NEW MINERS

DEEP METAL/NONMETAL

MINE MAP; ESCAPEWAYS; EMERGENCY EVACUATION; BARRICADING

1981

THE BENDIX CORPORATION
ENERGY, ENVIRONMENT AND TECHNOLOGY OFFICE
2582 South Tejon Street
ENGLEWOOD, COLORADO 80110
303-922-6394

DEEP METAL/NONMETAL

COURSE PLAN: MINE MAP; ESCAPEWAYS; EMERGENCY EVACUATION; BARRICADING

I. GOAL: The goal of this module is to enable the miner to read mine maps, locate escapeways, identify potential emergencies, understand the proper response to these and know the procedures for emergency evacuation and barricading, if necessary. Fire prevention and fire fighting are also important goals of this topic area.

II. BACKGROUND: When a fire or other emergency condition exists in the mine it is important that everyone knows the routes of escape from the mine, or if escape is impossible then miners must know how to barricade. Although such mine disasters are relatively infrequent in underground metal/nonmetal mines, disasters such as at the Sunshine Mine show the importance of knowing how to quickly leave the mine.

III. OBJECTIVES

A. Trainer will do the following:

1. Present the mine map with an explanation of symbols
2. Describe possible causes of emergencies at the mine.
3. Discuss and demonstrate, if possible, the emergency warning system and actions to take in response to emergency conditions.
4. Describe escapeways and emergency evacuation plans.
5. Display fire fighting equipment and discuss methods of fire prevention.
6. Explain when to barricade and procedures to follow

B. Trainees will be able to do the following:

1. Recognize symbols on the mine map and tell how the map is oriented.
2. Find escapeways in the mine either on the mine tour or on the mine map.
3. Respond appropriately to alarm signals and indicators of emergency conditions.
4. Communicate with the appropriate person and take the proper action given a scenario describing a simulated mine disaster.
5. Describe characteristics of escapeways and means of reaching them.
6. Locate refuges in the mine physically by using the map as a guide.
7. Extinguish a fire, set and controlled by the trainer, using accepted techniques.

8. Describe barricading procedures and locate storage of barricading materials on the mine map, if pertinent.

IV. ACTIVITIES

A. In classroom: Students identify various map locations and features of the mine.

B. On site - in conjunction with Introduction to the Work Environment

1. Students going to specific locations using the map as a guide
2. Examine locations of emergency supplies, e.g. barricading materials

V. MATERIALS

A. Visual aids - illustrations contained in the Lesson Guide and Materials

B. The mine map and emergency evacuation plan

C. Fire fighting equipment, such as different kinds and sizes of extinguishers.

VI. EVALUATION

A. Demonstrate, describe or identify:

1. Indicators of mine emergencies
2. Characteristics of the mine map
3. Emergency evacuation procedures
4. Fire fighting techniques

B. Self-Checks

1. Any time hands-on evaluation is possible such as operating equipment or walking prescribed routes is possible it should be used.
2. Eliminate the use of self-checks if they are not pertinent to your class.
3. Change written self-check items where necessary to fit your local mine situation.

VII. RESOURCES

A. Training standards - Part 48.5-5

B. Applicable Federal regulations Part 57.11 - 50 through 59

C. Mine map and emergency evacuation plan

TOPICS COVERED

I. MINE MAP

A. Contents of the mine map

B. Uses of the mine map

II. CAUSES OF MINE EMERGENCIES

A. Accidental explosions

B. Fire

C. Toxic gases

D. Loss of ventilation

E. Inundation

III. MINE EMERGENCY WARNING SYSTEM

A. Types of warning systems

1. Visible - colored lights
2. Audible - alarms, horns and buzzers
3. Smell - stench canisters
4. Mantrip drivers - giving personal warnings to individual miners

B. Emergency responses of the miner

1. Immediately warn others
2. Use self-rescuer if necessary
3. Emergency assembly
4. Provide first aid
5. Follow supervisor or other leader
6. Use phone if available

