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Chapter: 1 Methane/Oxygen (Gasses)

METHANOMETER

1. How do you test a methanometer?
   - Check for battery level and zero

2. Where should you check for methane?
   - Confined area in the coal crushing plant, under hoo ds, etc.

METHANE TEST

1. What is methane?
   - A colorless, flammable gaseous hydrocarbon (CH₄)

2. How is methane detected?
   - By a methane monitor

3. What is the composition of methane?
   - It is a product of decomposition of organic matter in marshes and mines; or the carbonization of coal.

4. Is methane light or heavier than air?
   - Lighter

5. When checking for methane inside a building or structure, where would you expect to find it?
   - In high places, within 12 inches of roof or ceiling. It will accumulate in corners too.

6. What is the explosive range of methane, in percentage?
   - 5% to 15%

7. If you detect 2% methane, what action should be taken?
   - All persons must be evacuated from work area.
   - All power cut off and the area ventilated until percentage is below 1%

8. What is the first thing you should do to make an area safe to cut or weld?
   - Exam work area for methane and ventilate if methane is present.
9. Why should you not smoke in areas where methane might occur?
   • Methane has a low ignition point and is very explosive.

10. Who should check for methane?
    • A Qualified Person

11. What would you expect to happen when the methane monitoring system in the plant picks up 1% methane?
    • At 1% an alarm would sound and we would ventilate
    • At 2% we would evacuate, de-energize equipment and ventilate.
    • 1% to 5% Methane, No explosion
    • 5% to 9% Methane, May be an explosion
    • 9% to 10% Methane, High probability of explosion
    • 10% to 15% Methane, May be an explosion
    • > 16% Methane, Explosion unlikely

OXYGEN DEFICIENCY TEST

1. What element in air is essential for life?
   • Oxygen

2. What is oxygen?
   • Odorless, colorless, tasteless gas

3. Where would you expect to find a deficiency of oxygen?
   • Confined spaces

4. Who should test for oxygen deficiency?
   • A Qualified Person

5. Is oxygen an explosive substance?
   • No

6. What is the safe and normal percentage of oxygen in the air?
   • 21%

7. If you entered a place that had an oxygen deficiency, how would it affect you?
   • Breathing would become faster and deeper.
   • May become light headed, Lose consciousness, or Die.
1.) How do you test a methanometer?

2.) Where should you check for methane?

3.) What is methane?

4.) How is methane detected?

5.) Is methane light or heavier than air?

6.) When checking for methane inside a building or structure, where would you expect to find it?

7.) What is the explosive range of methane, in percentage?
8.) What is the first thing you should do to make an area safe to cut or weld?

9.) Why should you not smoke in areas where methane might occur?

10.) Who should check for methane?

11.) What element in air is essential for life?

12.) What is oxygen?

13.) Where would you expect to find a deficiency of oxygen?

14.) Who should test for oxygen deficiency?

15.) What is the safe and normal percentage of oxygen in the air?

16.) What is the composition of methane?
17.) If you detect 2% methane, what action should be taken?

18.) What would you expect to happen when the methane monitoring system in the plant picks up 1% methane?

19.) If you entered a place that had an oxygen deficiency, how would it affect you?
Chapter: 1 Practice Question Answers

1). Check for battery level and zero

2). Confined area in the coal crushing plant, under hoods, etc.

3). A colorless, flammable gaseous hydrocarbon (CH4)

4). By a methane monitor

5). Lighter

6). In high places, within 12 inches of roof or ceiling. It will accumulate in corners, too.

7). 5% to 15%

8). Exam work area for methane and ventilate if methane is present.

9). Methane has a low ignition point and is very explosive.

10). A Qualified Person

11). Oxygen

12). Odorless, colorless, tasteless gas

13). Confined spaces

14). A Qualified Person

15). 21%

16). It is a product of decomposition of organic matter in marshes and mine; or the carbonization of coal.

17). All persons must be evacuated from work area. All power cut off. Ventilate until percentage is below 1%.

18). At 1% an alarm would sound and we would ventilate. At 2% we would evacuate, de-energize equipment and ventilate. 1% to 5% Methane - No explosion, 5% to 9% Methane- May be an Explosion, 9% to 10% Methane- High probability of explosion. 10% to 15% Methane- May be an explosion, > 16% Methane- Explosion unlikely.

19). Breathing would become faster and deeper, light headed, loss of consciousness, and fatal.
Chapter: 2 General Mining

1.) Waste or rags containing flammable or combustible liquids that could create a fire hazard shall be placed in (A)_______, (B)_______ containers until disposed of properly.

2.) The formula "C1/T1) + (C2/T2) + + (Cn/Tn) < 1" represents the maximum mixed exposure level to ________.

3.) No noise exposure shall exceed ________dBA.

4.) What is roll over protection?

5.) Moving conveyors shall be crossed only at designated points.
   True / False

6.) What is "overburden"?
   A.) Trees and shrubbery
   B.) All of the earth and other material above the mineral being mined
   C.) Loose materials found on the highwalls
   D.) Material which is found in deposits of earth and rock
7.) What is the final step in the surface mining process?
   A.) Removal of the material being mined
   B.) Transportation of material being mined
   C.) Milling process of material being mined
   D.) Reclamation of earth disturbed by mining

8.) What is a "bench"?
   A.) A sloped area on which the work of removing overburden is performed
   B.) A flat area on which the work of removing overburden is performed
   C.) The actual overburden that is present before stripping of minerals begins
   D.) None of the above

9.) Why do environmental problems of landslides and acid mine drainage occur when traditional contour-mining operations are used?
   A.) The overburden is placed on hillsides
   B.) The overburden is blasted
   C.) The equipment used is not sufficient
   D.) Roads needed to be built on the steep slopes

10.) Danger from the failure of highwalls is the greatest during what time of the year?
    A.) The first two months the mine is in operation
    B.) Summer
    C.) Spring and Winter
    D.) Fall and Summer

11.) By what are the width and height of benches governed?
    A.) The Mine Safety and Health Administration
    B.) The ground control plan submitted by the operator to the State Mine Inspector
    C.) The mine operator and foreman
    D.) The type of equipment used and operations performed
12.) How often shall active working areas be inspected?
   A.) Every shift
   B.) Weekly
   C.) Monthly
   D.) None of the above

13.) How many gallons of water are in a cubic foot?
   A.) Exactly 5 gallons
   B.) 7.5 gallons
   C.) 10 gallons
   D.) 23.5 gallons

14.) What is "reclamation"?
   A.) The passing of laws which regulate surface mining
   B.) Measuring the depth of minerals to be mined
   C.) Restoring the mined land to productive use
   D.) None of the above

15.) Topsoil refers to:
   A.) The top 6 inches of soil
   B.) The earth found above a mineral deposit
   C.) The soil on the surface prior to mining that will support plant or animal life
   D.) None of the above

16.) If an Indian artifact is unearthed during mining operations:
   A.) Area should be left as is until an archaeological survey is conducted and clearance received
   B.) It must be turned over to the State as all artifacts are their property
   C.) Work may continue until archaeology team arrives
   D.) None of the above
17.) Inexperienced employees should be assigned to work with experienced personnel:
   A.) For the first month on the job
   B.) Until the experienced person feels they are able to work safely
   C.) For the first two months on the job
   D.) Until the inexperienced person has acquired the necessary job skills to perform his duties safely

18.) Which State agency has control of water impoundments?
   A.) Department of Mines and Minerals
   B.) Department of Environmental Quality
   C.) Department of Water Quality
   D.) None of the above

19.) Any place in a surface mine where miners are normally required to work or travel is called:
   A.) Active workings
   B.) Work zone
   C.) Safety workings
   D.) Travel zone

20.) According to Wyoming statute, inspection of each working area will be made by a competent person at least:
   A.) Once each day
   B.) Once each week
   C.) Once each shift
   D.) None of the above

21.) Pneumoconiosis is:
   A.) A lung disease
   B.) A skin disease caused by dust
   C.) An eye condition caused by dust
   D.) A disease that is not caused by dust
22.) No employee shall be assigned, allowed or be required to perform work alone in any area where conditions exist that could endanger his safety unless:
   A.) He can communicate with others
   B.) He can be heard
   C.) He can be seen
   D.) All of the above

23.) Barricades, signs or other effective means to prevent unauthorized entry shall be provided where final preparations are being made in:
   A.) Drilling areas
   B.) Blasting areas
   C.) Reclamation areas
   D.) Bench areas

24.) What is required on any permanent ladder?
   A.) That it be anchored securely
   B.) That it have hand holds
   C.) That it extend three feet above the landing
   D.) All of the above

25.) What is a disadvantage of poor drainage at surface mines?
   A.) The erosion of soil and slick roadways
   B.) Freezing water resulting from poor drainage causes slick roadways
   C.) Roadways are harder to maintain and interfere with loading
   D.) All of the above

26.) What protection should be given to drillers when drilling horizontal holes along the highwall?
   A.) Drilling machine should be equipped with a heavy gauge steel screen roof
   B.) Safety belts and rollover protection should be provided
   C.) Drillers should wear steel-toed shoes and drill should be provided with headlights
   D.) Company is required to provide accident and disability insurance
27.) In drilling operations, which statement is true?
   A.) all drill holes must be covered
   B.) The drill operator must be certified
   C.) Drill must be attended at all times while in operation
   D.) All of the above

28.) Men are not permitted to work in unsafe conditions:
   A.) Unless they are working to correct the hazardous condition
   B.) Between equipment highwalls if equipment hinders emergency retreat
   C.) Under or near highwalls or banks
   D.) All of the above

29.) If hazardous material must be removed from a highwall, how should it be done?
   A.) Hazardous material should never be removed by hand
   B.) Material should be removed by working from a safe location
   C.) Hazardous material should be removed from above
   D.) Hazardous material should be removed with a scaling bar from below

30.) Before men are allowed to work in an area, what must be examined?
   A.) Highwalls
   B.) Benches
   C.) Terrain sloping into work areas
   D.) All of the above

31.) What element or elements could change the condition of the ground?
   A.) Rain
   B.) Freezing
   C.) Thawing
   D.) All of the above
32.) If large layers of rock make up part of the highwall, what should be done with them when stripping operations are carried on?
   A.) They should be removed and loaded separately
   B.) They should be placed near the bottom
   C.) They should be loaded along with the rest of the material
   D.) They should be blasted or crushed into smaller stones prior to loading

33.) When there is an unsafe condition found to exist on a highwall, it shall be corrected:
   A.) Before any other work is performed in the hazardous area
   B.) Sometime during that particular shift
   C.) During the next 24-hour period following discovery of the condition
   D.) Immediately after notification of the State Mine Inspector

34.) Lighting shall be provided in and on all surface structures, paths, walkways, stairways, loading and dumping sites:
   A.) During evening and night shifts
   B.) If other methods of illumination are not sufficient
   C.) Of sufficient intensity to provide safe working conditions
   D.) all of the above

35.) Protective gloves should be worn:
   A.) At all times
   B.) When handling materials which may cause injuries
   C.) Only when handling electrical cables as most injuries occur when gloves become caught in machinery
   D.) Only a and b

36.) Why are safety rules at a mine necessary?
   A.) To cover hazards not covered in the State or Federal mining statutes
   B.) To lower accident frequencies at the mine site
   C.) To reinforce State or Federal mining statutes
   D.) All of the above
37.) Men should not walk or stand above:
   A.) Surge piles
   B.) Storage piles
   C.) Reclaiming areas
   D.) All of the above

38.) A competent or qualified person should be in charge:
   A.) During blasting operations
   B.) During electrical maintenance work
   C.) During hoisting operations
   D.) At all times when men are working

39.) When safety belts or lines are used to enter tanks or bins:
   A.) A catch net must be provided under the worker or workers
   B.) A second person shall tend the lifeline at all times
   C.) Personnel may be raised only to a height of 50 feet
   D.) All of the above

40.) What is the simplest form of mine drainage?
   A.) Pump and pipeline
   B.) Drainage tunnels
   C.) Siphon
   D.) Gravity drainage

41.) If failure of a water or silt retaining dam will create a hazard, it shall be:
   A.) Of substantial construction
   B.) Inspected at regular intervals
   C.) Both a and b
   D.) Neither a or b
42.) A mine operator must have prior arrangements established for how many hours of medical coverage?
   A.) 8 hours
   B.) 16 hours
   C.) 24 hours
   D.) None of the above

