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Chapter One

Introduction to Safety

1

Responsibility for Safety

1.01 By law, your employer is responsible for providing you with a safe place to work. Your company does this in many ways—by selecting safe equipment, by designing facilities in a safe manner, and by identifying and controlling hazards. Company management establishes rules and procedures according to regulations that the government has set forth for your industry. Every employee must understand these rules and procedures and the importance of following them. Company rules and procedures are established with good solid reasoning behind them.

1.02 Your company management puts part of the responsibility for safety in the hands of people like you—its employees. In other words, safety is a shared responsibility. Your employer provides a safe environment. You are expected to arrive at work in the proper physical condition to perform your job. You must perform your job as you were trained to do it. Working safely is a condition of employment. Failure to work safely, like any other major violation of company rules, can be reason for discipline or termination of employment.

1.03 Not only must you learn the rules and job procedures, you must follow them every time. The one time you do not follow the rules, you might cause an accident. An *accident* is an unexpected event that results in injury to an employee, illness, or damage to property. In addition to learning and obeying the rules, it is also your responsibility to report any dangerous behavior or conditions that might have been overlooked during an inspection. In short, the elimination of unsafe conditions and unsafe behavior should be daily concerns for every person at your facility.

1.04 Safety experts agree that many minor injuries and close calls usually occur in a given situation before a serious injury occurs. Many employees learn to live with close calls or minor cuts and bruises and wrongly assume that injuries at work are a part of the job. When an accident occurs, however, it is impossible to know if the result will be a minor inconvenience, like a scrape or bruise, or a major problem. Suppose two people slip on a grease spot. One might fall and get his pants dirty, while the other person might fall on the same grease and break an arm—or worse.

Your Company's Safety Program

1.05 The various elements of your company's safety program all help to ensure your safety on the job. Some of the more important of these elements are covered in the following paragraphs.

1.06 **Safety committees.** Safety committees are developed in some facilities to allow employees and supervisors to meet and discuss safety issues. Safety committees also offer workers a place to go with questions or complaints. Representatives generally come from each department and work shift. Members are often given authority to assist in accident prevention. If your company has a safety committee, consider becoming a member.

1.07 **New employee orientation.** The safety message in a plant should be communicated to all employees. Although accidents can happen to new employees and experienced employees alike, new employees are often considered at greater risk. If you are a new employee, make certain you have been given basic safety information before you start working. This basic information should include:

- a tour of the work area
- location of medical care
- method of reporting injuries
- location of fire and emergency equipment
- required personal protective equipment
- incentive and awards programs
- housekeeping requirements
- required department inspections
- plant safety rules.

1.08 **Bulletin boards/communication.** One way in which your company attempts to remind you and other employees of the safety message is through the use of bulletin boards. Bulletin boards also can be used to answer questions that commonly arise among employees. Bulletin boards often contain such items as:

- required federal/state safety posters
- additional safety posters on a wide variety of subjects
- method of obtaining emergency care
- plant safety rules
- plant emergency plan and map
- list and location of all chemicals used in each department.

1.09 **Training.** Training should be on-going in all areas that relate to your job. Knowing how to do your job properly will help you perform your job safely. Every employee should receive certain basic training, including:

- required training for the job being assigned (including the hazards involved in the job, control measures, and work procedures)
- use of powered industrial equipment
- safe handling of chemicals on the job
- proper lifting and carrying techniques
- first aid and CPR procedures
- emergency evacuation, weather emergencies, fire safety procedures
- information covered by signs and tags.

1.10 Depending on your job responsibilities, training might also be necessary in some of the following areas:

- use of forklifts and cranes
- machine safety
- lockout/tagout procedures

- use of respirators and other personal protective equipment
- radiation, fumes, mists, gases, etc.
- welding and cutting procedures
- Material Safety Data Sheets (MSDSs).

1.11 **Incentive programs.** Some companies use incentive programs to encourage safe work habits. The program might be based in hours worked without an injury, for example. If your company has an incentive program, the important thing to remember is that its purpose is to improve safety awareness, not to hide injuries to win an award.

Unsafe Acts and Unsafe Conditions

1.12 **Unsafe acts.** The majority of on-the-job injuries are the result of unsafe acts. Every unsafe act, however, does not result in an accident or injury. In fact, safety experts estimate that about 300 unsafe acts occur before a single injury results from this unwanted behavior. The problem is that you never know if that first, single unsafe act or the 300th repetition of it will result in an accident. When you get into the habit of repeating an unsafe act, it can be a very difficult habit to break.