IV. ESCAPEWAYS AND EMERGENCY EVACUATION

A. Locations of all exists and escapeways from the mine

B. Emergency evacuation plan

V. FIRE FIGHTING EQUIPMENT AND METHODS

A. Mine's fire prevention and fire fighting plan

B. Basics of fire

1. Class A fires
2. Class B fires
3. Class C fires
4. Class D fires

C. Locations of fire extinguishers

D. How to use fire extinguishers

VI. BARRICADES

A. When to barricade

B. How to barricade

1. Choosing a site
2. Materials for barricading
3. Sealing airways
4. Waiting inside barricade.

DEEP METAL/NONMETAL

LESSON GUIDE AND MATERIALS: MINE MAP; ESCAPEWAYS; EMERGENCY EVACUATION; BARRICADING

I. MINE MAP

A. A mine map is a schematic drawing on paper of the mine workings, drawn according to scale and showing all important features of the mine. The mine map is designed by a competent engineer and is periodically updated to reflect all changes in the mine, such as new development areas, abandaned areas, or drill holes.

VISUALS NOTE: DURING THE FOLLOWING SECTION YOU MAY WANT TO PRESENT YOUR MINE MAP. NOTE THAT NOT ALL FEATURES IN THIS LIST ARE RELEVANT TO YOUR MINE. POINT OUT ANY FEATURES ON YOUR MAP THAT ARE NOT INCLUDED IN THIS LIST.

B. The mine map shows all important features of the mine. The following list represents the kinds of features that might be shown on the map. The actual contents of the map depend on important features at the mine.

1. Name and address of the mine.
2. The scale and orientation of the map.
3. The property or boundary lines of the mine
4. The adit shafts, stops, drifts, tunnels, entries, rooms, crosscuts, and all other excavations of the ore bed being mined.
5. All drill holes that penetrate the ore bed being mined.
6. Dip of the ore bed.
7. Any outcrop of the ore bed within the bounds of the property.
8. The elevations of tops and bottoms of shafts and slopes.
9. The elevation of the floor at intervals of not more than two hundred feet for:
    a. At least one entry of each working section and one intersection.
    b. Developments advancing toward or adjacent to property or boundary lines or adjacent mines.
10. Contour lines passing through whole number elevations of the ore bed being mined.
11. Entries and air courses with the direction of air flow indicated by arrows, and location of fan controls.
12. The location of all mine ventilation fans.

13. Escapeways throughout all levels of the mine.
14. The known underground workings in the same ore bed on the adjoining properties within one thousand feet of such mine workings and projections.
15. The location and elevation of any body of water dammed in the mine or held back in any portion of the mine.
16. The abandoned portion or portions of the mine.
17. Mines above or below the mine workings.
18. The location of any streams or bodies of water on the surface.
19. Either producing or abandoned oil and gas wells located within five hundred feet of the mine.
20. The location of all high pressure pipelines, high voltage power lines and roads.
21. The location of railroad tracks and public highways leading to the mine and mine buildings of a permanent nature and showing identifying names.
22. Where the overburden is less than one hundred feet, any dwellings.
23. Major underground travelways and haulageways and ore passes at the mine.
24. Major underground facilities including lunchrooms, refuge areas, mine shafts, shops, storage facilities (explosives, fuel, supply), and locations of underground telephones.

II. CAUSES OF MINE EMERGENCIES

A. Accidental explosions

1. Dynamite
2. Fuel tanks
3. Electrical Equipment
4. Certain mine gases (hydrogen, methane, etc.)

B. Fire

1. Timber
2. Rubber tires
3. Electrical equipment, including batteries and battery chargers
4. Combustible metals, such as magnesium, titanium, zirconium, and sodium.
5. Rubbish
6. Petroleum products

C. Toxic gases

1. Gases from undetonated explosives
2. Gases from exploding batteries or other burning electrical equipment
3. Fumes from certain petroleum products

4. Gases from the ore itself

D. Loss of ventilation due to accidental failure of ventilation fans.

E. Inundation from water flooding into the mine.

III. MINE EMERGENCY WARNING SYSTEM

A. Types of warning systems

1. Visible - colored lights (red or blue, for example) mounted on stands in various parts of the mine.
2. Audible - emergency alarms that can be heard over most mining equipment throughout the mine.
3. Smell - stench canisters that release a chemical smelling like rotten eggs. The stench is carried through the mine by ventilation system and fills the entire mine within minutes.
4. Mantrip drivers - drivers may give personal warnings to individual miners and pick them up for immediate transportation out of the mine.

