

- Working section
- Area where equipment is being installed or removed
- Set of equipment simultaneously mining on same working section

§ 75.332 (continued)

Prohibits use of air to ventilate a working place if air has passed

- Through any area
 - Not examined under § 75.360, § 75.361 or § 75.364, or
 - Second mining has been done
- By an opening of unsealed area
 - Not examined under § 75.360, § 75.361 or § 75.364

Discussion

- When two or more sets of mining equipment are simultaneously engaged in cutting, mining, or loading coal or rock, each set of mining equipment shall be on a separate split of intake air.

Section 75.323(a). Actions for excessive methane.

- Tests for methane concentration under this section shall be made by certified or qualified persons trained in the use of an approved detecting device which is properly calibrated. Tests shall be made at least twelve inches from the roof, face, ribs, and floor.

Section 75.323(b). Actions for excessive methane.

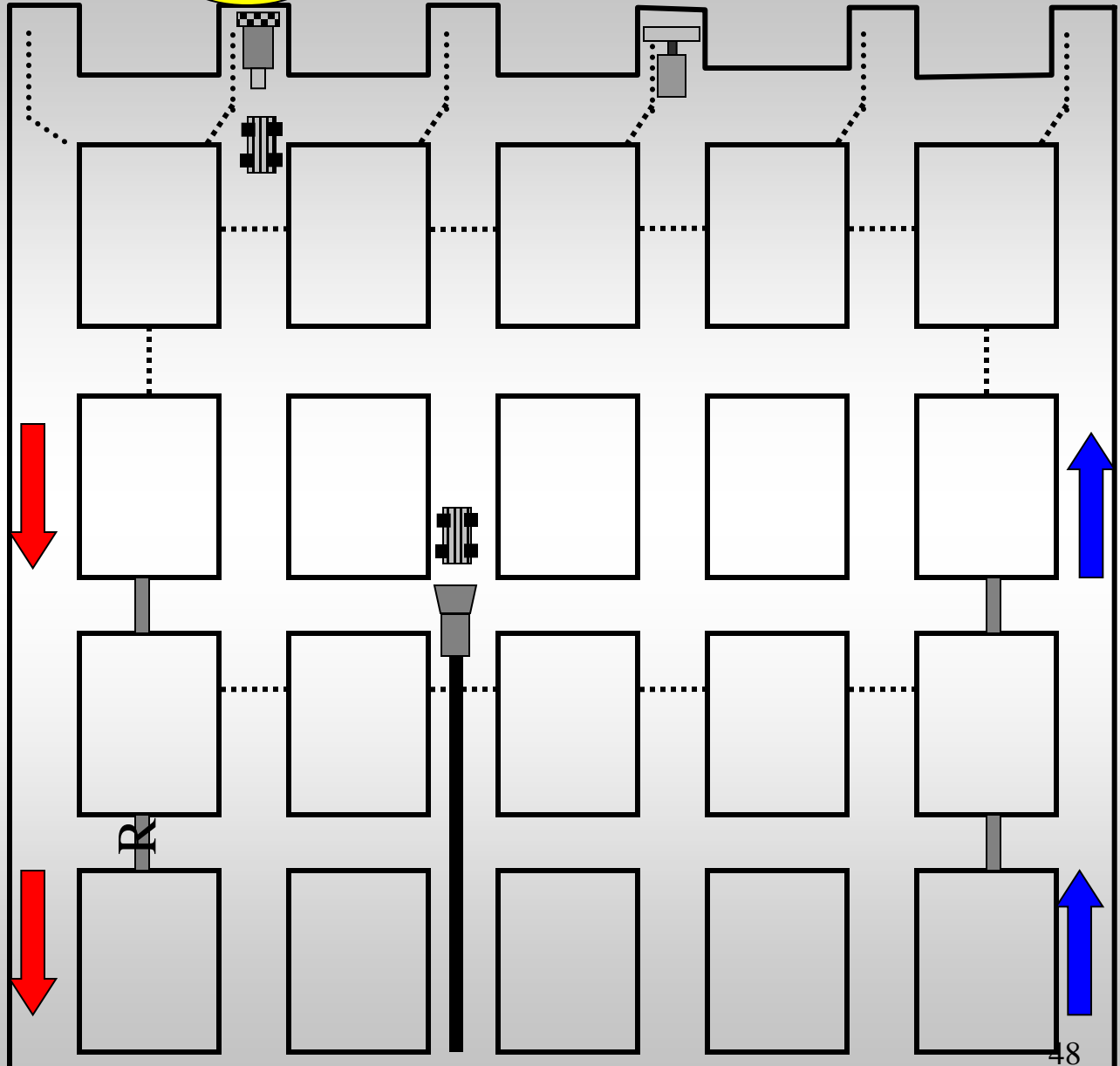
- When one percent or more methane is present in a working place or an intake air course, including an air course in which a belt conveyor is located, or in an area where mining equipment is being installed or removed, work shall cease and electrical power shall be de-energized in the affected area except intrinsically safe atmospheric monitoring systems (AMS).

