

Oral Review



What is the purpose of mine ventilation?



**To provide sufficient
air to employees and
to dilute, render
harmless, and carry
away all the dangerous
and noxious gases and**



**To provide a safe and
productive working
environment for men
and equipment in
underground mines.**



What is the minimum amount of oxygen in air permitted in working places?



19.5%



**To which areas should
the ventilation in a
mine be directed?**



**To the faces and active
areas where miners
work or travel.**



What path should ventilating air follow in a mine?



The air should course through the intake airways to the working faces and return to the outside through the return airways.



What are the main requirements of an intake opening?



It should be unobstructed, fireproof, and located away from possible sources of contamination to the air.



What are the main requirements of airways?



They should be of sufficient area and kept free of obstructions, such as roof falls and accumulations of water.



**How is the ventilating
air current controlled?**



**By the use of
stoppings, doors,
overcasts, regulators,
check curtains, and line
brattices.**



Through what portions of the mine should the ventilating air not be permitted to pass before reaching working places?



Through abandoned workings that are not regularly inspected or past seals of abandoned areas.



What methods should be used to ensure ventilation at faces where unusual quantities of gas or smoke exist?



Line brattices or other approved methods of ventilation should be used.



Why should idle, dead-end working places not be permitted?



**It is difficult to ventilate
these areas.**



When miners are found working in places in advance of air currents, what action should be taken?



**The miners should be
withdrawn immediately.**



Where should the ventilating air current be measured?



In the main returns, in the last open crosscuts in active sections, and at the intake air side of pillar lines.



**What attention should
be given ventilating
equipment, controls,
airways, and
travelways?**



They should be inspected regularly and written records should be kept of these inspections.



In the event of a ventilating system failure, what action should be taken?



**The approved
ventilation interruption
plan should be
followed.**



What action should be taken before miners are permitted to re-enter a mine following ventilating system failure?



Mine ventilation should be restored and the mine carefully examined and reported safe by a qualified person.



While ventilation is being restored, who is permitted to enter the affected part of the mine?



No one, except those miners doing the necessary repair work or inspections.



**When should changes
in ventilation be made?**



When the mine is idle.



What is the disadvantage of permitting intake air to pass by seals before ventilating active parts of a mine?



Any failure of the seals may permit dangerous gases to be carried to the active workings; therefore, seals should be installed on return air or on separate splits.



How should underground substations, transformer stations, and battery-charging stations be ventilated?



**By a separate air current
vented directly to the
return.**



What is the speed of a ventilating air current called?



The velocity.



Why should excessively high velocities in a mine be avoided?



High velocities increase the necessary ventilating pressure and power consumption, keep coal dust in suspension, and may cause discomfort to the workers.



Why should extremely low velocities be avoided?



Low velocities will not properly sweep out the gases.



What is the greatest single factor negatively influencing air velocity, pressure and resistance?



**Irregular, congested
airways.**



**How may high velocities
be avoided?**



By the use of airways with adequate cross-sectional area and by splitting the air current.



**For efficient ventilation,
what should be the
maximum velocity in
airways?**



500 feet per minute (fpm).



What is the danger of not having sufficient air velocity on haulage and travelways in a gassy mine?



Insufficient air velocity may not sweep gas out of pockets in the roof or other places such as refuge holes.



What must be overcome to pass a ventilating current through a mine?



The mine resistance.



What is mine resistance?



The resistance to the passage of air on the surfaces, bends, and obstructions in the airways.



What factors determine mine resistance?



**The area, perimeter, length,
and condition of airways, as
well as velocity of the
ventilating air current.**



How can mine resistance be decreased without decreasing the volume of air or changing its course?



**By enlarging and cleaning
the airways.**



What effect do constricted airways have upon mine resistance?



Constricted airways increase resistance by offering a greater proportion of rubbing surface for the effective area, thereby requiring increased velocity for a given quantity of air.



What is ventilating pressure?



Ventilating pressure is the pressure which must be exerted upon an air current to overcome the mine resistance.



How is ventilating pressure measured?



**With a water gage or
continuous reading pressure
recorders.**



How is ventilating pressure produced by fans?