1.13 Figure 1-1 shows an accident pyramid. The broad bottom of the pyramid represents near misses that are the result of an unsafe act. At the next level, you can see that many unsafe acts result in minor injuries. Farther up in the pyramid, some injuries are serious enough to require medical attention. Finally, the top of the pyramid illustrates the few serious accidents that occur. It is important to focus on accident prevention at the bottom part of the pyramid. That is, focus on recognizing and eliminating hazards and avoiding close calls so that the opportunity for a serious injury is minimized.

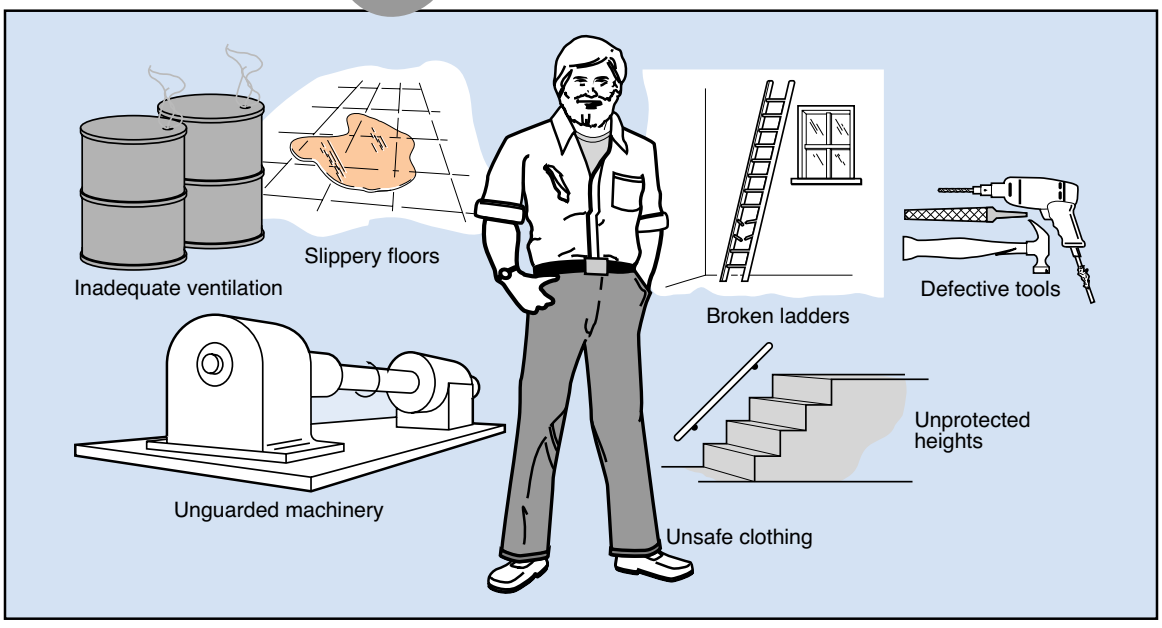
Fig. 1-1. Accident pyramid

1.14 As mentioned earlier in this chapter, training in safe work habits is the responsibility of your employer. Remember, however, that it is your responsibility to perform your job as you were trained to do it. It is also important that your employer provide you with the knowledge you need to be able to recognize, understand, and report unsafe acts in order to help prevent accidents. The following is a partial list of unsafe acts:

- not wearing required protective equipment (safety gear)
- engaging in horseplay, distractions, or teasing of others
- operating any equipment without being trained in its use
- operating equipment outside its intended operating range
- failing to secure or store objects properly
- failing to warn or give information or signals to others
- working on moving equipment
- carrying, lifting, or loading in an unsafe way
- making safety devices inoperative
- using unsafe or dangerous equipment or machinery
- failing to call attention to the unsafe acts of others.

1.15 **Unsafe conditions.** In addition to avoiding unsafe acts, make it a habit to keep your eyes open to unsafe conditions as you walk around the plant. Some examples of unsafe conditions are illustrated in Fig. 1-2. Whenever you see something unsafe, do something about it. Always report the condition to your supervisor.

