

Oral Exam Explosives



What is the only kind of explosive that can be used in an underground coal mine?



Permissible explosives and permissible blasting devices.



**How must a permissible
explosive be fired?**



**Only with electric
detonators of proper
strength.**



What is the maximum charge of permissible explosive for a hole (six) 6 ft. or more in depth?



Answer: three (3) pounds



What is the maximum charge of permissible explosive for a hole less than six (6) ft. in depth?



**Answer: one and one half
($1\frac{1}{2}$) pounds**



**How must permissible
explosives be stemmed?**



Answer: they must be properly confined in a hole with incombustible stemming material of the following lengths:

- (1) At least 24 in. long; or**
- (2) One-half the length of the hole if the hole is less than 4 ft. in depth**



**What must be done
immediately before the
shot is detonated?**



The place must be checked for gas and the methane content must be less than 1% and excessive coal dust must not be present.



What may be the result of using permissible explosives in a non-permissible manner?



Any of the following can occur: an ignition of methane/air/dust mixture, misfire, blowout, or a premature ignition.



**What is the principal cause
of explosives accidents
when permissible explosives
are used?**



**Answer: Carelessness or
improper use**



**What poisonous gases are
liberated by explosives
when fired?**



**Answer: carbon monoxide
and oxides of nitrogen.**



**How shall explosives and
detonators be transported
into a mine?**



They shall be enclosed in non-conductive boxes and transported separately from firing devices.



If explosives and detonators are to be hauled on the same trip, how shall they be kept in relation to each other?



They shall be separated by substantially fastened hardwood partitions, at least 4 in. thick, or by a construction providing equivalent safety protection.



How may explosives be hauled by electrically operated trips?



In covered cars or containers that are substantially well built and lined with non-conductive material.



What are the provisions related to carrying explosives on trips which transport workers?



**Explosives are prohibited
on trips which carry
workers.**



**At what time interval
should explosives trips
precede or follow any other
trip?**



**They should be not less
than five minutes apart.**



What supplies may not be hauled in the same trip with explosives?



Oil, grease or other highly flammable materials.



**How may explosives and
detonators be transported
by belt conveyors?**



**Only in the original,
unopened case or in
enclosed, insulated
containers.**



Where explosives and detonators are transported by belt conveyor, what must be provided at loading and unloading points?



Stop controls must be provided and an attendant shall supervise the loading and unloading of supplies.



What types of equipment are illegal to use for the transportation of explosives and detonators?



**Flight conveyors,
continuous mining
machines, loading and
cutting machines, and
drills.**



How much clearance is required where explosives are transported on a belt conveyor?



The same clearance as is required for workers, I.e. 24 in., except in low coal, where 18 in. may be approved.



How shall explosives be stored?



**In cool, dry, well ventilated
magazines.**



**With what material shall
the outside of explosives
magazines be constructed?**



Incombustible material.



**In what condition should
the area in or around
magazines be maintained?**



**Rubbish or accumulations
of combustible material
should not be permitted in
or within 25 ft. of the
magazines.**



What methods of lighting shall not be permitted in magazines.



Open lights



What kind of lights may be used inside magazines?



**Only permissible lights
that are worn or carried.**



**Is it permissible to smoke,
carry smokers' articles, or
have open flames in or
near any magazine?**



No. Smoking, carrying smokers' articles, or having open flames is prohibited in or near any magazine.



What quantity of explosives may be stored underground in magazines?



**Not more than a 48-hour
supply.**



How should explosives be stored near the working faces?



They shall be stored in separate, closed containers and shall be in a location that is at least 50 ft. from the face and out of the line of blasting.



**How far from pipelines,
power lines, rails, or
conveyors shall explosives
and detonators be kept
when stored near the
working faces?**



At least 15 ft.



**What distance shall
separate explosives and
detonators when stored
near working faces?**



A distance of at least 10 ft.



When shall explosives and detonators be removed from their containers?



**Immediately before use at
the working face.**



**What shall be posted near
surface magazines?**



Warning signs, placed so that a bullet passing directly through them will not hit the magazines.



**What type of tools should
be used to open cases of
explosives?**



Only non-metallic tools.



What safety precaution shall be taken with surface magazines?



**They must be kept locked
at all times when
unattended.**



**What type of blasting units
must be used to fire
permissible explosives?**



**A permissible shot-firing
unit of adequate capacity
to fire all caps.**



**By whom shall shots be
charged and fired?**



**By certified shotfirers
designated by the mine
foreman.**



How is an electric blasting cap protected from stray electric current?



By means of a shunt.



How is a shunt made?