1.2 %

1. Stop Work in No. 2

2. Kill Power to Affected Electric Face Equipment.

Methane Example



Section 75.323(b). Actions for excessive methane.

- Changes or adjustments shall be made to the ventilation system to reduce the concentration to less than one percent. *Only work to reduce the concentration of methane below one percent shall be permitted.*

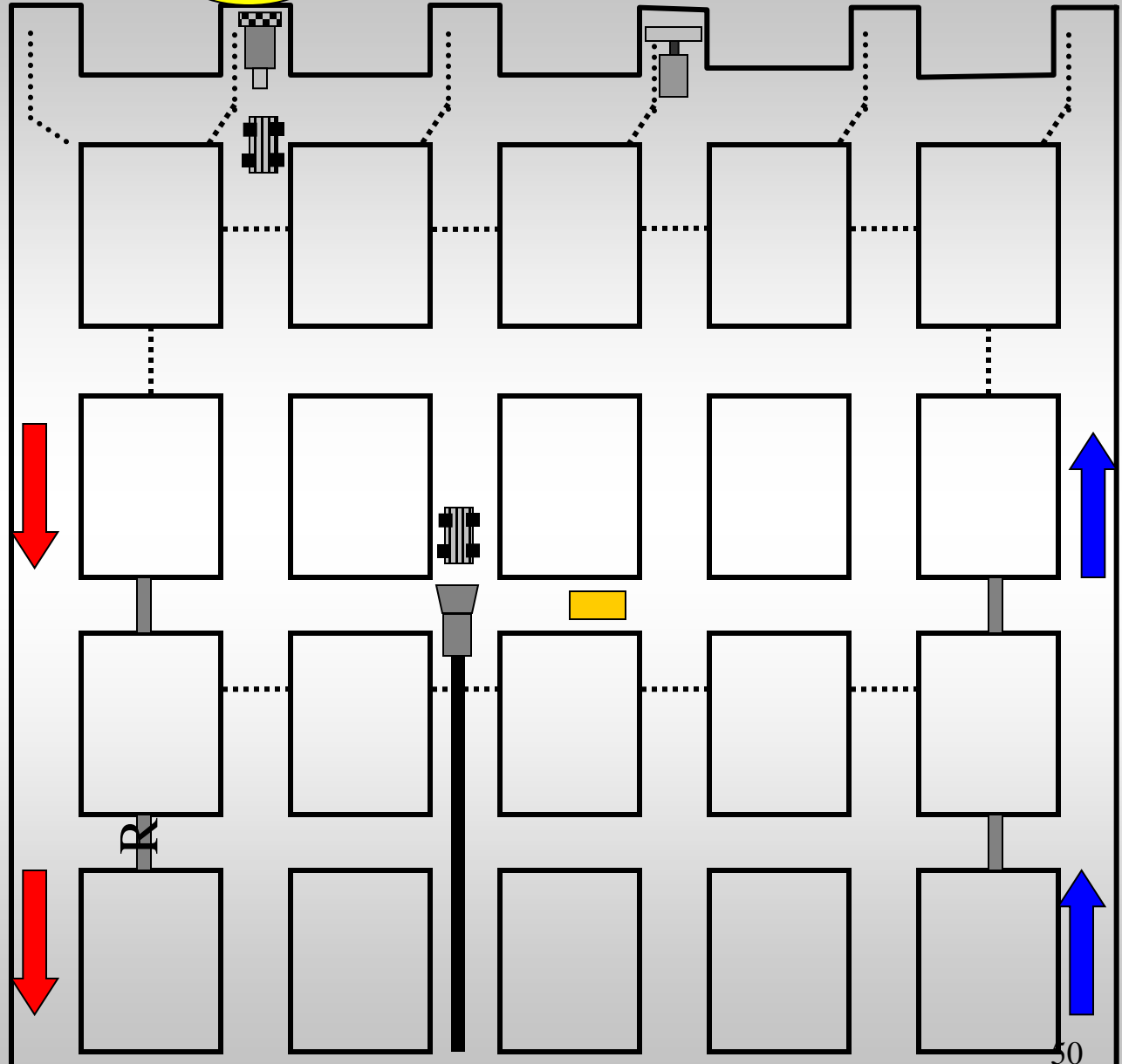
1.2 %

1. Stop Work in No. 2

2. Kill Power to Affected Electric Face Equipment.

3. Adjust Ventilation.

Methane Example



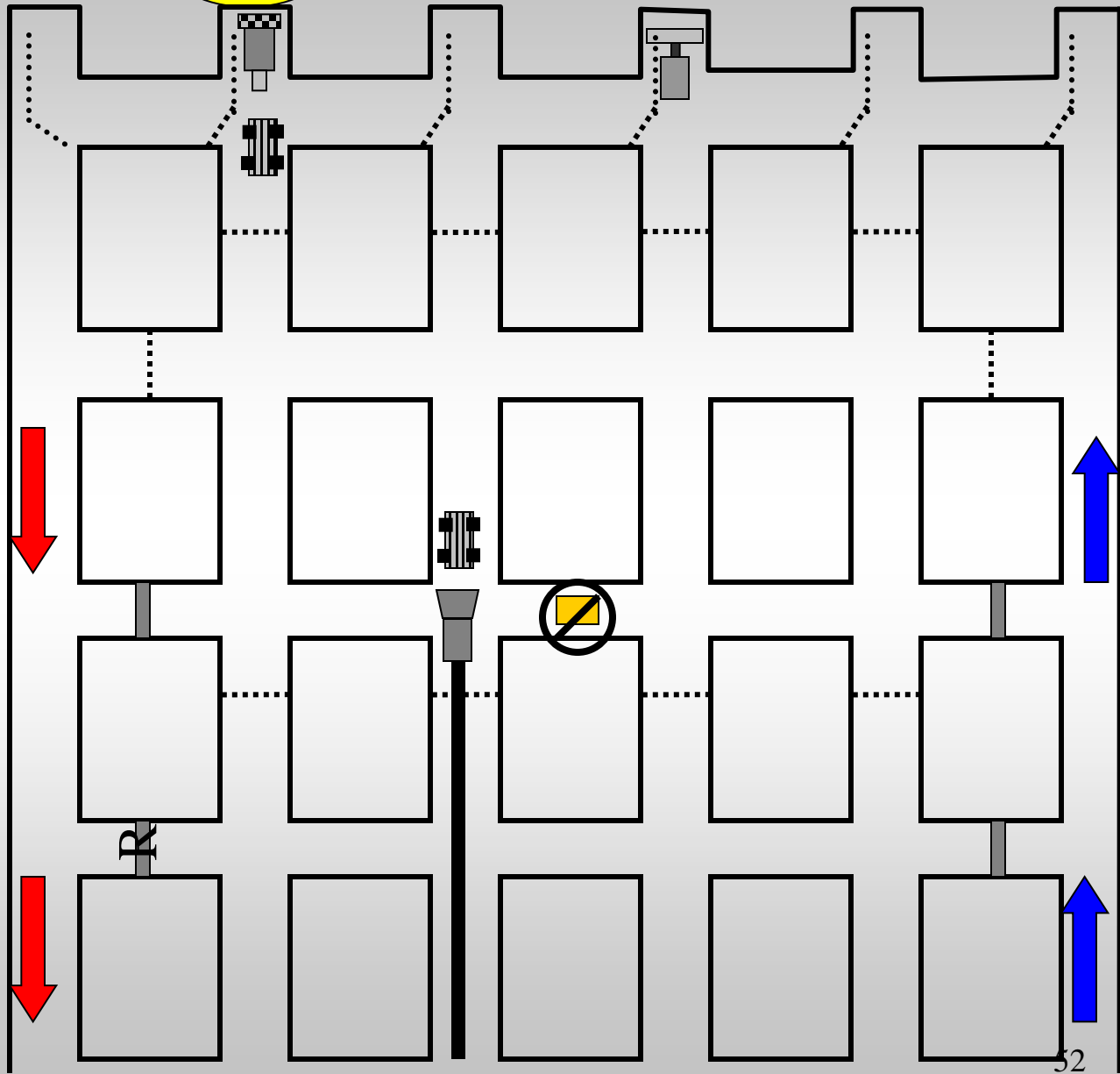
Section 75.323(b). Actions for excessive methane continued.

- When one and one-half percent or more methane is present in a working place or an intake air course, including an air course in which a belt conveyor is located, or an area where mining equipment is being installed or removed, only work necessary to reduce the methane concentration to less than one and one-half percent will be permitted and all other personnel shall be withdrawn from the affected area.
- Electrically powered equipment in the affected area shall be de-energized and other mechanized equipment shall be shut off except of intrinsically safe atmospheric monitoring systems (AMS).

1.6 %

- 1. Work to reduce CH4 concentration.
- 2. Withdraw all other personnel.
- 3. De-energize power center.

Methane Example



Rock Dusting

- Generous applications of rock dust can prevent the propagation of coal dust explosions.
- The standards require that all areas of a coal mine that can be safely traveled must be kept adequately rock dusted to within 40 feet of all working faces
- MSHA has promulgated an Emergency Temporary Standard (ETS) that requires no less than 80 percent incombustible content of dust in all accessible areas of underground bituminous coal mines. When methane is present in the ventilating air current the incombustible content of the dust shall be increased 0.4 percent for each 0.1 percent of methane.

Permissible Electric Equipment

- In order to prevent methane ignitions caused by electrical equipment, all such equipment taken into or used in by the last open crosscut, in return air or located within 150 feet of pillar workings or longwall faces must be maintained in permissible condition

The End