Fig. 1-2. Unsafe conditions in the plant



1.16 Many unsafe conditions occur as a result of unsafe acts. Removing the guards from rotating equipment is an unsafe act that, in turn, creates an unsafe condition. Some examples of other unsafe conditions are:

- defective tools, equipment, or machinery
- dangerous work surfaces, work areas, and elevations
- inadequate ventilation, illumination, or work station design
- inadequate or improper warning procedures and alarm systems
- unsafe clothing or protection devices
- slippery walking surfaces (floors, aisles, steps).

1.17 Before you can eliminate unsafe conditions, someone must first identify them. Inspecting the workplace on a daily, weekly, and monthly basis is necessary to identify unsafe conditions. It shows the company's interest in the welfare of its workers. A sample inspection checklist is shown in Fig. 1-3. Although inspections are usually carried out by supervisors, this checklist can help make you aware of any unsafe conditions that might exist in your plant.

1.18 Some workplace conditions can be corrected immediately. Relocating a box of product that is sticking out into an aisle is an example of an easily corrected problem. Other unsafe conditions, however, such as a missing guard or exposed wiring, require the use of a trained maintenance department for correction. Report such conditions to your supervisor immediately. If you believe that a condition presents an immediate danger to you, the law says that you do not need to perform that task until the situation is corrected.

Recognizing Hazards

1.19 You must constantly be aware of the physical surroundings in your facility. A *hazard* is a condition with the potential to cause injury. By recognizing and understanding the hazards around you in the plant, accidents can be prevented. The following paragraphs identify the four main types of hazards, which are illustrated in Fig. 1-4 on page 10.

1.20 **Electrical hazards.** Because electricity provides the power for most machinery, tools, heat, and light, these hazards are everywhere in the plant. Also, static electricity can be a danger if it is not drained off properly.

Fig. 1-3. Safety inspection checklist

SAFETY INSPECTION CHECKLIST

SUPERVISORS ARE REQUESTED TO CONDUCT A COMPLETE SAFETY INSPECTION OF THEIR DEPARTMENTS. USE THIS FORM FOR RECORDING YOUR FINDINGS.

File this form when completed.

Date: _____ **Job No.(s):** _____

Location: _____ **Crew Member:** _____

Supervisor: _____

ITEMS	OK	NEEDS ATTENTION	REMARKS
1. Walking/working surfaces:			
(a) Tripping hazards?			
(b) Slippery surfaces?			
(c) Floor holes?			
2. Fire extinguishers:			
(a) Monthly inspection?			
(b) Accessible?			
(c) On mechanized equipment?			
3. Fire hoses unobstructed?			
4. Electrical Tools:			
(a) Guards in place?			
(b) Good condition?			
(c) Stored properly?			
5. Floor dry, free of grease, oil, etc.?			
6. Proper personal protective equipment (PPE):			
(a) Safety glasses?			
(b) Hard hats?			
(c) Earmuffs and/or ear plugs?			
(d) Safety shoes?			
(e) Respirators?			
7. Flammables/combustibles:			
(a) Welding and cutting			
(b) Safety vents			
(c) No smoking r enforc			
8. Houseke			
(a) bage?			
(b) C nli			
(c) El l cords?			
(d) Lad s?			
9. Cranes/rigg equipment properly stored and ins ted?			
10. Plant overhead lights working?			
11. Exhaust fan operable?			
12. Hand tools in safe cond			
13. Scaffold system:			
(a) Fully assem d?			
(b) Tags?			
(c) Inspections?			
(d) Fully planked g			
14. Exits clear?			
15. MSDSs onsite with containers labeled?			
16. Proper barricading/warning signs:			
(a) Trenches?			
(b) Fuel areas?			
(c) Storage construction sites?			
17. Hot work:			
(a) PPE?			
(b) Permit?			
(c) Combustibles?			
(d) Flammables protected?			
18. Excavation:			
(a) Properly sloped or shored?			
(b) Permits?			
(c) Inspections?			
(d) Barricaded daily?			
19. Electrical:			
(a) Proper grounding?			
(b) Lock and tag?			
(c) GFCI in good condition and inspected?			
20. Product stored safely?			
21. Chemicals being handled safely?			
22. Other:			

Fig. 1-4. Four basic industrial hazards

Mechanical

Environmental

Chemical

ectrical

1.21 **Chemical hazards.** Flammable, explosive, toxic, and corrosive chemicals all present hazards.

1.22 **Mechanical hazards.** Moving parts, gears, in-process work, and material handling can all be dangerous. Point-of-operation guarding must be installed where appropriate.