The speed at which the fan is operating (depending on the characteristics of the fan) determines the ventilating pressure.



What effect do obstructions in airways have upon the quantity of air circulated, if the fan speed remains constant?



The quantity of air is decreased.



What effect does a short circuit have on the quantity of air circulated, if the fan speed remains constant?



**The quantity is increased
outby the point of the short
circuit, since there is less
resistance.**



What is meant by splitting a ventilating current?



**Dividing the main current
into separate individual
currents.**



What is an air split?



An air split is a portion of the main ventilating current forming a continuous current through a definite part of the mine.



What effect does splitting an air current have on mine resistance?



The overall mine resistance is decreased. However, splitting a given volume of air too many times will result in insufficient ventilation.



What effect does a decrease in mine resistance have on the performance of a fan?



**The fan is able to circulate
an increased quantity of air.**



What effect does a cold intake current of air have upon the dampness of a mine?



As the temperature of the air rises, moisture is absorbed by the air and the mine surfaces become dry.



What are the two systems of ventilation?



**Blowing (forced air) and
exhausting.**



On what air current is it generally recommended that haulage roads be placed?



Usually on intake air.



How can the main haulway of a mine be placed on fresh air when the mine is ventilated by a forced-air system?



By the use of air locks or by placing the main haulway on a separate split of air.



What is the advantage of having the main haulway on the intake in the event of an explosion or fire?



Usually, entrance to the mine is more easily attained.



What is the proper method of producing ventilation in a mine?



A mechanically operated fan.



What types of fans are in common use?



Centrifugal, propeller, and disk.



Where are the main ventilating fans located?



On the outside of the mine.



How should fan buildings be constructed?



**With incombustible
material.**



Where should main fans be installed with respect to the mine openings?



They should be placed at least 15 feet to one side or above the openings and the exhaust duct should be directed away from the openings to prevent recirculation.



Why should fans not be located in a mine opening?



Because of the possibility of their destruction in the event of a mine explosion.



**How can a mine fan
installation be protected
from an explosion?**



**By installing explosion doors
with the fan placed to one
side of the outlet.**



True or False – the mine fan can be operated from the same power source used for all the other mine equipment.



False, the main fan must be operated from a separate power source.



What is the purpose of explosion doors?



To relieve the pressure of an explosion and prevent it from reaching the fan.



Why should mine fans not be located inside the mine?



Locating fans inside the mine creates the possibility of recirculation of air, introduces a fire hazard, and provides no means of protection against explosions.



What is a booster fan?



A booster fan is one which is placed in the mine to handle the total volume of air of one or more splits. It boosts the air current delivered by the outside fan.



Why are booster fans objectionable?



They may recirculate air and constitute a fire hazard; their intermittent use may permit accumulations of gas.



How should man doors at fans be installed?



In pairs to form an air lock.



Why should mine fans be reversible?



So that the air current can be reversed in case of fire or explosions, if necessary.



What is atmospheric pressure?



The pressure exerted by the column of air above a given point.



What is the normal pressure of air on the earth's surface at sea level?



About 14.7 pounds per square inch (psi).



What is a barometer?



**An instrument for
determining atmospheric
pressure or elevation.**



What is the barometer reading for normal air pressure at sea level?



Thirty inches.



How many pounds of atmospheric pressure per square inch are denoted by one inch of mercury column?



0.491 pounds.



Of what value is a barometer relative to underground mine ventilation?



A falling barometer indicates decreased atmospheric air pressure, which permits air in the mine to expand. This is important where there are seals and large pillar lines.



How may a sudden marked reduction in atmospheric pressure affect the atmosphere of an underground mine?



By permitting gases in sealed or large abandoned areas to expand into active workings.



What is a water gage?



An instrument which detects differences in air pressure.



Of what does a water gage consist?



The water gage consists of a glass U-tube that is partially filled with water and open at both ends.



How is a water gage used to determine differences in air pressure?



The ends of the tube are connected to the points between which the difference is to be measured.



**Where can the total mine
resistance be determined?**



At the fan.



What are stoppings?