43.) Radio transmissions are prohibited and there should be warning signs posted within how many feet of charged holes when blasting electrically?
   A.) 25 feet
   B.) 40 feet
   C.) 50 feet
   D.) 75 feet

44.) A surface mine pit will have less danger from flooding:
   A.) Mining proceeds in the direction of the downward pitch of the ore body
   B.) The mining proceeds perpendicular to the pitch of the ore body
   C.) The mine pit is kept reasonably short
   D.) The diversion ditches are established along the upper edge of the highwall side

45.) One way to prevent accidents and injuries to miners is to:
   A.) Keep equipment and structures clean
   B.) Provide shelter enclosures for inclement weather conditions
   C.) Maintain structures and equipment in good repair
   D.) All of the above

46.) Travelways where men must walk are required to be:
   A.) Installed and maintained to all working areas
   B.) Kept clear of stumbling and slipping hazards
   C.) Constructed of non-skid material if walkways incline
   D.) All of the above
47.) How should your foot be positioned when walking up the tracks of a dozer?
   A.) Sideways
   B.) Toe first
   C.) Heel first
   D.) You should never walk up a track

48.) What is meant by "good housekeeping" in and around mine buildings and yards?
   A.) Cleanliness
   B.) Orderly storage of materials
   C.) The removal of possible sources of injury
   D.) All of the above

49.) Company policy on safety is communicated to employees primarily by:
   A.) Safety Department
   B.) Supervisor
   C.) Company magazine
   D.) Company bulletins conspicuously posted

50.) Hidden costs of accidents are:
   A.) Lower than the direct costs
   B.) Impossible to calculate
   C.) Equal to or higher than direct costs
   D.) Can be easily identified and calculated

51.) One of the best ways to maintain employees' interest in safety is to:
   A.) Use posters liberally
   B.) Report all accidents
   C.) Involve them in safety activities
   D.) Reprimand all safety infractions
52.) Housekeeping is the responsibility of:
   A.) Laborers
   B.) Maintenance
   C.) Everyone
   D.) Foremen

53.) Electrical current is measured in:
   A.) Volts
   B.) Amps
   C.) Ohms
   D.) Joules

54.) The primary articles of protective wearing apparel include:
   A.) Gloves, coats, hard hat
   B.) Hard hat, protective footwear, safety glasses or goggles
   C.) Safety glasses or goggles, overalls, safety belt
   D.) All of the above

55.) The green wire on a three-wire connector in a single-phase circuit is:
   A.) Hot
   B.) Neutral
   C.) Ground
   D.) Secondary

56.) Do miners have the right to bring safety violations to the attention of MSHA or the State Mine Inspector?
   A.) No
   B.) Yes
   C.) Only in special cases
   D.) Only if no action has been taken by the company upon request
57.) Is the mine operator required to pay miners during the time spent in MSHA mandatory training?
   A.) Yes
   B.) No
   C.) Only if training is on company grounds
   D.) Only if training is during regular working hours

58.) During a federal inspection, who may accompany the inspector to represent the miners?
   A.) Safety supervisor
   B.) Mine foreman
   C.) Miners’ representative
   D.) None of the above

59.) Anyone using a grinding wheel must:
   A.) Stand at least three feet away
   B.) Wear gloves
   C.) Always wear a face shield or goggles
   D.) All of the above

60.) The definition of high voltage potential, according to MSHA, is:
   A.) Over 650 volts
   B.) Over 300 volts
   C.) 300-650 volts
   D.) Over 800 volts

61.) If you see or are working with a piece of equipment with an electrical short, you should:
   A.) Immediately shut off the equipment
   B.) Report it to your supervisor
   C.) Notify fellow miners so they can avoid the hazard
   D.) None of the above
62.) The definition of a low voltage potential, according to MSHA, is:
   A.) Over 110 volts
   B.) 0 to 480 volts
   C.) 0 to 1000 volts
   D.) 0 to 650 volts

63.) If a tagged piece of equipment is needed for a job, you should:
   A.) Leave the tag on the equipment and allow it to be used for emergencies only
   B.) Remove the tag while equipment is in use and promptly replace afterwards
   C.) Inform the people needing the tagged equipment that it cannot be used until repaired
   D.) Have the person who requires the equipment sign a release form and accept all responsibility for its use

64.) When required inspections disclose hazardous conditions:
   A.) The foreman must sign them and notify the mine operator of the hazards
   B.) The foreman should move his work crew to another working face until condition is corrected
   C.) The foreman should promptly take action to correct the hazardous condition
   D.) Notify the State Mine Inspector and MSHA that hazards exist in the mine

65.) Before reaching for exposed mechanical power transmission equipment elevated out of normal reach, you should:
   A.) Have unnecessary workers leave the area
   B.) See that all mechanical guards are in place
   C.) Make sure all power is shut off and locked out
   D.) All of the above

66.) All exposed moving machine parts that may come in contact with, and cause injury to, a person shall be:
   A.) Posted as dangerous
   B.) Guarded
   C.) Operated only by experienced competent personnel
   D.) None of the above
67.) It is a good idea for foreman and supervisors to know company rules and Federal and State laws to:
   A.) Be able to correct infractions
   B.) Understand safety hazards
   C.) Enforce their authority
   D.) All of the above

68.) What is the importance of pressure-release shut-off controls on hand-held equipment?
   A.) The equipment shuts off immediately when pressure is released
   B.) They slow the operating speed of the equipment, reducing the chance of injury
   C.) They make the equipment wear longer
   D.) The quality of the work is enhanced

69.) A person is permitted to work alone only:
   A.) If there is an emergency
   B.) If they volunteer for the work assignment
   C.) If they have access to a telephone
   D.) If their cries for help can be heard

70.) When should safety devices on compressed air systems be checked?
   A.) Daily
   B.) Weekly
   C.) Bi-monthly
   D.) Monthly

71.) Who is the person most important in promoting and maintaining an effective health and safety program?
   A.) Mine operator
   B.) Safety supervisor
   C.) State Mine Inspector
   D.) Mine Foreman
72.) Gloves should not be worn:
   A.) At anytime
   B.) Where they may become intertwined in machine
   C.) During roof and rib checks
   D.) b. and c. only

73.) Before repairs are made on compressors or compressed-air-powered equipment:
   A.) Plan of repairs must be approved by MSHA
   B.) Equipment must be taken to the surface
   C.) The pressure must be bled off
   D.) Warning signs must be posted around area where repairs are being made

74.) How often must a foreman be recertified?
   A.) Every five years
   B.) Whenever he changes employers
   C.) A foreman need never recertify
   D.) Annually

75.) Power wires must be guarded:
   A.) When they are more than seven feet above the floor
   B.) At material loading and unloading areas
   C.) From the shaft station to the working stations
   D.) Anywhere inside the mine

76.) Applying heat to a specific volume of gas in a closed container will:
   A.) Increase the gas volume
   B.) Decrease the gas volume
   C.) Increase the gas pressure
   D.) Decrease the gas pressure
77.) What is a berm?
   A.) A ditch to prevent equipment from moving
   B.) A mound of material capable of retaining equipment
   C.) Both a and b
   D.) None of the above

78.) What is a safety can?
   A.) Any can that provides a safe means of transport
   B.) A container made of either plastic, glass or metal.
   C.) Approved container not over 5 gallons, has spring loaded cap and spout cover.
   D.) None of the above

79.) What does certified mean?
Chapter: 2 Practice Question Answers

1). (A) Covered (B) Metal
2). Noise
3). 115 dBA
4). "Roll over protection" means a framework, safety canopy, or similar protection for the operator when equipment overturns. (30 CFR 77.2(w))
5). T
6). B
7). D
8). B
9). A
10). C
11). D
12). A
13). B
14). C
15). C
16). A
17). D
18). B
19). A
20). C
21). A
22). D
23). B
24). D
25). D
26). A
27). C
28). D
29). B
30). D
31). D
32). A
33). A
34). D
35). B
36). D
37). D
38). D
39). B
40). D
41). B
42). C
43). C
44). D
45). D
46). D
47). A
48). D
49). B
50). C
51). C
52). C
53). B
54). B
55). C
56). B
57). A
58). C
59). C
60). A
61). A
62). D
63). C
79). "Certified" or "registered," as applied to any person means a person certified or registered by the State in which the coal mine is located to perform duties prescribed by this Part 77, except that, in a State where no program of certification or registration is provided or where the program does not meet at least minimum federal standards established by the Secretary, such certification or registration shall be by the Secretary. (30 CFR 77.2(m))
Candidates should be familiar with all materials in this subpart.

**Wyoming Law reference:**

30-2-101 (a)(ix) Definition of mine foreman.
30-2-308 Mine and unit foreman; duties mines to be supervised by certified personnel.
30-2-309 Same; qualifications generally; certificate of competency required; reciprocity.
30-2-312 Optional certifications of surface mine foreman and mine examiner.
1.) Who may perform electrical work at mine sites?
   A.) Trained Electrician
   B.) A certified person
   C.) A qualified person
   D.) Both b and c

2.) Who may perform methane and oxygen deficiency tests?
   A.) Anyone
   B.) a qualified person
   C.) a certified person
   D.) Both b and c

3.) Who qualifies persons to do methane and oxygen deficiency tests?
   A.) The Secretary of Labor
   B.) An authorized representative of the Secretary of Labor
   C.) The State of Wyoming Mining Council
   D.) Any of the above

4.) An individual is a qualified person to repair energized surface high-voltage lines only if he has had at least ______ year(s) experience in the repair of energized high-voltage lines located on poles or structures.
   A.) 1 year
   B.) 2 years
   C.) 3 years
   D.) 5 years

5.) How long does it take to become qualified to perform electrical work at the mine sites.
Chapter: 3 Practice Question Answers

1).  C
2).  D
3).  D
4).  B
5).  One year experience. (30 CFR 77.103)
Chapter: 4 Ground Control and Haulage

30 CFR PART 77 - SUBPART K, GROUND CONTROL, SUBPART Q, HAULAGE

Candidates should be familiar with all material in these subparts.

Wyoming law references:

30-3-110 - Pits and Quarries

GROUND CONTROL AND HAULAGE

In strip mining there are two main hazards associated with the physical make-up of the mine. These are slope failures and water hazards. The most serious are the slope failures.

Slides in soils occur in nearly every conceivable manner, at varying rates, and for any number of reasons.

The failure of a slope in a cohesive material is usually preceded by tension cracks behind the rim of the slope. Model studies indicate that these cracks do not penetrate to depths greater than one-half the slope height. The curve that results from the slide resembles the arc of an eclipse and is usually approximated by an arc of a circle or of a logarithmic spiral.

A failure that occurs at the toe, or at some point above the toe, is called a slope failure; when the failure surface occurs at some distance beyond the toe of the slope, the failure is called a toe failure.

Refer to Figure 10-1

![Diagram of slope failure](image)

Of the many factors that appear to effect the stability of rock slopes, perhaps the most important are the number and orientation of the defects in the rock and the stress concentrations in the rock wall behind the slope.

Slope failures in rock have been defined as:

Refer to Figure 10-2.
1. Rock falls that might randomly occur from any point.
2. Rotational shear, which is similar to toe failure in soils.
3. Slope Failure.
4. Block flow which is a general crushing that allows blocks of rock to flow in a mass.

Experience in the mining industry has also led to the conclusion that any general failure is preceded by open cracks on the rim. In most cases, a small vertical displacement will occur along these cracks and the slope before a failure in rotational of plane shear becomes manifest. Further, the mining industry also experiences failures along benches that may be either rotational shear or plane shear failures.

Indications of slope failure are: Refer to Figure 10-3.