1.23 **Environmental hazards.** Extreme heat and cold, high humidity, excessive noise and vibration, and exposure to radiation are all examples of environmental hazards. Also, fires can injure people and destroy property.

Health Hazards

1.24 Some unsafe conditions in the plant are not as obvious as those mentioned earlier. Employees can be exposed to unseen hazards. These

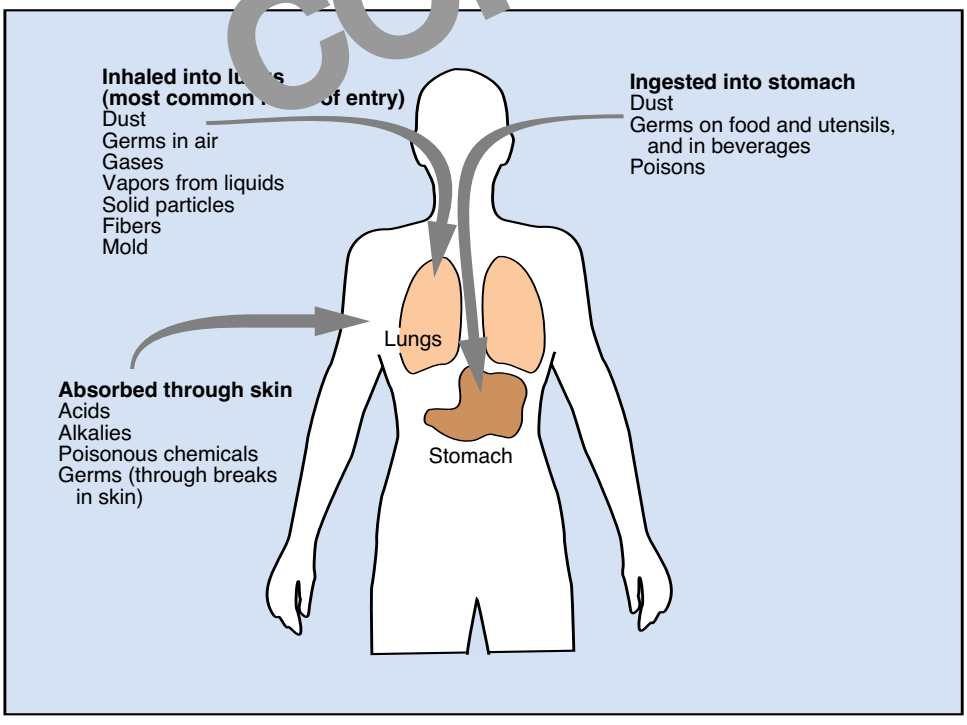
unseen hazards can sometimes take months or even years to cause harm. Exposure to these hazards could arise from loud machines, aerosol cans, painting operations, welding, dip tanks, or the mixing of chemicals, to name a few.

1.25 *Toxic substances* or chemicals can enter the body in three ways. The most common way, with about 90% occurrence, is through *inhalation* (breathing in). The second most common method, *absorption,* is entry through the skin. *Ingestion*, or swallowing the toxic substance, is the third, and least common method. All three methods are illustrated in Fig. 1-5 along with a list of toxic substances in each category.

1.26 Toxic substances in the air can be in the form of dusts, fumes, mists, vapors, smoke, and gases. When inhaled, they can cause a very rapid effect on the body (carbon monoxide, for example) or the toxic substances can take many years to affect the body. Asbestos is a good example of a long term health hazard. It can take 30 years or more to feel the effects of asbestos.

1.27 Noise is another health hazard. You know the noise is there, but you cannot know if you are being harmed in any way. It can take many years to lose your hearing from excessive noise. Federal guidelines limit the amount of noise that you can be exposed to during the work day. Noise regulations are more thoroughly discussed in a later chapter.

Fig. 1-5. Entrance of toxic substances into the body



1.28 Radiation exposure is not as common in the workplace as some of the other health hazards mentioned, but it must be a concern where radiation is present. Radiation exposure can cause internal harm to the body without the victim even being aware of its presence.