B. Emergency responses of the miner

1. The first thing to do in a mine emergency is warn other miners of the situation. Tell everyone to pass the word along so as to assure that all miners are aware of the emergency situation.
2. Use your self-rescuer if the situation calls for it. In the event of a fire or explosion, put it on automatically in order to minimize your breathing carbon monoxide.
3. Gather together in designated places according to the mine's fire and evacuation plan. Stay together and remain calm.
4. Provide first-aid to any injured miners. If any miners are unable to walk, use a first-aid stretcher or build one using whatever materials (planks, rods, fencing) are available.
5. A supervisor should take charge of planning and organizing. Because of his experience and knowledge, you should respect and follow his orders. If no supervisor is present, one senior miner should take on the leadership of the group.
6. If the phones are working, report your situation, location, and intentions to the dispatcher or operator. He may have some helpful information. If you are wearing your self-rescuer, do not remove it. You could use a code system such as the hoist signal system to communicate with the dispatcher by lightly hitting the phone with a tool.

INSTRUCTOR NOTE: BRIEFLY REVIEW THE HOIST SIGNAL SYSTEM AND PROVIDE A FEW EXAMPLES ILLUSTRATING ITS USE IN COMMUNICATING WITH THE TELEPHONE DISPATCH.

IV. ESCAPEWAYS AND EMERGENCY EVACUATION

A. Your knowledge of the locations of all exits and escapeways from the mine is extremely important. If the main exit out of the mine is blocked, you must be familiar with the secondary route.

VISUALS NOTE: ON THE MINE MAP AGAIN POINT OUT THE LOCATIONS OF EXITS AND ESCAPEWAYS FROM THE MINE.

1. Part 57-11-50 states that: "Every mine shall have two or more separate, properly maintained escapeways to the surface from the lowest levels which are so positioned that damage to one shall not lessen the effectiveness of the others".
2. Escapeways are periodically inspected and maintained in acceptable condition. The law requires that escapeways be maintained in a safe and travelable condition, and that they be marked with conspicuous and easily read direction signs that clearly indicate the ways of escape. For your reference, a mine map is posted at all shaft stations, and at all underground shops, lunchrooms, and other areas where miners congregate. You should know where these locations are from your working area.
3. When an emergency occurs, you should attempt to reach fresh intake air above the fire or explosion. Air on the return side of the fire or explosion will contain carbon monoxide against which you should use your self-rescuer for protection.
4. The final leg of your escape from the mine may be travelling an emergency hoist to the surface. Try to remain orderly and calm while waiting for the hoist, and keep your self-rescuer on if you are using it. Follow your supervisor's orders, and let injured miners take the hoist first so that they can receive medical attention quickly.
5. After you reach the surface, contact a supervisor or the mine operator immediately so he will know you are out of the mine.

INSTRUCTOR NOTE: THE FOLLOWING SECTION CONCERNS THE MINE'S EMERGENCY EVACUATION PLAN. PRESENT THAT PLAN AT THIS TIME. THE FOLLOWING POINTS ARE ONLY AREAS FOR ADDED EMPHASIS.

B. Emergency evacuation plan

1. If you are going to evacuate, first try the route into the intake air so that you will be in fresh air. If that route is blocked, then try the secondary escapeway.
2. You should carry your lunch bucket because you may need food if you are trapped or if you are forced to barricade.
3. If the mine is full of dense smoke, use a rope if one is available to tie the miners in a line. Otherwise, keep close together so that no one gets lost from the group. Keep a look-out for fires or other hazardous conditions.

EVALUATION NOTE: HAVE TRAINEES ANSWER SELF-CHECK NUMBER ONE INDIVIDUALLY OR IN GROUPS OF THREE OR FOUR. REVIEW RESPONSES AND CLARIFY ANY INCORRECT ANSWERS. THESE QUESTIONS CONCERN THE CONTENTS OF THE MINE MAP, CAUSES OF MINE EMERGENCIES, THE MINE EMERGENCY WARNING SYSTEM AND ESCAPEWAYS AND EMERGENCY EVACUATION.

INSTRUCTOR NOTE: THE FOLLOWING SECTION CONCERNS THE MINE'S FIRE PREVENTION AND FIRE FIGHTING PLAN. PRESENT THAT PLAN AT THIS TIME.