It is made by short-circuiting the ends of the leg wires.



How should a shunt on leg wires be maintained until its removal?



It should be short-circuited or shunted at the battery until ready to attach to the blasting unit.



What is the proper type of shot-firing cable?



A well insulated, two-conductor cable of adequate size, strength, and length to permit the shot firer to get to a safe place, i. e. around a corner of a pillar.



What precaution should be observed when unwinding the shot-firing cable?



The cable should be kept clear of power wires and all other possible sources of active or stray electric currents.



How should the shot firing cable be handled between the charge and the firing station?



It should be staggered as to length, ends kept well separated when attached to the detonator leg wires, and unreeled from the charge toward the “firing station”



**What are the two dangers
of electric firing?**



The current may be applied before all workers have reached a safe place or stray electric currents may cause premature detonation.



When should the blasting cap be placed in explosives?



**Not until the holes are
ready to be charged.**



Where should the blasting cap be placed when a bore hole is charged?



The blasting cap, or primer, shall be placed in the bore hole first, pointing outward, and the rest of the charge shall be pushed in a continuous train to the back of the bore hole to prevent cuttings from getting between the cartridges.



What is a primer?



**An explosives cartridge
with a blasting cap
inserted.**



How should the blasting cap be inserted in a primer?



In making a primer, a powder punch of non-sparking material shall be used. The hole in the cartridge shall be at least $\frac{1}{2}$ in. deeper than the length of detonator used. Rolling the end of a cartridge is prohibited.



**What is meant by the term
“multiple blasting”?**



**Detonating more than one
hole at a time.**



What are the advantages of multiple blasting?



The shot firer is less likely to be injured by a premature blast caused by a possible misunderstanding and not as apt to be injured by roof loosened by preceding shots.



What are the disadvantages of multiple blasting?



One or more of the shots may fail to detonate due to faulty wiring or defective detonators. Failed shots are usually covered by loose coal from other shots and are undetected until dug into by machines or by hand.



How must the leg wires be connected when using delay detonators?



In a series circuit.



**Why is series wiring of
shots considered
preferable?**



If the shots are properly prepared and wired correctly, all shots will detonate, unless there is a defective detonator.



**May instantaneous,
regular or zero-delay
detonators be fired in the
same circuit as delay
detonators?**



No



What is the minimum delay interval between adjacent rows of shots when using delay detonators?



25 milliseconds.



**What must be done before
a misfire is removed when
using delay detonators?**



The failed shot must be tested with a galvanometer.



Does a shot firer and drill operator for solid blasting have to be certified?



Yes



**Should mudcaps (adobes)
or other non-permissible,
unconfined shots be fired
underground.**



No



What is the purpose of cutting the coal prior to blasting?



To provide an additional free face or faces to assist the action of the explosive and lessen the danger of blown-out shots.



Must a coal mine have a permit to shoot from the solid?



Yes



What procedure should coal mine operators follow in order to engage in shooting coal from the solid?



They should submit an application for a permit to the Office of Mine Safety and Licensing.



**What is the danger of
blasting off the solid?**



Ignition of explosive mixtures of gas and coal dust by blown-out shots.



**What is the minimum
burden that all blasting
charges shall have?**



Eighteen inches in all directions, if the height of the seam permits.



**What is the limit of drilling
blast holes in relation to
cut depth?**



Blast holes shall not be drilled beyond the depth of the cut.



**What is the remedy for
holes that are drilled
deeper than the cut?**



The holes must be stemmed with incombustible material to the depth of the cut.



Why should holes not be drilled deeper than the depth of the machine cut?



**They may result in a
blown-out shot and will not
be as effective.**



**How does the shot-firer
know if holes are drilled to
the correct depth?**



By carefully measuring the depths of the cut and holes.



How shall a hole be prepared before loading the charge?



**It shall be scraped as clean
as possible.**



What may be the result of a charge that is separated by unremoved drill cuttings?



Incomplete explosion and possible burning of the unexploded charge.



**How many types or brands
of explosives may be used
in the same hole?**



Only one.



How shall explosives be placed in the borehole?



Explosives shall be pushed into the hole in a continuous train, with no cushions between the back of the hole and the explosives or between the explosives and the stemming.



How shall explosives be confined in a drill hole?



**They shall be confined with
incombustible stemming
material.**



What is proper stemming material?



**Incombustible material
such as sand, clay, rock
dust, or special devices
such as water dummies.**



Why is coal dust stemming dangerous?



The flame of the explosive blast will be increased and the coal dust may be ignited.



**What are the practical
benefits of proper
stemming?**



Proper stemming makes a shot more effective.