1. Fractured or broken rocks in the highwall.
2. Vertical displacement of rock layers.
3. Opening or crack in rocks from which water may be coming.
4. Trees overhanging a highwall can break free without warning.
5. Cracks in the ground above highwalls.
6. An undercut highwall could suddenly collapse.
7. A stable highwall can be unstable in periods of extreme freezing and thawing.
8. Heavy rocks piled on top of lighter soil. If the weight gets to be too great on the top pile, the bottom material on the slope will slip out.
9. Material piled at steeper than normal angle.
10. Wet rainy weather could add pressure to weaker layers and cause failure.
Indications of Slope Failure

Figure 10-3

- Undercutting highwall
- Jagged section of highwall
- Horizontal crack in highwall
- Boulders slipping off top of spoil bank
- Vertical crack in highwall
- Loose rocks in highwall
- Crack on top of highwall
- Trees overhanging highwall
Several ground control methods used by surface mines to prevent highwall accidents are:

1. Maintaining the proper slope in the highwalls.
2. Barriers such as restraining fences and walls.
3. Rock bolting a screen fence to a highwall.
4. Building benches, or terraces on steep hillsides.
5. Remove water pressure by drainage.
6. Scaling loose material from the highwall.

A ground control method to control spoil pile slope failure is to pile heavier rock material on the bottom of pile and lighter material at the top and maintain proper slope.

**WATER HAZARDS**

Three potential water hazards to men and equipment in surface mining are:

1. Electrical shock or electrocution. Areas covered with water are excellent conductors of electricity from as little current as is supplied from a simple extension cord.
2. Loosening of materials that were previously solid such as, highwalls, spoil banks, benches, and sloping terrain.
3. Haulage roads become slick.

**ILLUMINATION**

The following list of rules is a good guideline to follow when working at night:

1. Make sure the highwalls are illuminated enough to ensure adequate inspection to maintain safety.
2. Keep on all equipment lights.
3. Drive more slowly at night, and dim headlights at approaching trucks or other vehicles.
4. Set out flares if you're forced to stop on a roadway.

**MOVING MATERIAL IN THE MINE**

The transport of coal and overburden by truck is one of the most dangerous aspects of mining. The following hazards can contribute to truck haulage accidents.

1. Poor haulage road conditions - this category includes water on the roads; rough, bumpy roads; and trash and obstructions on the road.
2. Poor visibility - this includes poor sight distance because curves and obstructions, as well as poor visibility from rain, snow, fog or dust from very dry haulage roads.
3. Defective equipment - this includes loss of steering control, loss of brakes, as well as missing lights, horns, and reflectors.
4. Improperly marked roads.
SUMMARY

Two main hazards concerning ground control are:

1. Slope failures.
2. Water hazards.

The two kinds of soil failures are called:

1. Slope failures.
2. Toe failures.

The four kinds of rock failures are called:

1. Rock fall.
2. Rotational shear.
4. Block flow.

Be able to identify each of these.

Almost all slope failures are preceded by cracks in the ground above the rim. Piling heavier material at the bottom of a pile, and lighter material near the top of a pile, and maintaining a proper slope, are good ways to prevent failures.

Hazards associated with water are:

1. Electric shock or electrocution.
2. Loosening of materials in highwalls, etc.
3. Slick haul roads.

Hazards contributing to truck haulage accidents are:

1. Poor haulage road conditions.
2. Poor visibility.
3. Defective Equipment.
4. Improperly marked roads.
1.) What are the two main hazards in the pit area?

2.) What are three reasons that water is a hazard in the pit area?

3.) It is permissible to drive over a power cable if:
   A.) The power is off
   B.) You notify the operator first
   C.) The ground is soft so the cable sinks into the mud
   D.) None of the above

4.) The soil and dirt covering a mineral in surface mining is called:
   A.) Spoilage
   B.) Overburden
   C.) Terrain
   D.) Iron ore

5.) The first cut made in a tract of land to be surface mined is called the:
   A.) Pit
   B.) Bench
   C.) Box cut
   D.) Slope
6.) When traveling on haulage roads, loaded trucks should usually be:
   A.) Given the right of way
   B.) Allowed to drive where they wish
   C.) Allowed to drive on the inside of all curves
   D.) Forced to give the right of way to other traffic

7.) The proper way to come down from a piece of equipment with a ladder is:
   A.) To come down facing the equipment
   B.) To come down with your back to the equipment
   C.) To jump down
   D.) To slide down

8.) Where shall berms or guards be provided on elevated roadways?
   A.) They need not be provided unless slope is more than 35°
   B.) They shall be provided on the outer bank of an elevated roadway
   C.) They shall be provided on the inner and outer banks of an elevated roadway
   D.) They need only to be provided on elevated roadways if the road is not wide enough for two vehicles

9.) If the piece of equipment you operate has a hazardous safety defect, you should:
   A.) Report it and proceed to work
   B.) Report it at the end of the shift
   C.) Let the next shift report it
   D.) Report it and wait until it is corrected before proceeding to work

10.) A jib is found on a:
    A.) Backhoe
    B.) Crane
    C.) Front end loader
    D.) Dragline
11.) When the driver of a haul unit is having their truck loaded at a shovel or front end loader, the driver should:
   A.) Stand on the platform
   B.) Stay in the cab
   C.) Get out of the truck for each load
   D.) Stand on the ladder

12.) When operating a scraper, the bowl should be carried in which of the following positions?
   A.) As high as possible
   B.) As low as possible
   C.) In the middle position
   D.) None of the above

13.) A walk-around inspection is required only on:
   A.) Trucks
   B.) Loaders
   C.) Dozers
   D.) All of the above

14.) A truck with low oil pressure at high idle:
   A.) Is safe to run at low speed
   B.) Should be shut off and checked
   C.) Is safe to operate at high speed
   D.) Should be driven to the shop regardless of the distance

15.) If traveling in fog or dusty areas, a driver should:
   A.) Go faster to get through it
   B.) Turn on bright lights
   C.) Use extreme caution and turn on lights
   D.) Stop immediately off the side of the road and wait for clearing before proceeding
16.) Before starting or moving a haul unit, a driver should:
   A.) Sound the horn
   B.) Make a walk-around inspection
   C.) Check mirrors
   D.) All of the above

17.) On a scraper project, a push cat is used:
   A.) To pull scrapers
   B.) Only to pull out stuck scrapers
   C.) To push on the push block of the scraper being loaded
   D.) All of the above

18.) When starting up a piece of equipment, the transmission or directional control should be in the:
   A.) Forward position
   B.) Reverse position
   C.) Neutral position
   D.) None of the above

19.) When shutting off a hot diesel engine, it is recommended that the engine be allowed to cool at least:
   A.) 2 minutes
   B.) 1 minute
   C.) 5 minutes
   D.) 3 minutes

20.) When can men work or pass under buckets or booms of loaders in operation?
   A.) During preventive maintenance
   B.) Only when operator is in cab of loader
   C.) Only if loader is locked in the up position
   D.) Never
21.) It is legal to transport personnel:
   A.) In the cargo space of a dump truck
   B.) Outside the cab of a loader
   C.) In the bucket of a loader
   D.) None of the above

22.) What can be transported with personnel in man-trip vehicles?
   A.) Small hand tools
   B.) Explosives, if in a special cargo area
   C.) Mined minerals
   D.) None of the above

23.) How can the explosiveness of coal dust be reduced?
   A.) By removing oxygen
   B.) By watering down
   C.) By mixing with incombustible material
   D.) All of the above

24.) When should drivers inspect their trucks?
   A.) Once each shift
   B.) At the beginning of the shift and after each stop that requires dismounting of the operator
   C.) At the beginning of each shift and hourly thereafter
   D.) Once each shift and whenever the truck acts or feels differently

25.) Must hardhats be worn in trucks?
   A.) Yes
   B.) No
   C.) Only if cab does not have a ROP's structure
   D.) Only in work areas which require it
26.) On what equipment are seatbelts required?
   A.) Seatbelts are not required on any equipment
   B.) Seatbelts are required only on shovels and pickup trucks
   C.) Seatbelts are required only on equipment in which cabs are not enclosed
   D.) Seatbelts are required on all mobile equipment

27.) What is the minimum height of dump berms?
   A.) 12"
   B.) 1/4 of wheel height of highest wheel on mine site
   C.) 1/2 of wheel height of highest wheel using the road
   D.) Berms must be a full 30" high

28.) When can equipment be driven out of gear?
   A.) On downhill grades
   B.) When equipment is low on fuel
   C.) When brakes are not working
   D.) Equipment should not be driven out of gear

29.) Can an end dump truck be permitted to drive with its hoist up?
   A.) Yes
   B.) No
   C.) Hoist should be mid-way
   D.) Yes, hoist must always be in locked upright position when in transit

30.) When a scraper is traveling, what position should the lip be in?
   A.) Closed position
   B.) Open position
   C.) Either a or b.
   D.) Neither a or b.
31.) For drainage, all haulage roads should be:
   A.) Built with run-off channels
   B.) Built sloping into a hill
   C.) Built with drainage ditches on either side
   D.) Built with either a crown or slope

32.) When using push-pull scrapers, which scraper should be loaded first?
   A.) The rear scraper
   B.) The front scraper
   C.) Either scraper first
   D.) None of the above

33.) When operating an electric shovel or dragline, what should the operator do before leaving the seat?
   A.) Signal equipment will be unattended
   B.) Block all wheels
   C.) Place accessories on the ground, set all brakes.
   D.) All of the above

34.) The particulate respirator removes dust from the air by:
   A.) Chemical reaction with contaminates in the air
   B.) Providing an independent air supply from compressed air cylinders
   C.) Filtering out contaminates and allowing clean air to pass through
   D.) None of the above

35.) Traffic regulations at all mines:
   A.) Are identical
   B.) Depend on the existing conditions at individual mines
   C.) Are set by federal law and there can be no deviations
   D.) Require a 40 mph speed limit
36. Personnel may be transported
   A.) In or on equipment specifically designed for that purpose
   B.) In buckets of empty equipment
   C.) On or in almost any equipment used in mining operations
   D.) All of the above

37. When the brakes or steering on mobile production equipment shows evidence of improper operation, the foreman should:
   A.) Shut the equipment down and call maintenance for immediate repair
   B.) Allow the equipment to operate until they fail and then call maintenance
   C.) Advise the operator to use caution in the operations until the end of the shift when it can be repaired
   D.) Assign the equipment to the best operator until repairs can be made

38. A particulate respirator can protect you from:
   A.) Carbon dioxide
   B.) Dust
   C.) Carbon monoxide
   D.) All of the above

39. When operating a vehicle in an open pit traffic pattern, the operator must:
   A.) Be alert to all vehicles around him
   B.) Be alert to pedestrian traffic
   C.) Be trained and competent
   D.) All of the above

40. The most effective method to clear ice from haulage roads is:
   A.) A patrol or grader
   B.) A scraper
   C.) A patrol spreading sand and gravel
   D.) Salt
41.) Set traffic patterns are advisable:
   A.) So foremen can keep track of where equipment is working
   B.) To remove the equipment in a safe and orderly procedure
   C.) To aid federal inspectors in their inspection of mine property
   D.) To avoid traffic jams

42.) What exterior lighting is required on haulage trucks after dark?
   A.) Headlights, taillights, turn signals and stop lights
   B.) Headlights, side clearance lights, taillights, stop lights and back up lights
   C.) Headlights, side flood lights, stop lights, taillights and brake lights
   D.) None of the above

43.) In the event of sloughing of dumps, operators should:
   A.) Be warned of hazard and dump with caution
   B.) Dump short at all times and let dozers push load over
   C.) Be allowed to use their own judgment
   D.) Be allowed to dump normally

44.) What method or methods are required by MSHA to prevent injury to an operator of a dozer, loader or scraper?
   A.) Berms
   B.) Rollover cabs or ROP’S
   C.) Seatbelts
   D.) All of the above

45.) Loading and haulage equipment shall be inspected by a competent person:
   A.) At least once during each shift
   B.) After each shift
   C.) Before equipment is placed in operation
   D.) There is no inspection requirement
46.) Dippers, buckets, scraper blades, forks and similar movable parts shall be secured or lowered to the ground:
   A.) Only at the end of the shift
   B.) Each time the operator leaves the cab
   C.) Each time the equipment stops
   D.) When the equipment might roll without an operator in the cab

47.) What is commonly used to allay dust on roadways?
   A.) Water
   B.) Coherex
   C.) Dust allaying agents
   D.) All of the above

48.) Chemical cartridge respirators contain:
   A.) Purified water and cotton
   B.) Activated charcoal and other agents
   C.) Alcohol concentrations and asbestos
   D.) Ammonium nitrate and soda

49.) The riding on a conveyor belt is:
   A.) Okay for a short distance
   B.) Okay for a long distance to save time
   C.) Strictly forbidden except where specifically designed to transport persons
   D.) For maintenance personnel only