V. FIRE FIGHTING EQUIPMENT AND METHODS

A. The mine's fire prevention and fire fighting plan is designed to reduce the opportunity for a fire starting, and should one occur, to limit the extent of its destruction. The damage resulting from a fire can be minimized through adequate fire protection. Fire protection consists of monitoring and controlling fire hazards, available fire fighting equipment, especially portable fire extinguishers, and the personnel who are trained to use the equipment effectively in the event of a fire. The following are some good fire prevention techniques.

VISUALS NOTE: PASS OUT VISUAL 40 SHOWING A CHECKLIST OF VARIOUS FIRE PREVENTION POINTS. ADD ANY POINTS TO THE LIST THAT ARE RELEVANT TO YOUR MINE.

B. Basics of Fire

1. The necessary ingredients of a fire are fuel, oxygen, and heat. Fire fighting calls for removal of at least one of these ingredients. The fuel can be moved to a safer location. Oxygen can be sealed off from the fire, thereby suffocating it. Or the fire's heat can be reduced by cooling the fuel.
2. Fires have been classified into four types based on the kind of fuel involved in the fire. These different kinds of fires are fought in different ways. In fact, using the wrong kind of chemical to extinguish the fire can even spread the fire further.

VISUALS NOTE: SHOW VISUAL 41 ILLUSTRATING THESE FOUR TYPES OF FIRE.

a. CLASS A fires - These fires occur with ordinary combustible material such as wood, pyritic ore, coal, cloth, paper or oil rags. These materials leave ashes after the fire, so you can associate Class A fires with Ashes. Class A fires are usually fought with water, which cools and dampens

the fuel. Also, some special dry chemicals are used to quickly extinguish the flame and prevent reflash.

b. CLASS B fires - These fires are burning flammable liquids, such as gasoline, greases, hydraulic oil, diesel fuel, and lubricating oils. The fire occurs in the fumes over the surface of flammable and combustible liquids. Typical Class B fires occur with spills or pools of liquids found near rubber-tired vehicles, drills, bulk fuel storage areas, maintenance shops, and lube operations. Class B fires involve liquids that Boil. These fires are fought with dry chemicals, foam, vaporizing liquids, carbon dioxide and water fog.

c. CLASS C fires - These are electrical fires. Typical electric fires include electric motors (as used in fans), batteries, battery chargers, transformers, and circuit breakers. You can associate Class C fires with the electric Current. Class C fires are fought with non-conducting extinguishing agents, such as dry chemicals, carbon dioxide, and vaporizing liquids. If the current is still on do not fight the fire with water or foam because these conduct electricity, and thereby pose another hazard to fire fighters. Once electricity is cut off the fire can be treated as a Class A or B fire, thereby permitting use of water.

d. CLASS D fires - These fires involve combustible metals such as magnesium, titanium, zirconium, and sodium. These fires require special extinguishing agents and fire fighting techniques. Normal extinguishing agents should not be used to fight Class D fires because they could make the fire worse. This is because they may have a hazardous chemical reaction with the burning metal.

C. When a fire is discovered, your immediate reaction in fighting the fire is crucial. Mere seconds are available for preventing the spread of the fire. For this reason you should know where the nearest fire extinguisher is located, and whether it is permissible for this type of fire. If you are uncertain about the contents of the extinguisher, read the main instructions on the body of the cannister.

VISUALS NOTE: DISTRIBUTE VISUAL 42 EXPLAINING THE CHARACTERISTICS OF PORTABLE FIRE EXTINGUISHERS.

VISUALS NOTE: DISTRIBUTE VISUAL 43 DESCRIBING FOUR TYPES OF FIRE EXTINGUISHERS.

INSTRUCTOR NOTE: BRIEFLY REVIEW LOCATIONS OF FIRE FIGHTING EQUIPMENT IN THE MINE (RUBBER TIRED EQUIPMENT, SHOPS, LUNCH ROOMS, ETC.)

D. For most portable fire extinguishers, you usually have to stand no more than 8 feet from the fire. Direct the stream at the base of the flame, not higher up at the smoke. A 30-pound extinguisher will normally last 18 to 25 seconds. Do not turn your back to a fire. When the fire is extinguished, back away from it and watch for any flare up.