Partitions erected across openings.



What is the purpose of a stopping?



To prevent short-circuiting of an air current or to seal off portions of the mine.



What is short-circuiting of the air?



When air enters the return through an unintended path before reaching the faces.



What material is used to construct permanent stoppings?



Durable and incombustible materials such as concrete, brick, tile, rock, metals, and other materials.



Why should temporary materials be used only for short-life stoppings?



They generally permit excess leakages of the ventilating current.



What are the principal requirements for permanent stoppings?



They should be airtight and substantially built.



As a mine deepens, what effect will this have on leaky stoppings?



The increased ventilating pressure will cause the stoppings to permit more air to pass through them.



In what way do leaky stoppings decrease the efficiency of ventilation?



They require the fan to move a greater quantity of air than otherwise necessary to properly ventilate the working faces.



When should brattice cloth stoppings be used?



**Only as temporary
stoppings.**



How can the ventilating of large abandoned areas be avoided?



By sealing them.



What should be done when conveyors are extended through stoppings?



They should be boxed to prevent excessive air leakage.



What is a seal?



A seal is a specially constructed stopping, based on engineering plans and drawings, that is designed to effectively prevent the mixing of air from the sealed area with air circulated by the mine ventilating system.



When should seals be constructed?



When abandoned mine workings can no longer be adequately ventilated and examined, a sealing plan should be submitted for approval before construction begins.



Why should seals not be used?



Seals must be regularly inspected. Therefore, if seals cannot be safely inspected, they should not be built.



**What is required before seals
can be constructed?**



Approval from the OMSL and MSHA of a sealing plan and associated engineering specifications.



How often should a certified person examine seals?



If intake air passes by seals, those seals must be examined as part of each preshift examination. If seals are adjacent to a return airway, they must be inspected weekly.



What is an overcast?



**It is an enclosed airway
which provides a means for
one air current to cross
another.**



How should overcasts be constructed?



They should be airtight and substantially constructed of incombustible material.



What conditions should overcasts satisfy?



They should provide sufficient area for the volume of the air current and permit a smooth, uninterrupted flow of air.



What are some of the common errors made in constructing overcasts?



**They are of insufficient area
and offer rough and abrupt
interruptions to the
ventilating current.**



How do overcasts aid haulage?



**They eliminate the necessity
for doors on the haulage
road.**



How do overcasts aid ventilation?



They permit splitting of the air and allow uninterrupted ventilation to the various work areas in the mine.



**Can an undercast be used
for the same purpose as an
overcast?**



Yes.



What is a regulator?



**An adjustable, partial
obstruction in an airway.**



What is the purpose of a regulator?



To control the distribution of the air in the mine by regulating the resistance of an air split.



How is a regulator usually constructed?



**It usually is a stopping
provided with an opening
which has a sliding door.**



What is the effect of a regulator on the amount of air entering a split?



The regulator serves as a valve to increase or decrease the amount of air.



Why are regulators essential to the ventilation of a mine?



They proportion the air to meet the requirements of each individual split.



**Who determines where
regulators are placed?**



Mine management.



What types of regulators are used?



Slides, door types, and other approved methods.



Where are regulators usually placed in a mine?



**At the return ends of the
splits.**



What is the purpose of ventilating doors?



To permit traffic in haulageways without interrupting ventilation.



Why are doors in a mine objectionable?



If damaged or left open, they permit leakage or short-circuiting of the air and, unless built of incombustible material, they constitute a fire hazard.



How should a door be hung?



**So that it will close
automatically and tightly.**



What provision should be made to prevent short-circuiting of a main ventilating current controlled by doors?



Doors should be hung in pairs to form an air lock.



How far apart should the doors of an air lock be placed?



**At sufficient distance to
accommodate the haulage
equipment.**



When are doors advisable?



When it is impractical to use overcasts.



If a serious explosion of methane occurred in a mine which was normally well ventilated, what would be the probable cause?



Interrupted ventilation.



**Should haulage equipment
be parked in doors or
curtains?**



No.



Is the use of automatic doors preferable to ordinary doors?



Yes, but they should be inspected regularly and kept in operating condition.