50.) Which statement is not true concerning safety at dumping locations?
   A.) Lights shall be used to direct trucks at night
   B.) Protection shall be provided against falling material
   C.) Sizing devices shall be anchored securely in place
   D.) None of the above
51.) Where shall the dipper of a loading shovel be swung?
   A.) Either to the right or left of the truck
   B.) Over the cab
   C.) Over the body of the truck
   D.) None of the above

52.) How should conveyor belts be maintained?
   A.) They should be kept well aligned
   B.) They should be well illuminated
   C.) They should be kept clean
   D.) All of the above

53.) Who is permitted to drive on haulage roads?
   A.) Anyone
   B.) Authorized persons only
   C.) No one
   D.) Only federal inspectors during an inspection

54.) What precautions should be taken when trucks are traveling in the same direction?
   A.) The truck in front should be made aware of the rear truck
   B.) The trucks should travel fairly close together
   C.) The truck in the rear should maintain a safe traveling distance behind
   D.) The truck in the rear should stop and wait until the front truck is five minutes ahead

55.) What should be installed where trucks are required to unload?
   A.) A scale to weigh each load
   B.) Bumping blocks, guard rails or berms to prevent trucks from tipping over
   C.) A stop light and a traffic controller
   D.) All of the above
56.) When approaching an extreme downhill grade, what should the driver do?  
   A.) Take the truck out of gear, keep foot on brake and coast down slowly  
   B.) Put the truck into high gear and exercise caution to keep truck under control  
   C.) Slow the truck and put it into low gear to keep under control  
   D.) Any of the above methods are suitable for downhill grades

57.) When necessary to dump material at stock piles, what should be done?  
   A.) Timber of sufficient size should be placed so that wheels of truck cannot back over edge of  
       stock pile  
   B.) A person should be stationed at the stock pile to direct the driver  
   C.) Sufficient material should be placed at the edge of the pile to prevent trucks from tipping  
   D.) Any of the above

58.) Where conveyor belts are installed overhead, what precautions should be taken?  
   A.) Men below the belt must be protected from falling material  
   B.) Area below conveyor belt must be posted as hazardous  
   C.) Hard hats must be worn  
   D.) Men may not work below conveyor belt when it is in operation

59.) Who is permitted to ride on trains or locomotives?  
   A.) Authorized persons only  
   B.) Employees of the mine  
   C.) Only federal inspectors during an inspection  
   D.) No one

60.) Which piece of equipment removes material by pulling its bucket toward the machine?  
   A.) Front-end loader  
   B.) Shovel  
   C.) Dragline  
   D.) Bucket wheel excavator
61.) Travelways at preparation plants that are used regularly shall be:
   A.) Equipped with non-skid material or cleats
   B.) Sanded, salted, or cleared of snow and ice as soon as practicable
   C.) Kept clear of all extraneous material
   D.) All of the above

62.) What shall shovel or dragline operators do before moving forward or backward?
   A.) Give a one minute warning to all persons in the immediate area
   B.) Give a five minute warning to all persons in the immediate area
   C.) Sound a signal, such as a whistle, bell, or horn before moving
   D.) None of the above

63.) When a front end loader's brakes fail, you can:
   A.) Use the bucket as a brake
   B.) Put the loader into neutral
   C.) Jump off
   D.) Quickly pull in the dragline

64.) Which piece of equipment removes overburden by pushing its blade forward?
   A.) Dozer
   B.) Dragline
   C.) Shovel
   D.) Bucket wheel excavator

65.) How should the bucket of a front-end loader be carried for long distances?
   A.) High to avoid ground obstruction
   B.) At any height that clears the ground
   C.) Low for better balance
   D.) One foot from the ground at all times
66.) What should be worn for haulage operations and around moving equipment?
   A.)  A hard hat
   B.)  Snug-fitting clothing
   C.)  Safety shoes
   D.)  All of the above

67.) What is not a requirement as to how ropes are to be attached to the drum and dipper?
   A.)  They should be secured by at least four suitable wire rope clips
   B.)  They should be properly wedged
   C.)  They should be welded into place
   D.)  None of the above

68.) When may a loading bucket legally be swung over the cab of a haulage truck?
   A.)  Never
   B.)  When the driver is out of the cab
   C.)  Only when the driver of the haulage truck is notified
   D.)  Only when MSHA has granted approval for such practices

69.) What shall cabs of mobile equipment be kept free of?
   A.)  Fuel, oil and gasoline
   B.)  Explosives
   C.)  Extraneous material
   D.)  All of the above

70.) If you begin to slip sideways downgrade while driving a front-end loader, you can regain control by:
   A.)  Turning in the direction away from the downgrade
   B.)  Applying your brakes
   C.)  Turning in the direction of the downgrade
   D.)  None of the above
71.) Can trailing cables be moved with a shovel dipper?
   A.) Yes, it is common practice
   B.) No, never
   C.) Yes, if a sling is used
   D.) Yes, only if trailing cables are dragged and warning signals are used

72.) If a windshield is broken on the driver’s side:
   A.) It would pass inspection if only cracked
   B.) It would not meet MSHA requirements
   C.) It would not affect the safety of the operation, but should be repaired eventually
   D.) It can be sealed with silicon and operated until the crack begins to spread

73.) When operating a blade, which of the following procedures should an operator use when turning?
   A.) Watch for traffic and make sure heel will clear rear wheels and lean front wheels into turn
   B.) Turn opposite direction wheels are leaned
   C.) Blades have the right of way, so traffic will yield to you
   D.) Use turn signals, watch for traffic and proceed

74.) When operating a dozer, which of the following should you do to eliminate washboards?
   A.) Do not accumulate too much dirt in front of dozer
   B.) Set hand speed indicator to eliminate bouncing motion
   C.) Accumulate a full blade of dirt and make cut over washboards
   D.) Grade the road down 5"

75.) When should lights, flares or other warning devices be used on a parked vehicle?
   A.) When parked vehicle creates a hazard for other traffic
   B.) When parked vehicle is parked on an incline
   C.) Only when vehicle is parked after dark
   D.) All of the above
76.) Mobile equipment such as trucks, forklifts, front-end loaders, tractors, graders, etc. shall be equipped with an adequate:
   A.) Alarm signal which is sounded when the equipment is being operated in a forward gear
   B.) Alarm signal that sounds automatically when equipment is put into reverse
   C.) Warning signal the operator sounds when his vision to the rear is obstructed
   D.) Both b and c.

77.) When dozing off a steep wall with a track or rubber tire dozer, which of the following is necessary?
   A.) Doze up a single load and push it over with a second load
   B.) Doze one load at a time
   C.) Doze at an angle
   D.) None of the above

78.) Which is the safest procedure to follow when traveling on ramps and inclines with a front-end loader?
   A.) Travel with bucket in the air
   B.) Lower bucket with teeth tilted back
   C.) Travel with bucket on down side, lower bucket with teeth slightly forward
   D.) It does not matter because the machine has brakes

79.) When loading rocks, operators should use which of the following methods?
   A.) Dump two or three buckets of loose material in the truck to insure the rocks don't hit the bottom
   B.) Glance them off the side of the truck to insure they don't hit the bottom too hard
   C.) Dump the rocks first and then load the loose material
   D.) None of the above

80.) It is required that all mobile equipment be equipped with
   A.) First aid kit
   B.) Two-way radio
   C.) Fire extinguisher
   D.) All of the above
81.) What is the minimum height of berms?
   A.) The dozer blade height
   B.) 6 feet high
   C.) Half the axle height of the largest equipment in area
   D.) None of the above

82.) When can men work near or under dangerous highwalls?
   A.) never
   B.) when a supervisor says you can
   C.) when you can be seen and communicate with others
   D.) only when to correct the danger safely

83.) What are hazards that can contribute to truck haulage accidents?
   A.) Poor road conditions
   B.) Poor visibility
   C.) Defective equipment
   D.) All of the above

84.) When is water needed on haulage roads?
   A.) In hot, dry weather
   B.) In freezing weather
   C.) When needed to melt snow
   D.) All of the above

85.) Each operator shall establish and follow a ground control plan for the safe control of:
   A.) Highwalls
   B.) Pits
   C.) Spoil banks
   D.) All of the above
86.) The ground control plan shall identify the:
   A.) Name and location of the mine
   B.) ID number
   C.) Name and address of the mine operator
   D.) All of the above

87.) Loose material on a highwall must be:
   A.) Stripped for a safe distance
   B.) Sloped to angle of repose where loose unconsolidated material is present
   C.) Provided with barriers, baffle boards, screens or other devices
   D.) Any of the above

88.) When making a box cut, what precautions should be taken?
   A.) Two ways or roads into cut
   B.) Minimize the possibility of spoil materials rolling into pit
   C.) Should be at least 200 feet wide
   D.) None of the above

89.) Highwalls, banks, benches, and terrain sloping shall be examined when?
   A.) Need not be examined
   B.) After every rain, freeze, or thaw
   C.) Once each working shift
   D.) Both b and c

90.) Equipment used during a shift shall be inspected:
   A.) Frequently
   B.) Once each shift
   C.) Once every 24 hours
   D.) Weekly
91.) Equipment defects affecting safety shall be corrected:
   A.) During the shift
   B.) Before the shift is over
   C.) Before the equipment is used
   D.) Before the next day

92.) Drills in operation shall be:
   A.) Attended at all times
   B.) Checked periodically
   C.) Checked when drill steels need to be changed
   D.) All of the above

93.) Men may be on a mast while the drill bit is in operation:
   A.) At no time
   B.) When a safe platform is provided and safety belts used
   C.) Only when the supervisor is near
   D.) Whenever it is necessary

94.) Drill holes that need to be covered are:
   A.) All drill holes
   B.) Any hole 6 inches in diameter or greater
   C.) Holes large enough to constitute a hazard
   D.) Holes larger than 12 inches in diameter

95.) When putting water on roads for dust control, what should be avoided?
   A.) Putting on too much dust suppressant
   B.) Using contaminated water
   C.) Putting down too much water
   D.) All of the above
96.) What governs the width and height of benches?

97.) When should highwalls, banks, benches, and terrain sloping into the working areas be examined?

98.) What should you do if there are overhanging highwalls?

99.) What are the four types of slope failure in rock?

100.) What are four hazards that can contribute to truck haulage accidents?

101.) Where are berms required?

102.) When shall mobile loading and haulage equipment be inspected?

103.) When are lights, flares, or other warning devices used on parked equipment?

104.) What equipment is used to tow heavy equipment?

105.) How are shovel trailing cables moved using the shovel dipper?
## Chapter: 4 Practice Question Answers

1). (1) Slope failure (2) Water hazards  

2). (1) Electrical shock or electrocution (2) Loosening of materials that were previously solid such as: highwalls, spoil banks, benches, and sloping terrain (3) Haulage roads become slick  

3). D  
4). B  
5). C  
6). A  
7). A  
8). B  
9). D  
10). B  
11). B  
12). A  
13). D  
14). B  
15). C  
16). D  
17). C  
18). C  
19). C  
20). D  
21). D  
22). A  
23). C  
24). B  
25). C  
26). D  
27). C  
28). D  
29). B  
30). A
31). D
32). B
33). C
34). C
35). B
36). A
37). A
38). B
39). D
40). C
41). D
42). B
43). B
44). D
45). C
46). B
47). A
48). B
49). C
50). D
51). C
52). A
53). B
54). C
55). B
56). C
57). C
58). A
59). A
60). C
61). D
62). C
63). A
64). A
65). C
66). D
67). C
68). B
69). C
70). C
71). C
72). B
73). A
74). C
75). A
76). B
77). A
78). B
79). A
80). C
81). C
82). D
83). D
84). A
85). D
86). D
87). D
88). B
89). D
90). B
91). C
92). A
93). B
94). C
95). D

96). The type of equipment to be used and the operation to be performed. (30 CFR 77.1003)
97). After every rain, freeze, or thaw and before men work in such areas. (30 CFR 77.1004(a)
98). They shall be taken down and other unsafe ground conditions shall be corrected promptly, or the area shall be posted. (30 CFR 77.1004(b))
99). (1) Rock falls (2) Rotational shear in soils (3) Slope failure (4) Block flow
100). (1) Poor haulage road conditions. (2) Poor visibility (3) Defective Equipment (4) Improperly marked roads.
101). (1) On the outer bank of elevated roadways (2) At dumping locations
102). Before such equipment is placed in operation.
103). When parked equipment creates a hazard to vehicular traffic.
104). Tow bars and a safety chain.
105). Only with cable slings or sleds.
Chapter: 5 Fire Safety
Candidates should be familiar with all material in this subpart.