VI. BARRICADES

INSTRUCTOR NOTE: THE TRAINER SHOULD WEIGH THE EMPHASIS ON BARRICADES IN LIGHT OF THE COMPANY EMERGENCY EVACUATION POLICY AS WELL AS THE PRACTICALITY OF BARRICADING AT HIS MINE. IN ANY GIVEN MINE BARRICADING MAY NOT BE A POSSIBLE OR EVEN DESIRABLE RESPONSE TO AN EMERGENCY. THE SAFETY AND TRAINING STAFF SHOULD EXPLORE THE UTILITY OF BARRICADING WITH OTHER COMPANY PERSONNEL AND WITH STATE AND FEDERAL MINE INSPECTORS TO FORMULATE AN APPROPRIATE EMERGENCY RESPONSE FOR THE MINE.

A. Under most circumstances when an evacuation of the mine is called for, all underground miners should be knowledgeable about how to escape. However, if an explosion or fire is serious enough, all escapeways may become blocked. If you find yourself trapped you must do something to protect yourself from the fire, heat, and gases which may eventually fill the entire area. When you are certain that all possible escapeways are closed off to you, you have no other choice but to build a barricade.

B. Barricading means building airtight bulkheads or stoppings to enclose a large quantity of relatively fresh air and to keep any poisonous gases out while you wait for rescue. It is important to remember that barricading is a last resort and should generally not be needed if escapeways and other emergency features are properly maintained. But it is important that you know how and where to build barricades when an emergency develops that cuts off all escape routes.

C. Some underground mines have refuge centers that double as lunch rooms. By closing off the center completely, you can seal the smoke out. Air and water valves may be available in the refuge center. Some mines have two air doors located close together. Located between these doors may be a red fire seal box containing burlap, nails, hammer, candles, matches, pipe wrench and an ax, all of which can be used to seal out smoke.

D. In choosing the best location for a barricade, a number of factors must be considered. Remember that the purpose of a barricade is to form an airtight refuge chamber that keeps fresher air in and smoke and gases out. The following is a list of factors to be considered in building a barricade.

1. One of the first considerations is to keep the air in your chamber as free of contaminates as possible. Therefore, an important first step is to choose an area in which you can short-circuit the ventilation as soon as possible to keep noxious gases from entering the area. It may be necessary to open doors, destroy doors, or stopings, etc.
2. The size of the enclosed space determines the number of men the barricade will shelter and the length of time they can remain there safely. It is necessary to keep in mind that as much area as possible containing fresh air should be sealed off. In general, barricade as large a space as possible with the fewest barricades necessary. Often there may be only time to erect one permanent barricade which may take from 30 minutes to 2 hours to build, depending on conditions.
3. Try to barricade at any available borehole with materials which have been stored in the area for such a purpose. A good barricade at a borehole helps assure a safe refuge because air, food, and communications can pass through the borehole to the trapped miners.
4. Back-filled ground should not be used because gases are likely to pass right through it. Remember, for your chamber to be effective, all openings into it must be sealed.
5. Remember, in many instances there may be a general power failure. Water pumps and ventilating fans won't work, so don't barricade in areas where water might accumulate or where certain gases might settle.
6. It would be good if the area you choose to barricade also has air or water lines.
7. Do not build your barricade in an area connected or next to mined out or caved-in areas.

E. You should write on the outside of both the temporary and permanent barricades the date, time, and number of men inside the chamber. This will tell the rescue team what first aid and oxygen supplies they will need when they break through the barricade.

F. Waiting inside the barricade.

1. The leader should space the miners throughout the refuge area. You should rest to conserve oxygen. (You can use up more than ten times as much oxygen when you are active.) Keep your self-rescuer on.

2. Air in an enclosed space doesn't circulate and can get stale. Someone should periodically stir the atmosphere. This person should check the condition of each miner. Also, the barricade should be checked regularly for leaks.

3. You don't know how long you will have to wait to be rescued. So the leader should collect all lunch pails and then ration the food and water.

4. Leader should be ready with a list of names and any injuries to report when the rescue party arrives.

5. Remember, only the mine rescue party should open a barricade.

EVALUATION NOTE: HAVE TRAINEES ANSWER SELF-CHECK NUMBER TWO INDIVIDUALLY OR IN GROUPS OF THREE OR FOUR. REVIEW RESPONSES AND CLARIFY ANY INCORRECT ANSWERS. THESE QUESTIONS CONCERN FIRE FIGHTING EQUIPMENT AND METHODS AND BARRICADING.