**In which direction should
doors swing to close?**



In the direction of the air current so the pressure will keep the door closed.



**Why should latches on doors
be prohibited?**



Because doors should not be provided with any device to interfere with their closing.



What should be provided for the passage of miners through doors when the ventilating pressure prevents their easy opening?



Man doors on the clearance side.



What should be the minimum dimensions of man doors in permanent stopping or overcasts?



**Thirty inches or the height of
the coal seam.**



What are the requirements relative to the construction of doors placed on main haulageways?



They should be substantially built and hung so that they close automatically.



Should air which has passed through a belt conveyor entry be used for face ventilation?



**No, unless a special permit
has been granted.**



**How should belt conveyors
be ventilated?**



By placing them on a separate split of air with the air passing into the return entry after passing through the belt entry.



How much air is required to ventilate a belt conveyor entry?



**Enough to keep the entry
free of explosive gases and
provide a safe atmosphere.**



What is the minimum number of entries required where belt conveyors are used?



Three.



Why must there be a least three entries when belt conveyors are used?



**One entry is for intake air,
one for return air, and the
third should be a neutral
split of air used for
ventilating the belt entry.**



What is an anemometer?



An instrument resembling a small disk fan used to measure air velocities.



**For what period of time are
underground mine air
velocities measured?**



Usually for one minute.



How is an anemometer used to obtain velocities?



It is held in an air current for a given period of time to measure linear feet of air travel.



In which direction should the air current pass through the anemometer?



**The air current should enter
the back of the anemometer.**



Why should the anemometer be moved across the airway when taking the reading?



**So that the average reading
may be obtained.**



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19.5%.



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where miners work or travel.**



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from possible sources of
contamination to the air.**



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How much air is required to pass through the last open crosscut at each active section on the intake and return side?



9000 cubic feet per minute



What is the minimum quantity of air required at each working face where coal is being cut, mined, or loaded in a working section?



3000 cubic feet per minute



What is the minimum quantity of air that must be delivered to the intake side of the pillar line?



9000 cubic feet per minute



Who shall have the authority to require additional air in any mine when he deems it necessary for the safety of the employees?



The Commissioner



True or False

Air that has passed through and ventilated all the working places in an air split of a mine is still considered to be intake air.



False, it is return air.



When working places advance, what is the maximum distance permitted between breakthroughs or crosscuts, unless permission is granted from the commissioner?



90 feet



True or False

All permanent stoppings shall be substantially built with suitable combustible material that does not have to be fire resistant.



**False, it must be incombustible
and fire resistant.**



When doors are required on the main haulways, they shall be built in a substantial manner and shall be hung so as to close _____ when unobstructed.



Automatically



In a mine where methane can be found to an extent of one percent (1%) or more on the return of any one (1) split, what may the inspector, with the approval of the commissioner require?



The inspector may require the mine be ventilated with the exhaust system and that no electrical wires or haulage roads be located on the return.



The ventilation in a mine shall be sufficient to prevent methane accumulations, so far as practicable, and to keep the methane percentage in the return to not more than _____ percent.



Answer: Two (2) percent



The ventilating current from the belt entries must be directed to the return before reaching the face areas. But is it ever possible to use belt air in the face areas?



Yes, belt air can be used at the face area if a permit has been granted from the OMSL.



Who is allowed to work at a place where sufficient ventilation cannot be maintained?



Only those persons employed to make the places safe and in compliance with the ventilation requirements.



Who is required to supervise the workers employed for making the place safe and in compliance with the ventilation requirements?



The repair work shall be done under the constant supervision of a certified official designated by the mine foreman.



When the fan stops or for whatever reason the ventilation at a mine is interrupted for 15 minutes or more, what action must be taken by the licensee?



All persons must be withdrawn from the working sections and the power must be cut off in a timely manner.



After repairs have been completed to the interrupted ventilation system at a mine, what must be done before the workers are allowed to reenter the mine?



The mine must be reexamined by a certified official to make sure the air is traveling its proper course and that methane has not accumulated in the amount of one (1) percent or more.



End of Part 1 of Unit 7