CHEMISTRY OF FIRE

A fire results from a combination of fuel, heat, oxygen, and chain reactions. When a substance that will burn is heated to a certain critical temperature called it's "ignition temperature", it will ignite and continue to burn as long as there is fuel, the proper temperature, and a supply of oxygen. Speed this process up and an explosion results.

This principle is commonly illustrated as "the fire pyramid." A four-sided pyramid with each side or face representing one of the necessary components of a fire. The removal of one or more of the sides or faces of the pyramid will result in extinguishment.

Knowing how the chemical reaction of a fireworks also forms the basis for knowing how to extinguish a fire. Heat can be taken away by cooling, oxygen can be taken away by excluding the air, fuel can be removed to an area where there is insufficient heat for ignition, and the chemical reaction can be stopped by inhibiting the rapid oxidation of the fuel.

To extinguish a fire, one or more of the following steps should be taken:

1. Exclude the air by smothering (for example, by shutting the lid over a tank of burning solvent or with foam) or dilution (replacing the air with an inert gas such as carbon dioxide).
2. Remove or seal off the fuel by mechanical means, or divert or shut off the flow of burning liquids or gases.
3. Cool the burning material below its ignition point with a suitable cooling agent (hose streams or water extinguishers).
4. Interrupt the chemical reaction of the fire (using dry chemical or halon extinguishing agents.)

Refer to Table 11-1.

CAUSES OF FIRE

In order to reduce or eliminate the possibility of fire a foreman must be aware of potential causes of fire, especially the more common ones.

1. SPONTANEOUS IGNITION

Spontaneous ignition results from a chemical reaction in which there is a slow generation of heat from oxidation of organic compounds that under certain conditions is accelerated until the ignition temperature of the fuel is reached. This condition is reached only where there is sufficient air for oxidation but not enough ventilation to carry away the heat as fast as it is generated.

It is a condition usually found only in quantities of bulk material packed loosely enough for a large amount of surface to be exposed to oxidation, yet without adequate air circulation to dissipate heat. Exposure to heat increases the tendency towards spontaneous ignition, as does the presence of moisture unless the material is wet beyond a certain point.
It is generally agreed that at ordinary temperatures some combustible substances oxidize slowly and under certain conditions can reach their ignition point. These include vegetable and animal oils and fats, coal, charcoal, and some finely divided metal. Rags or waste saturated with oil or paint often cause fires, too.

The best preventatives against spontaneous ignition are either total exclusion of air or good ventilation. With small quantities of material, the former method is practical. With large quantities, such as storage piles of coal, both methods have been used with success.

TABLE 11-1

<table>
<thead>
<tr>
<th>AGENT</th>
<th>EXTINGUISHING PROPERTIES</th>
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<tbody>
<tr>
<td>Water</td>
<td>Cools or quenches the temperature of the fuel below its flash point.</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>Displaces oxygen.</td>
</tr>
<tr>
<td>Foam</td>
<td>Forms a vapor tight seal between the fuel and the atmosphere.</td>
</tr>
<tr>
<td>Dry Chemicals</td>
<td>Inhibits chemical chain reaction within the flame.</td>
</tr>
<tr>
<td>Halons</td>
<td>Inhibits chemical chain reaction within the flame.</td>
</tr>
<tr>
<td>Dry Powder</td>
<td>Primarily a smothering agent.</td>
</tr>
</tbody>
</table>

Temperatures of 140°F are considered dangerous in coal piles. If temperatures approach or exceed that figure, it is generally advisable to move the pile or rearrange it to allow better circulation of air.

2. ELECTRICAL EQUIPMENT FIRES

Electrical equipment should be installed and maintained by a qualified person to perform electrical work in a manner consistent with safe, sound, electrical engineering practices. Over-heating of electrical equipment and arcs from short circuits in improperly installed or maintained electrical equipment are two of the leading causes.

3. SMOKING

Carelessly discarded cigarettes, pipe embers, and cigars are a major source of fire. "No Smoking" areas should be marked with conspicuous signs and rigidly enforced.

4. FRICTION

Excessive heat generated by friction can cause a fire. A program of preventative maintenance on machinery can avert fires resulting from inadequate lubrication, misaligned bearings, and broken or bent equipment.
Fires may result from overheated power transmission bearings and shafting in structures where dust accumulates. Frequent inspections should be made to ensure that bearings are kept well oiled and do not run hot. Accumulation of coal dust on them should be held to a minimum.

Drip pans should be provided beneath bearings and should be cleaned frequently to prevent oil from dripping on combustible material below. Oil holes of bearings should be kept covered to prevent dust and gritty substances from entering the bearings to cause over-heating.

Another common problem is the tension adjustment of belt-driven machinery. If the belt is too tight or too loose, excessive friction can cause serious over-heating.

5. OPEN FLAMES

Open flames such as heating equipment, torches, and welding and cutting operations are serious fire hazards.

Gas and oil fired air heaters if over-heated can ignite nearby combustible materials. They should be mounted on a secure base or anchored properly and well insulated from floors or other combustible bases.

Gasoline, kerosene, liquefied petroleum gas, acetylene, or alcohol torches should never be used around flammable liquids, paper, rags or similar material.

6. WELDING AND CUTTING

Poor housekeeping can result in fires when cutting and welding. Always have a fire extinguisher at the welding site. Always check methane before welding or cutting.

7. HOUSEKEEPING

Many fires are the direct result of accumulation of combustible refuse.

8. DUST EXPLOSIVE ATMOSPHERE

A dust explosion hazard exists whenever material that will burn or oxidize readily (such as coal) is available in powder form because the surface (contact) area of each particle is very large in relation to its mass.

There are two ways to prevent dust explosions:

1. Prevent the formation of explosive mixtures of dust and air.
2. Prevent the ignition of such mixtures if their formation cannot be prevented.

9. GASES AND VAPORS

Gases such as methane, acetylene, propane, carbon monoxide, natural gas and manufactured gas can produce flammable mixtures with air or oxygen.
Gasoline, benzene, naphtha, and methyl alcohol are highly volatile liquids which emit flammable vapors.

Kerosene, turpentine, solvent, and other liquids with flash points about 100°F must generally be heated above normal room temperatures before they give off sufficient vapors to form ignitable concentrations. Only minimum amounts of flammable liquids, in safety containers, should be allowed in work areas.

10. INTERNAL COMBUSTION ENGINES

Internal combustion engines should always be stopped and shut down before refueling. (except diesel)

11. BATTERY-CHARGING STATIONS

Battery-charging stations should be in well ventilated areas, since they can produce explosive gas.

CLASSIFICATION OF FIRES

Four general classifications of fires have been adopted by the National Fire Protection Association based on the type of extinguishing media necessary to combat each.

CLASS A:

Fires are ordinary combustible materials, such as wood, paper, or clothing where the quenching-cooling effects of water or of solutions containing large percentages of water are of prime importance. Multi-purpose dry chemicals provide rapid knock-down of the flames and forms a coating which tends to retard further combustion.

Where total extinguishment is needed, a follow-up with water or other Class A agent is usually recommended.

CLASS B:

Fires in flammable liquids, greases, and similar materials, where smothering or exclusion of air, and interrupting the chemical reaction is most effective. Solid streams of water are likely to spread the fire, but under certain circumstances water fog nozzles prove effective. Generally, regular dry chemical, multi-purpose dry chemical, carbon dioxide, foam, and halogenated hydrocarbon agents are used.

CLASS C:

Fires in or near electrical equipment where the use of a non-conducting extinguishing agent is of first importance. Dry chemical, carbon dioxide, compressed gas and vaporizing liquid extinguishing agents are suitable. Foam or a stream of water should not be used because both are good conductors of electricity and can expose the operator to a severe shock hazard.

CLASS D:

Fires that occur in combustible metals such as magnesium, lithium, and sodium. Special extinguishing agents and techniques are needed for fires of this type. Normal extinguishing agents generally should not be used on metal fires as there is a danger in most cases of increasing
the intensity of the fire because of a chemical reaction between some extinguishing agents and the burning metal.

Refer to Figure 11-1 for symbols of fire extinguishers.

Equipment used to extinguish and control fires is of two types: fixed and portable.

Fixed systems include water equipment; automatic sprinklers, hydrants, standpipe hoses, as well as special pipe systems for dry chemical, carbon dioxide, and foam. Special pipe systems are applicable to areas of high fire potential where water may not be effective, such as tanks for storage of flammable liquids and on electrical equipment.

Fixed systems, however, should be supplemented by portable fire extinguishers available and ready for emergencies. "Portable" is applied to manual equipment used on small fires or in the interim between discovery of a fire and the functioning of automatic equipment or arrival of professional firefighters.

Portable extinguishers must be:

1. A reliable type approved by the Underwriter's Laboratories, Inc. or the Factory Mutual Research Corp. or other competent testing agency.
2. The right type for each class of fire that may occur in the area.
3. In sufficient quantity to protect against exposure in the area.
4. Located where they are readily accessible for immediate use.
5. Maintained in perfect operating condition, inspected frequently, checked against tampering, and recharged as required.
6. Operable by area personnel who can find them and who are trained to use them effectively and promptly.

**ACTIONS TO BE TAKEN IF A FIRE STARTS**

1. Attempt to extinguish the fire and warn everyone in the area.
2. Next, get clear of any area that should pose a threat, such as a collapsing wall.
3. Then, contact a supervisor, make sure a warning is issued and that fire fighting equipment is rushed to the area. If there is an alarm, sound it.

**SITE EVACUATION**

Each mine is required to have a specific escape and evacuation plan to be followed in the event of a fire or an emergency. Evacuation plans are usually made for preparation plants, or structures. Exits should be well marked, lit, and uncluttered. Employees should be instructed on the evacuation plan, and fire alarm signals. The plan should be posted in a convenient location.

**EXTINGUISHER OPERATION**
1. Approach no closer than 6 feet from the fire.
2. Pull the pin.
3. Aim at base of fire and squeeze the handles.
4. Use a side to side sweeping motion.
Classification of Fires

**CLASS ["A"]** fires occur in ordinary combustible materials such as wood, cloth and paper. The most commonly used extinguishing agent is water which cools and quenches. Fires in these materials are also extinguished by special dry chemicals for use on Class A, B & C fires. These provide a rapid knock down of flame and form a fire retardant coating which prevents reflash.

**GREEN TRIANGLE**

**CLASS ["B"]** fires occur in the vapor-air mixture over the surface of flammable liquids such as grease, gasoline and lubricating oils. A smothering or combustion inhibiting effect is necessary to extinguish Class "B" fires. Dry chemical, foam, vaporizing liquids, carbon dioxide and water fog all can be used as extinguishing agents depending on the circumstances of the fire.

**RED SQUARE**

**CLASS ["C"]** fires occur in electrical equipment where non-conducting extinguishing agents must be used. Dry chemical, carbon dioxide, and vaporizing liquids are suitable. Because foam, water (except as a spray), and water-type extinguishing agents conduct electricity, their use can kill or injure the person operating the extinguisher, and severe damage to electrical equipment can result.

**BLUE CIRCLE**

**CLASS ["D"]** fires occur in combustible metals such as magnesium, titanium, zirconium and sodium. Specialized techniques, extinguishing agents and extinguishing equipment have been developed to control and extinguish fires of this type. Normal extinguishing agents generally should not be used on metal fires as there is danger in most cases of increasing the intensity of the fire because of a chemical reaction between some extinguishing agents and the burning metal.
TYPICAL EXTINGUISHER OPERATION

Figure 11 - 2

- Approach no closer than six feet from the fire.

- Grasp the extinguisher firmly and pull out the lock pin.

- Aim the nozzle at the base of the fire. Squeeze the handles.