Self Check #1: Solutions

1. Answers may vary.

2. A supervisor and a senior miner.

3. Answer according to your mine situation

4. Tell others.

5. false

Self Check #2: Solutions

1. oxygen, heat, fuel

2. a. Class A - ordinary combustible material - wood, cloths, etc.
   b. Class B - burning flammable liquids - gasoline, diesel fuel
   c. Class C - electrical fires
   d. Class D - combustible metals

3. 18 to 25 seconds

4. Answers will vary

5. Miner's immediate reaction to fighting the fire.

6. When you are certain all possible escapeways are closed off to you.

SELF CHECK: MINE MAPS; ESCAPEWAYS; EMERGENCY EVACUATION, BARRICADING

SELF CHECK #1: MAPS AND EVACUATION

1. Circle the following features on your company's mine map.
   a. Orientation of the mine
   b. Mine entrance
   c. Exits
   d. Major travelways and haulage ways
   e. Maintenance and storage shops

2. Who should take charge in an emergency?

3. What is the mine's emergency alarm system, and how will you know when it has been activated?

4. What is your first responsibility when an emergency occurs?

5. An undetonated explosive is not hazardous, as it can be easily removed. (true, false)

SELF-CHECK #2: FIRE FIGHTING AND BARRICADING

1. What three things do fires need in order to burn?

   _____, _____ and _____.

2. What are the four types of fires?

   a. Class A -

   b. Class B -

   c. Class C -

   d. Class D -

   Why is it important to understand the differences in the types?

3. Most portable fire extinguisher will last about how long?

4. Name locations of fire extinguishers in your mine.

5. What is crucial in fighting any fire?

6. Under what circumstances would barricading be the best possible means of surviving an emergency at the mine?

FIRE PREVENTION CHECK LIST

ELECTRICAL EQUIPMENT

- ☐ No makeshift wiring
- ☐ Extension cords serviceable
- ☐ Motors and tools free of dirt and grease
- ☐ Lights clear of combustible materials
- ☐ Safest cleaning solvents used
- ☐ Fuse and control boxes clean and closed
- ☐ Circuits properly fused
- ☐ Equipment approved for use in hazardous areas (if required)
- ☐ Ground connections clean and tight

FRICTION

- ☐ Machinery properly lubricated
- ☐ Machinery properly adjusted and/or aligned

SPECIAL FIRE-HAZARD MATERIALS

- ☐ Storage of special flammables isolated
- ☐ Nonmetal stock free of tramp metal

WELDING AND CUTTING

- ☐ Area surveyed for fire safety
- ☐ Combustibles removed or covered
- ☐ Permit issued

OPEN FLAMES

- ☐ Kept away from spray rooms and booths
- ☐ Portable torches clear of flammable surfaces
- ☐ No gas leaks

PORTABLE HEATERS

- ☐ Set up with ample horizontal and overhead clearances
- ☐ Secured against tipping or upset
- ☐ Combustibles removed or covered
- ☐ Safely mounted on noncombustible surface
- ☐ Not used as rubbish burners

HOT SURFACES

- ☐ Hot pipes clear of combustible materials
- ☐ Ample clearance around boilers and furnaces
- ☐ Soldering irons kept off combustible surfaces
- ☐ Ashes in metal containers

SMOKING AND MATCHES

- ☐ "No smoking" and "smoking" areas clearly indicated
- ☐ Butt containers available and serviceable
- ☐ No discarded smoking materials in prohibited areas

SPONTANEOUS IGNITION

- ☐ Flammable waste materials in closed, metal containers
- ☐ Flammable waste material containers emptied frequently
- ☐ Piled material cool, dry, and well ventilated
- ☐ Trash receptacles emptied daily

STATIC ELECTRICITY

- ☐ Flammable liquid dispensing vessels grounded or bonded
- ☐ Moving machinery grounded
- ☐ Proper humidity maintained

HOUSEKEEPING

- ☐ No accumulation of rubbish
- ☐ Safe storage of flammables
- ☐ Passageways clear of obstacles
- ☐ Premises free of unnecessary combustible materials
- ☐ No leaks or drippings of flammables and floor free of spills
- ☐ Fire doors unblocked and operating freely with fusible links intact

EXTINGUISHING EQUIPMENT

- ☐ Proper type
- ☐ In proper location
- ☐ Unobstructed
- ☐ Clearly marked.
- ☐ In working order
- ☐ Service date current
- ☐ Personnel trained in use of equipment