**What is the danger of
improper stemming?**



The danger of a blown-out shot.



**What type of tool should
be used for tamping?**



Only non-metallic tamping bars shall be used for charging and tamping bore holes. This does not prohibit the use of a non-metallic tamping bar with a non-sparking metallic scraper on one end.



**What kind of tamping tools
are prohibited?**



**Metal or metal-clad
tamping bars.**



**After holes have been
charged, what should be
done with surplus
explosives?**



**They should be removed
from the place to be
blasted and out of the line
of fire.**



**Can flying coal or slate
from a shot detonate
permissible explosives?**



Yes. Miners have been killed when explosives were not removed to a safe place and were detonated by flying material from shots.



**May electrical equipment
be operated in the face
area while blast holes are
being charged?**



No



**How soon after charging
shall holes be fired?**



Promptly



What may be the cause of premature detonation of a shot?



Stray electric currents.



**What creates the force
when an explosive is fired?**



**The sudden expansion of
the gases liberated.**



**What is required before
shots may be fired in a
working place?**



The place shall be properly examined for the presence of methane.



What is considered a dangerous percentage of methane when permissible explosives are to be fired?



**A methane content of 1%
or more.**



In what direction is the maximum force of an explosive exerted?



**The force is exerted
equally in all directions;
however, it takes the
direction of least
resistance.**



How should warnings be given when shots are about to be fired?



**By distinctly shouting
“fire” three times after
miners have withdrawn
from the area where the
blasting will occur.**



**What should persons do
when warned that shots
are to be fired?**



**They should withdraw
immediately and proceed
to a safe place.**



**Where should persons be
when shots are fired?**



**Around the corner of a
pillar and out of the line of
fire.**



**When should the shot firer
make the connection to the
shooting cable?**



**When all persons are out
of the line of fire.**



**How soon may a person
approach the face after a
shot has been fired?**



**Not until the smoke has
cleared away.**



**What shall be done before
work is resumed after
blasting?**



The roof shall be examined and the working place shall be checked for gases and made safe.



What is the first thing to do when a misfire has occurred?



Disconnect the wires from the blasting unit and short-circuit them at that location.



**How long shall any person
wait after a misfire before
going back into the place?**



At least five minutes.



How shall a misfire be removed?



By firing a separate charge at least two feet away from, and parallel to, the misfired charge or by washing the stemming and the charge from the bore hole with water, or by inserting and firing a new primer after the stemming has been washed out.



**Who shall supervise the
removal of a misfire?**



A foreman or a competent person.



What method of removing misfires is not permitted?



Drilling them out.



How can misfires be prevented?



By careful selection of the explosives and firing devices and correct loading and firing of the charge.



What precaution should be taken with respect to misfires when using multiple blasting?



A careful examination should be made for misfires after each shot.



Who shall be designated to fire shots?



Only a certified shot firer.



**What is the danger of
adobe or mud-capping
with explosives other than
permissible sheathed
explosives?**



The unconfined explosion will raise coal dust which may become ignited.



What important regulation must be followed in the use of explosives and detonators underground?



Except for work involved in sinking a shaft or slope from the surface, all explosives and blasting devices used underground must be of the permissible type, including explosives used for blasting rock.



When may explosives and detonators be removed from their original containers?



Not until all other preparation work is completed and boreholes are ready for charging.



**What type of blasting units
may be used while firing
underground?**



Only permissible blasting units, unless firing is done from the surface with all personnel out of the mine.



What precaution must be taken when using permissible explosives in a mine?



A test for gas shall be made before and after firing each shot or group of shots.



**What other work may be done
while shots are being charged?**



No other work shall be permitted in the danger zone except emergency work necessary to safeguard the employees.



What type of tools may be used for opening explosive cases or boxes and inserting holes in the individual sticks of explosives?



**Only non-sparking tools may
be used for this type of work.**



When may the shunt be removed from the detonator leg-wire?



Not until the shot-firer is ready to connect to the firing cable.



May shots be fired by any other means than a permissible unit?



**No, except when all personnel
are outside the mine.**



What safety measure must be strictly observed before shots are fired in any working place?



Ample warning must be given and care taken to ascertain that all persons are in the clear, including persons working in the adjoining vicinity, before shots are fired.



What is the danger of under-charging or over-charging a shot or shots?



Blown-out shots.



**How many holes may be fired
at the same time and remain
permissible?**



No more holes may be fired at any one time than the number for which the permissible shot-firing unit is designed.



What device should be used to check the continuity of a circuit before blasting?



A galvanometer.



End of Unit 4