- Use a side to side sweeping motion to blanket the fire.
1.) The primary or "front line" fire fighting tool to be used on any fire is:
   A.) A fire truck
   B.) Shovels and rakes
   C.) Chemical fire extinguishers
   D.) Sand

2.) Breathing air from flares is dangerous because it contains:
   A.) Methane
   B.) H2S
   C.) CO
   D.) CO2

3.) What is the product of incomplete combustion?
   A.) Carbon monoxide
   B.) Hydrogen
   C.) Carbon dioxide
   D.) Nitrogen

4.) Which of the following is a product of complete combustion?
   A.) Hydrogen sulfide
   B.) Methane
   C.) Carbon dioxide
   D.) Nitrogen
5.) What is a common source of spontaneous combustion fires?
   A.) Oily rags
   B.) Coal
   C.) Mine refuse
   D.) All of the above

6.) When a small fire is spotted, personnel should have been trained:
   A.) To turn in alarm immediately
   B.) To notify their supervisors
   C.) To extinguish the fire
   D.) None of the above

7.) Fires in wood, paper and cloth are classified as:
   A.) Class A fires
   B.) Class B fires
   C.) Class C fires
   D.) Class D fires

8.) Electrical fires should be fought with:
   A.) Acid and foam extinguishers
   B.) Dry dust extinguisher
   C.) Wet sand
   D.) Water

9.) What type of engine produces carbon monoxide?
   A.) Battery operated
   B.) Internal combustion
   C.) Only diesel engines
   D.) Steam engines
10.) The term "humidity" refers to:
   A.) The temperature of the air
   B.) The percentage of moisture in the air
   C.) The velocity of the air
   D.) The rate in which moisture evaporates out of the air

11.) What is the minimum distance between detonator and explosive storage magazines must be located?
   A.) 15 feet
   B.) 25 feet
   C.) 40 feet
   D.) 50 feet

12.) Diesel smoke is:
   A.) Like carbon monoxide and very poisonous
   B.) Very irritating, but is not poisonous in limited amounts
   C.) Very explosive with a low ignition point
   D.) None of the above

13.) What is the explosive range of CO?
   A.) 12.5-75%
   B.) 15.2-15%
   C.) 10.0-64%
   D.) 14.0-64%

14.) Safety devices on compressed air systems should be checked:
   A.) Daily
   B.) Weekly
   C.) Monthly
   D.) Bi-annually
15.) Multipurpose dry powder extinguishers shall be used in a preparation plant or mill when:
   A.) Water is not available
   B.) There is a problem with freezing lines
   C.) Both a. and b.
   D.) None of the above

16.) Tunnels located below stockpiles, surge piles and coal structures shall be ventilated so as to maintain concentrations of methane below what percent?
   A.) 0.50%
   B.) 1.00%
   C.) 1.50%
   D.) 2.00%

17.) Gauges and regulators used with oxygen or acetylene cylinders shall be:
   A.) Stored in Properly marked containers
   B.) Stored in well-lighted areas
   C.) Kept clean and free of oil and grease
   D.) Kept clean of dust and dirt

18.) What is a term which describes the weight of a gas compared to the weight of the same volume of air?
   A.) Specific gravity
   B.) Atomic weight
   C.) Expressed gravity
   D.) None of the above

19.) Fuel lines must be equipped with valves to:
   A.) Cut off fuel supply at the source in case of fires
   B.) Protect against line freezing during cold winter months
   C.) Aid in control during the filling of fuel storage tanks
   D.) All of the above
20.) Buildings in which oil, grease, flammable liquids or other flammable materials are stored shall be:
   A.) Well ventilated
   B.) Of fire resistant construction
   C.) Provided with means to control spilled flammable liquids
   D.) All of the above

21.) The carbon dioxide percent in any structure, enclosure or other facility at any time shall not be more than:
   A.) 0.20%
   B.) 0.50%
   C.) 1.00%
   D.) 1.50%

22.) How can spontaneous combustion be prevented?
   A.) By storing all oily waste in an unventilated room
   B.) By storing combustible fuels with the lids loosened
   C.) By following good housekeeping regulations
   D.) All of the above

23.) A person discovering a small fire should first:
   A.) Report it to his supervisor
   B.) Make a prompt effort to extinguish it
   C.) Warn any people in the area
   D.) Reroute the air

24.) Employees should be instructed and trained in the use of fire fighting equipment:
   A.) Semi-annually
   B.) Bi-annually
   C.) Annually
   D.) Quarterly
25.) What kinds of materials can cause a fire hazard if allowed to accumulate?
   A.) Greasy rags
   B.) Paint and thinner
   C.) Diesel and fuel oil
   D.) All of the above

26.) Why should valves on oxygen and acetylene tanks be kept closed when the contents are not being used?
   A.) To prevent waste
   B.) To prevent getting the unit in operation faster
   C.) To prevent accumulations of gases which may intoxicate miners
   D.) To prevent accumulations of gases which may be explosive

27.) How many classifications or types of fires are there?
   A.) 2
   B.) 3
   C.) 4
   D.) 5

28.) Diesel fuel burning is classified as what class of fire?
   A.) Class A
   B.) Class B
   C.) Class C
   D.) Class D

29.) Paper and trash and an electrical cable burning in a puddle of diesel fuel with electrical power off, is what class of fire?
   A.) Class A
   B.) Class B
   C.) Class C
   D.) Class D
30.) What is a product of complete combustion?
   A.) Carbon monoxide
   B.) Hydrogen
   C.) Carbon dioxide
   D.) Nitrogen

31.) Breathing air from fires is dangerous because it contains:
   A.) CH4
   B.) H2S
   C.) CO
   D.) CO2

32.) Which of the following is a product of incomplete combustion?
   A.) Hydrogen sulfide
   B.) Methane
   C.) Carbon dioxide
   D.) Carbon monoxide

33.) The minimum temperature at which sufficient vapor is released to form a flammable mixture is called:
   A.) Flammable point
   B.) Combustible point
   C.) Flash point
   D.) Ignition point

34.) Electrical fires can best be fought with:
   A.) Acid and foam extinguishers
   B.) Carbon dioxide and dry dust extinguishers
   C.) Wet sand
   D.) All of the above
35.) Metal fires are classified as:
   A.) Class A fires
   B.) Class B fires
   C.) Class C fires
   D.) Class D fires

36.) A "Class B" fire is:
   A.) Gasoline
   B.) Grease
   C.) Diesel
   D.) All of the above

37.) Which does MSHA consider to have the lowest flash point?
   A.) Combustible material
   B.) Flammable material
   C.) Both of the above
   D.) None of the above

38.) The primary fire fighting equipment to be used on any fire is:
   A.) A fire truck
   B.) Shovels and rakes
   C.) Fire extinguishers
   D.) Sand

39.) Define "Class C" fires:
   A.) Flammable liquids
   B.) Electrical
   C.) Paper, rags, rubbish
   D.) All of the above
40.) What class of fire would combustible materials fall under?
   A.) Class A
   B.) Class B
   C.) Class C
   D.) Class D

41.) How many fire extinguishers are required by 77.1109(c)(1) for mobile equipment, including trucks, front end loaders, bulldozers, portable welding units, and augers?
   A.) 3
   B.) 2
   C.) 1
   D.) None are required

42.) What is the first step in using a fire extinguisher?
   A.) pull the pin
   B.) use side to side sweeping motion
   C.) aim at base of fire
   D.) approach the fire no closer than 6ft

43.) Chemical fire extinguishers shall be examined every _______. [75.1100-3]
   A.) 30 days
   B.) 90 days
   C.) 6 months
   D.) Annually

44.) Which is a flammable liquid:
   A.) One having a flashpoint below 100 degrees
   B.) One having a flashpoint between 100 - 140 degrees
   C.) One having a flashpoint greater than 140 degrees
   D.) One having an auto ignition temperature below 150
45.) According to MSHA, the lowest flashpoint of a cleaning solvent used in a mine is:
   A.) 25 degrees
   B.) 50 degrees
   C.) 100 degrees
   D.) 200 degrees

46.) Fires in coal storage areas are usually started by:
   A.) Electricity
   B.) Matches
   C.) Lightning
   D.) Spontaneous combustion

47.) Flammable liquids shall not be stored within 100 feet of:
   A.) Shafts
   B.) Mine opening or structures
   C.) Fans
   D.) All of the above

48.) Oxygen cylinders stored in surface installations:
   A.) Can create a fire hazard if they are leaking
   B.) Need not be worried about if stored in well ventilated rooms
   C.) Should not be used or stored with grease and oil
   D.) A & C

49.) Miners should know the mine emergency evacuation procedures for:
   A.) Emergency assembly
   B.) Transport procedures
   C.) Evacuation drills
   D.) All of the above
50.) During what type of mining operations would a person possibly come in contact with oxides of nitrogen?
   A.) Drilling
   B.) Scaling overburden
   C.) Blasting
   D.) Splicing electrical cable

51.) As required by MSHA, every building must have how many exits?
   A.) Sufficient number for prompt escape
   B.) At least 3
   C.) At least 1 door and 2 windows
   D.) Only 1 exit is required

52.) What is the minimum distance between detonator and explosive storage magazines?
   A.) 15 feet
   B.) 25 feet
   C.) 40 feet
   D.) 50 feet

53.) How many portable fire extinguishers are required on each combustible liquid storage installation?
   A.) 2 at each entrance
   B.) 1 at each entrance
   C.) 2 near each surface installation and 2 near each transfer pump for buried storage
   D.) 2 near each surface installation and 1 near each transfer pump for buried storage

54.) To prevent adverse effects from tank settling, outlet piping on unburied fuel storage tanks must be equipped with:
   A.) A pressure monitoring system
   B.) Flexible connections or special fittings
   C.) A valve to cut off fuel
   D.) A warning sign of possible danger
55.) Can a refuse pile be constructed over or near old refuse piles?  
   A.) Yes, if the old refuse piles are over one year old  
   B.) No, refuse piles must be constructed 75 feet apart  
   C.) Yes, if a fireproof barrier of clay or other inert material is used to separate the piles  
   D.) No, the possibility of spontaneous combustion is greatly increased (30 CFR 77.214(c)

56.) Gasoline-powered equipment:  
   A.) May be fueled while running  
   B.) Must be shut off while fueling  
   C.) Is not permissible on a mine site  
   D.) Has more power; therefore, it must be handled with more caution

57.) When flammable liquids are spilled, they should be:  
   A.) Washed or diluted with water  
   B.) Burned away with a controlled fire  
   C.) Removed, controlled or confined immediately  
   D.) All of the above

58.) What element does not have to be present to produce a fire?  
   A.) Fuel  
   B.) Oxygen  
   C.) Heat  
   D.) Friction

59.) When using a fire extinguisher on a class B fire, where should it be directed?  
   A.) At the top of the flame  
   B.) At the middle of the flame  
   C.) At the base of the flame  
   D.) Showered above the flame
60.) What equipment is required to have fire extinguishers?
   A.) Emergency vehicles
   B.) Vehicles which carry work crews
   C.) All mobile equipment
   D.) None of the above

61.) Fueling diesel engines:
   A.) Must be done while the engine is turned off.
   B.) May be done while engine is running if care is taken.
   C.) May only be done at the beginning of the shift.
   D.) At designated areas only.