THE FOUR TYPES OF FIRES

A COMBUSTIBLE MATERIAL

Timber
Smoldering Trash
Card Board Boxes
Wooden Pallets
Dry Rags
Tires

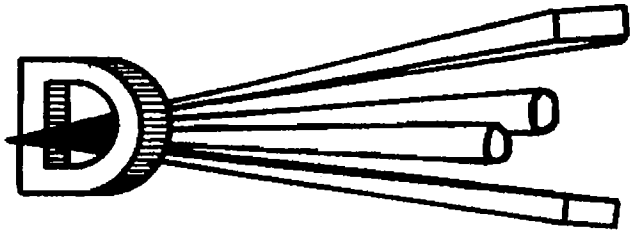
B FLAMMABLE LIQUID

Lubricating Oils
Greases
Fuel Oils
Gasoline

C ELECTRICAL

Electrical Motor
Battery Equipment
Battery Charging Station
Junction Box
Transformer
Circuit Breaker

D



COMBUSTIBLE METAL

Sodium
Titanium
Zirconium
Magnesium

VISUAL 41

PORTABLE FIRE EXTINGUISHER CHARACTERISTICS

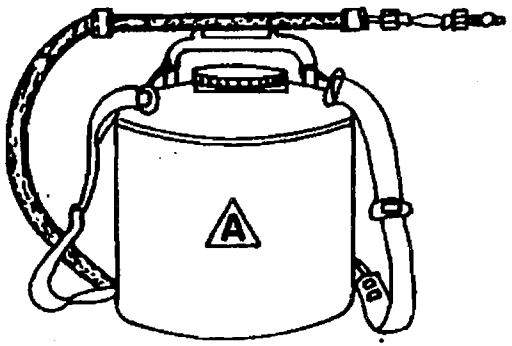
Fire Class	Extinguishing Agent	Available Sizes	Horizontal Range, Ft.	Discharge Time, Sec.
A	Water	1½-5 gal	30-40	45-180
A,B	Foam	1½-2½ gal	35	35-60
A, B, C	Ammonium phosphate	2-3 lb.	5-20	8-25
B, C	Carbon dioxide	2½-20 lb	2-4	15-30
B, C	Potassium bicarbonate	2-30 lb	5-20	8-25
B, C	Potassium chloride	2-30 lb	5-20	8-25
B, C	Potassium bicarbonate/urea	17-19 lb	15-30	26-30
B, C	Halon 1211	2½ lb	4-6	8-10
B, C	Halon 1301	2-4 lb	8-12	8-12

VISUAL 42

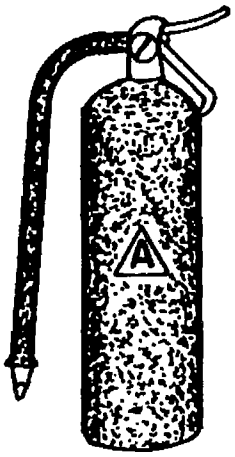
COMMON TYPES OF FIRE EXTINGUISHERS

WATER CARRIERS

For Class A Fires Only



PUMP TANK



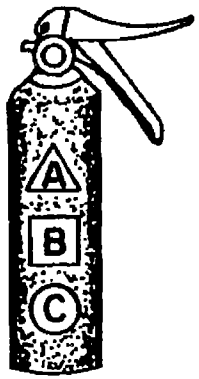
PRESSURIZED WATER

Do Not Use Water on Class B and C Fires

MULTI-PURPOSE

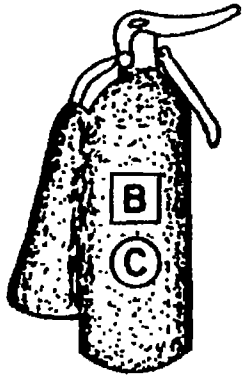
For All Types of Fires

EXCEPT Metal Fires



CARBON DIOXIDE

For Class B or Class C Fires



Class	A	Ordinary Combustibles
Class	B	Grease and Other Flammable Liquids
Class	C	Electrical Fires

TIPS ON USE:

Stand close to the fire and aim at the base of the fire using a side-to-side sweeping motion to smother the fire. Stand by in case of reflash.

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