62.) No smoking and warning signs must be posted:
   A.) Every six months to insure they are not destroyed
   B.) In places where fire or explosion hazards exist
   C.) In the dressing rooms, lunch rooms and other areas
   D.) All of the above

63.) Flammable liquids shall be stored: [77.1103(a)]
   A.) In open areas with 10 foot storage
   B.) Along with oxygen cylinders
   C.) In small containers
   D.) In accordance with NFPA standards

64.) Which of the following is prohibited in or near a vehicle containing explosives?
   A.) Cigarettes
   B.) Matches
   C.) An open flame
   D.) All of the above
65.) What should be part of any vehicle transporting explosives?
   A.) Warning markings
   B.) Additional storage space for supplies
   C.) Additional space for workers
   D.) Flashing red lights

66.) Explosives and detonators should be transported in:
   A.) Vehicles constructed for that purpose
   B.) Any available vehicle
   C.) Vehicles made only of metal and clearly marked
   D.) A separate compartment from the crew

67.) Areas surrounding surface magazines must be kept free of:
   A.) Rubbish
   B.) Gasoline
   C.) Dry grasses
   D.) All of the above

68.) When you cannot prevent a fire from reaching explosives, the most important action you must take is to:
   A.) Get plenty of help to fight the fire
   B.) Get help to barricade and evacuate the fire area
   C.) Get a large supply of fire extinguishers and fire fighting equipment
   D.) None of the above

69.) When flammable solvents are used for cleaning, they shall be transported in labeled safety cans of not over:
   A.) 1 gallon capacity
   B.) 2 gallon capacity
   C.) 4 gallon capacity
   D.) 5 gallon capacity
70.) Employees shall be instructed and trained _______ in the use of fire-fighting facilities and equipment.
   A.) Monthly
   B.) Every 6 months
   C.) Annually
   D.) None of the above

71.) All employees shall be instructed on:
   A.) Current escape and evacuation plans
   B.) Fire alarm signals
   C.) Applicable procedures to be followed in case of a fire
   D.) All of the above

72.) Signs warning against smoking shall be posted at:
   A.) Eating areas
   B.) In areas or places where fire or explosion hazards exist
   C.) Both A and B
   D.) None of the above

73.) Areas surrounding flammable-liquid storage tanks and electric substations and transformers shall be kept free from grass(dry), woods, underbrush and other combustible materials for at least _______ feet in all directions.
   A.) 10
   B.) 15
   C.) 25
   D.) 30

74.) Auxiliary equipment as portable drills, sweepers, and scrapers, when operated more than _______ feet from equipment required to have portable fire extinguishers shall be equipped with at least one fire extinguisher.
   A.) 200
   B.) 400
   C.) 500
   D.) 600
75.) Fire extinguishers shall be examined at least once every _______ months.
   A.) 3
   B.) 6
   C.) 9
   D.) 12

76.) Welding, cutting, or soldering shall not be permitted to commence or continue in air which contains _______ volume per centum or more of methane.
   A.) 0.5
   B.) 1
   C.) 1.5
   D.) 2

77.) The mine map shall be on a scale of not less than _______ or more than _______ feet to the inch.
   A.) 100 or more than 300
   B.) 100 or more than 400
   C.) 100 or more than 500
   D.) 200 or more than 500

78.) Underground mine workings underlying and within _______ feet of the active areas shall be shown on the map.
   A.) 100
   B.) 300
   C.) 500
   D.) 1,000

79.) How often must fire extinguishers be checked under 77.1110?
   A.) Monthly
   B.) Quarterly
   C.) Biannually
   D.) Annually
80.) Describe the four classes of fire?

81.) What are the symbols (shape and color) for each classification of fire?

82.) What are the four steps in using a fire extinguisher?
Chapter: 5 Practice Question Answers

1). C
2). C
3). A
4). C
5). D
6). C
7). A
8). B
9). B
10). B
11). B
12). B
13). A
14). A
15). C
16). B
17). C
18). A
19). A
20). D
21). B
22). C
23). B
24). C
25). D
26). D
27). C
28). B
29). B
30). C
31). C
32). D
33). C
34). B
35). D
36). D
37). B
38). C
39). B
40). A
41). C
42). D
43). C
44). A
45). C
46). D
47). D
48). D
49). D
50). C
51). A
52). B
53). C
54). B
55). C
56). B
57). C
58). D
59). C
60). C
61). B
62). B
63). D
64). D
65). A
66). A
67). D
68). B
69). D
70). C
71). D
72). B
73). C
74). D
75). B
76). B
77). C
78). D
79). C

80). (A) Combustible materials (B) Flammable Liquids (C) Electrical (D) Combustible metals

81). (1) Green triangle (2) Red square (3) Blue circle (4) Yellow star

82). (1) Approach no closer than 6 feet from the fire. (2) Pull the pin. (3) Aim at the base of fire and squeeze handles. (4) Use a side to side sweeping motion.
Chapter: 6 Personal Protective Clothing

Federal Regulations:

30 CFR Part 77.1710  Protective clothing; requirements
30 CFR Part 77.1710.1 Distinctively colored hard hats on hard caps identification or newly employed, inexperienced miners

Wyoming Law references:

30-3-103 Workers to wear protective gear and clothing; clothing to meet safety standards

PROTECTIVE CLOTHING

When a hazard is found to exist, every effort should be made to eliminate it or control it by engineering design. Where this is not possible, isolation of the process or the guarding of the hazard should be attempted. Personal protective equipment should be used only when all other methods of controlling or eliminating hazards are exhausted.

Protecting the Eyes and Face

Mining operations expose the eyes to a variety of hazards - flying objects, splashes of corrosive liquids or molten metals, dusts, and harmful radiation are common examples. Flying objects cause most eye injuries - metal or stone chips, personal nails, or abrasive grits. The National Society of the Prevention of Blindness lists the chief causes of eye injury as:

1. Flying objects (especially those set in motion by hand tools).
2. Abrasive wheels (small flying particles).
3. Corrosive substances.
4. Injurious light or heat rays.
5. Splashing metal.
6. Poisonous gas or fumes.

Usually, in all operations where hardened metal tools are struck together, where equipment or material is struck by a metal hand tool, or where the cutting action of a tool causes particles to fly, eye protection is needed by the user of the tool and by other workers who may be exposed to flying particles.

Occasionally, the need for eye protection is overlooked on such jobs as cutting wire or cable, striking wrenches, using hand drills, chipping concrete, removing nails from lumber, shoveling material head-high or working on the leeward side of a job, and using wrenches and hammers overhead, and on other jobs where particles of materials or debris may fall.

Cover goggles are frequently worn over ordinary spectacles. This protects
both the wearer's eyes and his corrective lenses. Lenses that have not been
heat or chemically treated are easily broken. A cover goggle protects against
pitting as well as breaking.

**Protective spectacles** with tempered lenses, meeting the American National
Standard (ANSI), should be worn to provide additional protection against
ordinary exposure.

Face shields of clear plastic protect eyes and face of a person who is sawing
or buffing metal, sanding or light grinding, or handling chemicals. The shield
should be slow burning and must be replaced if warped or scratched.

**Welding helmets**, shields, and goggles protect the eyes and face against
splashes of molten metal and the radiation produced by arc welding. Helmets
should have the proper filter glass to keep ultraviolet and visible rays from
harming the eyes. Cracked or chipped filter lenses must be replaced,
otherwise they will permit harmful rays to reach the welder's eyes. The shell of
the helmet must resist sparks, molten metal, and flying particles. It should be
a poor heat conductor and a nonconductor of electricity. Helmets that develop
pinholes or cracks must be discarded. Helmets should have a headgear that
permits the worker to use both hands and to raise the helmet to position his
work.

**Welding goggles** are available with filter glass shades up to No.8. If darker
shades are needed, then complete face protection is needed because of the
danger of skin burns. When shades darker than No. 3 must be used, a side
shield or cup goggles are recommended.

**PROTECTING THE FEET**

About a quarter of a million disabling occupational foot injuries take place each
year, pointing to the need for foot protection. All safety shoes have toes
reinforced with a toe cap, and should meet the minimum requirements of
ANSI.

Safety shoes with metatarsal guards should always be worn during operations
where heavy materials, such as pig iron, heavy castings, and timbers or other
objects have a possibility of falling and striking the foot above the toe cap.

**HEAD PROTECTION**

Safety helmets are rigid headgear of varying materials designed to protect a
person's head from:

1. Impact.
2. Flying Objects.

They also can protect the scalp, face and neck from overhead spills of
chemicals, hot liquids, etc. They can help shield the hair from entanglement in
machinery or exposure to irritating dust.

There are four classes of safety helmets:

**Class A:** Limited voltage resistance for general service

**Class B:** High voltage resistance

**Class C:** No voltage resistance (metallic helmets)

**Class D:** Limited protection for firefighter’s service

All helmets that meet the American National Standards (ANSI) Z89.1 or Z89.2, shall be identified on the inside of the helmet shell with the manufacturer’s name, the American National Standard designation, and class (A, B, C, or D).

It is the suspension that gives a helmet its impact distributing abilities. It is important that it be adjusted to fit the wearer and keep the hat itself a minimum distance of 1-1/4 inches above the wearer’s head.

Winter liners, (which may be worn in comfort in cold weather) rather than ordinary headgear are required for use with safety helmets in inclement weather because they do not interfere with the shock-absorbing clearance of the hat.

Before each use hard hats should be inspected for:

1. Cracks, signs of impact or rough treatment, or excessive wear on the shell. Paints or solvents which could damage the shells effectiveness should never be used.
2. Loose or torn cradle straps, broken sewing lines, loose rivets, defective lugs, and other defects in the suspension.

Once damaged, a hard hat or a suspension liner, or both, should be discarded.

**HEARING PROTECTION**

Ear protectors in general fall into two main groups - the plug or insert type and the cup or muff type.

The plug type, placed into the ear canal, varies considerably, both in design and material. Rubber and plastic types are popular because they are easy to clean and give good performance.

Cup (or muff) devices cover the external ear to provide an acoustic barrier. The attenuation provided by ear muffs varies widely due to differences in size, shape, seal material, shell mass, and type of suspension. Head size and shape also influence the attenuation characteristics of these protectors. The type of cushion used between the shell and the head had a
great deal to do with attenuation efficiency. Liquid or grease-filled cushions give better noise suppression than plastic or foam rubber types, but may present leakage problems.

**Ear plugs** will generally reduce noise by **25 - 30 dB**, which will provide protection against sound levels of 115 - 120 dB.

Good **ear muffs** will reduce noise by **35 - 45 dB**, making them effective against levels of 130 - 135 dB.

Combinations of ear plugs and muffs give 3 - 5 more dBs of protection.
1.) Lifejackets or belts should be worn where there is a danger of ____________.

2.) An inexperienced miner shall wear a distinctively colored hard hat for _______________ period of time.

3.) What gives the hard hat its impact distributing abilities?
   A.) Its color
   B.) MSHA rating
   C.) the suspension
   D.) none of the above

4.) What are the best types of ear protection?
   A.) cotton in ears or hands over ears
   B.) inside vehicle away from sound
   C.) muffs and insert type plugs
   D.) none of the above

5.) What protective equipment is required by everyone to have?
   A.) welding shield, fire proof leathers, and gloves
   B.) safety harness, goggles, and radio
   C.) safety glasses, hard hat, and safety toe boots
   D.) none of the above
6.) Suitable protective clothing to cover __________ must be worn when handling corrosive or toxic substances or other material which might cause injury to the skin.
   A.) Hands  
   B.) Eyes 
   C.) Entire Body 
   D.) Feet 

7.) What are the chief causes of eye injury? Name at least five?(A, B, C, D, E) 

8.) What do hard hats protect a person’s head from?(A, B, C) 

9.) What do you look for when inspecting a hard hat shell? 

10.) What do you look for when inspecting a hard hat suspension? 

11.) What protective clothing is required at a surface coal mine?(A, B, C) 

12.) What protective clothing is required for welding?(A, B, C) 

13.) When should protective gloves be worn?(A, B, C)
14.) What type of protective clothing should be worn around moving equipment? (A, B)
Chapter: 6 Practice Question Answers

1). Drowning

2). One Year

3). C

4). C

5). C

6). C

7). (A) Flying objects (especially those set in motion by hand tools).  
(B) Abrasive wheels (small flying particles).  
(C) Corrosive substances.  
(D) Injurious light or heat rays.  
(E) Splashing metal.  
(F) Poisonous gas or fumes.

8). (A) Impact. (B) Flying objects. (C) Electric shock.

9). Cracks, signs of impact or rough treatment, or excessive wear on the shell. Paints or solvents which could damage the shells effectiveness should never be used.

10). Loose or torn cradle straps, broken sewing lines, loose rivets, defective lugs, and other defects in the suspension.

11). (A) Hard Hats (B) Safety glasses (C) Hard toe Shoes

12). (A) Welding face shield (B) Leather Gloves (C) Leather Vest

13). (A) Handling power cables (B) Welding (C) Performing electrical repairs

14). (A) Tight fitting (B) Coveralls
Chapter: 7 Mining Law

1.) The main purpose of the MSHA Act of 1977 is to:
   A.) Improve the quality of uranium mines
   B.) Aid in the production of coal in the United States
   C.) Assure safe and healthful working conditions
   D.) None of the above

2.) Who is most important in promoting and maintaining an effective health and safety program?
   A.) Mine operator
   B.) Safety supervisor
   C.) State Mine Inspector
   D.) Foreman

3.) What is the maximum noise level, according to MSHA, that a worker can be exposed to for an eight-hour work period?
   A.) 115 dBA
   B.) 90 dBA
   C.) 80 dBA
   D.) 85 dBA

4.) According to MSHA, persons who use or handle explosives shall be:
   A.) Required to be certified by MSHA
   B.) Experienced men who understand the hazards involved or trainees working under direct supervision of experienced men
   C.) Required to undergo extensive formal training
   D.) All of the above
5.) Cases or boxes of explosives shall not be stored in magazines on their ends or sides nor stacked more than:
   A.) 5 feet high
   B.) 8 feet high
   C.) 3 feet high
   D.) 6 feet high

6.) A complaint from a miner to MSHA concerning a hazard at a mining operation:
   A.) Must be made verbally to an MSHA inspector
   B.) Can be made to MSHA only after the mine operator has refused to correct the situation
   C.) Must indicate the miner's name on the mine operator's copy
   D.) Remains anonymous to the mine operator, although the miner's name is to be made known to MSHA

7.) Men shall not work between equipment and dangerous highwalls except:
   A.) When necessary to correct unsafe conditions
   B.) When special safety precautions are taken
   C.) When there is no hindrance for escape from falls or slides
   D.) All of the above

8.) Scaling hazardous areas of highwalls means:
   A.) Climbing hazardous highwalls for inspection
   B.) Placement of barriers, baffle boards or screens over loose unconsolidated material
   C.) Removal of pieces from unsafe highwalls by the safest method
   D.) None of the above

9.) Loading and haulage equipment having defects affecting safety shall be:
   A.) Recorded and reported to the mine operator
   B.) Reported only
   C.) Recorded as a matter of record only
   D.) None of the above
10.) One portable fire extinguisher shall be provided:
   A.) In every office
   B.) Next to mechanical repair work
   C.) At each location where welding, cutting or soldering is performed
   D.) Every 10 feet per 5000 square feet of space

11.) When overhanging highwalls or banks cannot be taken down immediately or if other unsafe
ground conditions cannot be corrected promptly, these areas must be posted:
   A.) By notice in the main office
   B.) In the form of a bulletin
   C.) In a manner that will immediately warn workers of the danger
   D.) So as to prevent entry of any personnel

12.) A foreman is the immediate supervisor responsible for:
   A.) Meeting production schedules any way possible
   B.) The health and safety of employees
   C.) Escorting mine inspectors on inspections
   D.) All of the above

13.) Miners' representatives are appointed by:
   A.) Subdistrict office managers of MSHA
   B.) Company officials
   C.) Fellow workers
   D.) By the state in which they work

14.) Miners' representatives will be called upon to accompany Federal mine inspectors:
   A.) During complaint inspections
   B.) During spot inspections
   C.) Only during general inspections
   D.) All of the above
15.) During a general inspection with more than one MSHA inspector in the same area, the number of miners' representatives needed to accompany the inspection party is:
   A.) One miners' representative for each inspector
   B.) One miners' representative for each agent acting in the capacity of the operator
   C.) One miners' representative in the area regardless of other numbers
   D.) One miners' representative from each working shift

16.) Hoists and elevators must be inspected daily and the examinations must include:
   A.) A visual examination of the rope
   B.) Examination of automatic controls
   C.) Examination for defective or broken parts
   D.) All of the above

17.) Administration of the Federal Mine Safety and Health Act of 1977 falls under the Department of:
   A.) The Interior
   B.) Labor
   C.) Health, Education and Welfare
   D.) Environmental Quality

18.) The Federal Mine Safety and Health Act of 1977 defines an "accident" as:
   A.) Only those occurrences in which death or serious injury occurs
   B.) Any potential situation in which negligence caused an injury
   C.) A mine fire, explosion, ignition, inundation, injury to, or death of, a person
   D.) An incident which caused an injury which otherwise could have been avoided

19.) To make miners aware of any government actions, the mine operator must:
   A.) Conduct a special training session each time an order or citation is issued
   B.) Publish such information in the local newspaper
   C.) Post any such notices
   D.) Send a miners' representative to public hearings
20.) A miner (or miners' representative) may accompany an inspection team:
   A.) And will not lose pay for the time involved
   B.) Without pay
   C.) Only upon special request and with management's approval
   D.) None of the above

21.) Annual refresher training is required for:
   A.) Supervisor's only
   B.) Hourly personnel only
   C.) Superintendents and General Managers
   D.) All personnel who are exposed to the hazards of mining

22.) What are the responsibilities of a mine foreman with regards to safety?
   A.) Assigning a person to a work area or piece of equipment which he is qualified to operate
   B.) Seeing that his employees work in a safe, careful manner and abide by all company safety rules and regulations
   C.) Informing the workers of any known hazardous conditions before sending them into a new work area
   D.) All of the above

23.) A new surface miner with no previous mining experience is required to have how many hours of safety training?
   A.) 8 hours
   B.) 12 hours
   C.) 24 hours
   D.) 40 hours

24.) Which State agency is responsible for health and safety in the mining industry?
   A.) Mining Council
   B.) State Mine Inspector's Office
   C.) Bureau of Mines
   D.) Department of Environmental Quality
25.) By state law, surface mines must be inspected by MSHA how many times a year?
   A.) 1
   B.) 2
   C.) 3
   D.) 4

26.) Permissible means:
   A.) Equipment, machines or devices which have been approved by the State Mine Inspector for use underground
   B.) Equipment, machines or devices which meet with union standards
   C.) Equipment, machines or devices which have been inspected daily by a qualified person
   D.) Equipment, machines or devices which have been tested and approved by MSHA for use in gassy mines

27.) Escape and evacuation plans shall:
   A.) Be established and kept current
   B.) Include exits from all work areas, building and equipment
   C.) Be made known to all employees
   D.) All of the above

28.) 30CFR, Part 56, deals specifically with:
   A.) Surface metal and non-metal mining operations
   B.) Sand and gravel pits
   C.) Surface coal mining operations
   D.) Surface training and first aid standards

29.) Mandatory safety standards administered by MSHA for metal nonmetal mines are found in the:
   A.) Code of Federal Regulations, Part 77
   C.) Department of Environmental Quality Guidelines
   D.) OSHA Book of Regulations
30.) MSHA requires there be a conspicuous bulletin board at each mine with what posted on it?
   A.) Decisions regarding mining laws or regulations
   B.) Citations received by the mines
   C.) Orders and notices received from MSHA
   D.) All of the above

31.) Which State agency should be notified in the event of a fatality or serious accident?
   A.) Mine Safety and Health Administration
   B.) U.S. Bureau of Mines
   C.) State Mine Inspector's Office
   D.) Both a and c

32.) According to MSHA, the maximum permissible noise level exposure for any length of time is:
   A.) 95 dBA
   B.) 100 dBA
   C.) 110 dBA
   D.) 115 dBA

33.) Can a State or Federal mine inspector gain access to a mine without a search warrant?
   A.) Yes
   B.) No
   C.) The Federal Inspector must have a search warrant
   D.) The State Inspector must have a search warrant

34.) Accidents, whether resulting in injury or not, should be investigated to:
   A.) Determine cause and means of preventing recurrence
   B.) Allow MSHA to compile a complete record of accident frequencies
   C.) Determine future insurance rates
   D.) Determine who was responsible and provide extra safety training
35.) Who may initiate a blast at a mine site in the State of Wyoming?
   A.) A qualified person
   B.) A certified shot firer
   C.) A foreman
   D.) Any person with blasting experience

36.) If certified, workplace safety examinations may be performed by:
   A.) The mine foreman
   B.) Person designated by the operator
   C.) Superintendent of the mine
   D.) All of the above

37.) Newly employed, inexperienced miners must be identified by:
   A.) A name tag which identifies them as inexperienced
   B.) A different colored hard hat
   C.) A brightly colored arm band
   No special identification as there is no way to identify an inexperienced miner from an experienced one

38.) Thermal dryer systems and controls shall be protected with:
   A.) Audible warning indicators
   B.) Visual warning indicators
   C.) Fail safe monitoring systems
   D.) All of the above

39.) According to Paragraph 214, Section 110 of the Act, can a foreman be named in civil and criminal liability suits?
   A.) No, only the mine operator is responsible in criminal and civil liability suits
   B.) Yes, but since a foreman is acting in the capacity of an agent of the mine operator, the operator has to pay the fine
   C.) Yes, the foreman can be named and held responsible; therefore, any fine and/or penalty which is assessed must be paid by him personally
   D.) No, the only personal fine which can be assessed is for violating safety standards for smoking in a mine
40.) The operator of each mine shall maintain a list of:
   A.) All first aid materials and their locations
   B.) All certified and qualified persons
   C.) All people who have worked at the mine site for the past five years
   D.) All of the above

41.) According to the Act, how much of a fine can an employee be assessed for a willful violation of safety standards with regards to smoking?
   A.) A minimum of $50 per violation
   B.) A maximum of $500 per violation
   C.) A minimum of $175 per violation
   D.) A maximum of $250 per violation

42.) If the failure of a water retaining dam would create a hazard, the dam should be inspected:
   A.) At regular intervals
   B.) Once a week
   C.) Once a month
   D.) Annually

43.) As described in the Mine Act Mine Operators and/or agents who knowingly and willfully violate mandatory health and safety standards if convicted can be personally assessed
   A.) Up to $250,000
   B.) Up to 1 year in prison
   C.) No less than 6 months’ probation
   D.) Both A and B

44.) In reference to 110(d) of the Act, "willfully", has been defined as:
   A.) Exercising miners rights
   B.) Done knowingly and purposely by a person who, having a free will and choice, either intentionally disobeys the standard or recklessly disregards it's requirements.
   C.) Unintentional discharge of an employee for misrepresentation of a safety violation
   D.) Done knowingly and purposely by a person who, was directed by an Agent to disobey the standard or recklessly disregard its requirements
45.) Miners can be fined $275 personally for violating standards relating to:
   A.) Failure to wear PPE
   B.) Failure to wear seatbelts
   C.) Smoking
   D.) Driving too fast for conditions

46.) MSHA and the State Mine Inspector must be notified of the following event:
   A.) A death of an individual at a mine
   B.) An injury to an individual at a mine which has reasonable potential to cause death
   C.) Entrapment of an individual at a mine which has potential to cause death
   D.) All of the above

47.) Who is responsible to notify MSHA and the State Mine Inspector of an immediately reportable accident:
   A.) The person responsible for Health and Safety at the mine
   B.) The Mine Superintendent
   C.) Mine Operator or its designee
   D.) Mine Rescue Team Captain

48.) A Mine Foreman certificate may be suspended or revoked by the Mining Council for:
   A.) Violation of the Act or rules and regulations promulgated under the Act.
   B.) Intoxication while in duty status
   C.) Neglect while in duty status
   D.) All of the above

49.) Mine Foreman have a duty to ensure:
   A.) Production
   B.) Mine Efficiency
   C.) The Health and Safety of Miners
   D.) Continuous improvement
50.) Mine Foreman who willfully neglect their duty and responsibility:
   A.) May temporarily or permanently lose their certification
   B.) May be personally fined or sentenced to jail
   C.) Will always be covered by their company's indemnification policy
   D.) Both a & b

51.) Which is not an immediately reportable accident:
   A.) An entrapment of an individual for more than 30 minutes
   B.) A rain event exceeding 2 inches per hour
   C.) An unplanned ignition or explosion of dust or gas
   D.) An unplanned mine fire not extinguished within 30 minutes of discovery

52.) The Mine Act provides for Miners to have a right to all except:
   A.) Protection against discrimination
   B.) 30 minute uninterrupted break every 8 hours worked
   C.) Contest enforcement actions
   D.) Training

53.) The Mine Act provides miners with protection from discrimination for exercising any rights under
   the Act. Under section 105(c), miners may not be:
   A.) Fired for refusing to work in unsafe conditions
   B.) Transferred to a less desirable job for reporting hazards to MSHA
   C.) Suffer loss of wages due to becoming involved in an inspection
   D.) All of the above

54.) Mandatory safety standards administered by MSHA for surface coal mines are found in the:
   B.) Code of Federal Regulations, Part 77
   C.) Department of Environmental Quality Guidelines
   D.) OSHA Book of Regulations
### Chapter: 7 Practice Question Answers

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