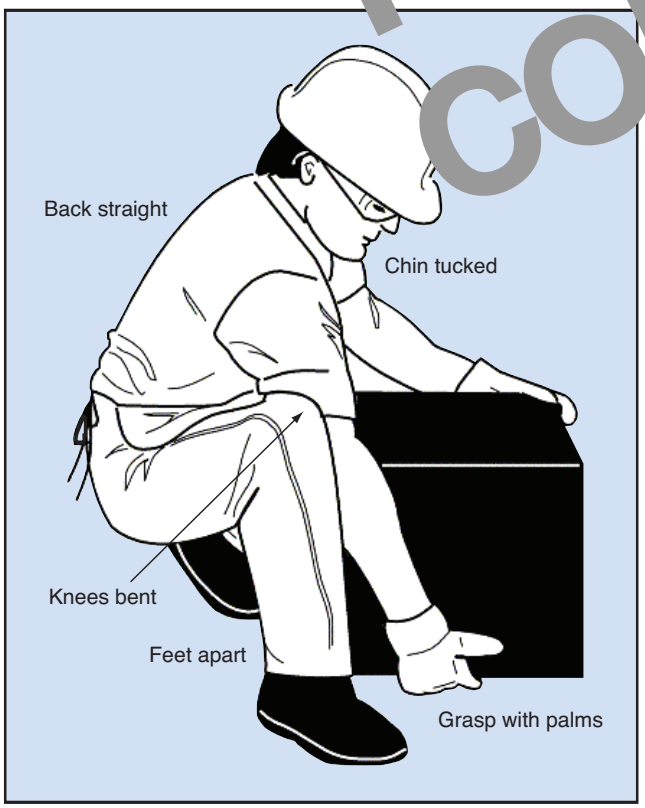
1.29 Each one of these health hazards is capable of being controlled in such a way that employees can perform their jobs without harm. The ideal method of control is through proper *engineering controls*. Engineering controls are used to minimize a worker's exposure to a hazard. Examples of these controls are as follows:

- proper ventilation or a device to capture or evacuate fumes, gases, and vapors
- proper barriers to reduce noise or radiation.

As a last resort, if engineering controls are not possible or effective, you must wear *personal protective equipment*. These protective devices can be goggles, glasses, ear plugs, protective suits, or respirators.

1.30 In some cases, personal protective equipment is the only method of controlling a health hazard. You must be fully trained in the use of this equipment, however, before you can safely use it. This training should include how to wear the equipment, when to wear it, and how to care for it. Personal protective equipment is the subject of a later chapter.

Fig. 1-6. Correct method of lifting



1.31 One other health hazard to note involves repetitive motion. Repetitive motion injuries usually affect the wrists, hands, and forearms. Repeated bending and lifting can cause soft tissue injuries to the back and shoulders. A day's work that involves gripping, squeezing, bending, and twisting can cause pain and injury. In many cases it is not the weight of the object being lifted or handled, it is the number of times the motion in repeated.

1.32 Repetitive motion and soft tissue injuries can sometimes be controlled or corrected by improved workplace design. Controls on machines might be relocated in a way that eliminates the need to lift the arms with each cycle of a machine. Using the correct method for lifting, as illustrated in Fig. 1-6, is essential. At times, devices can be used to aid in lifting and stacking in order to reduce back injuries.

Types of Accidents

1.33 One of the best ways to prevent accidents is to understand and eliminate their causes. One of the goals of this chapter is to help you do just that. The more you know about accident causes, the better equipped you will be to prevent accidents.

1.34 As mentioned earlier, many close calls might occur during the work day, each having the potential to cause an accident or injury. Many of these daily incidents go uncorrected because workers either get used to the hazards involved or because they do not recognize that these little things can be dangerous to them. The hazard that caused today's minor scrape can be responsible for tomorrow's serious injury.

1.35 Many basic accident types typically occur in the work environment. It is important for you to understand how accidents occur. The following is a list identifying the various accident types:

- **Caught-between accident.** This accident usually involves a *pinch point*, in which a part of the body is caught between moving objects or between a moving object and a nonmoving object.

- **Caught-in accident.** This accident results when a part of the body is caught in an enclosure of some kind. It could be as simple as a foot being caught in a floor grate or as complex as a person being caught in a large vessel or structure.

- **Caught-on accident.** In this type of accident, a person's clothing or body is caught on a moving or stationary part. A glove caught on a moving conveyor is a good example.

- **Fall from above accident.** When a person falls, the distance of the fall can be an important factor in the severity of the injury. A fall from above could be the result of falling from a ladder or scaffold or falling into a hole. A **fall same level accident** is one in which a person falls on a grease spot on the floor, for example.

- **Struck-by accident.** This type of accident is one of the most common causes of injury. Examples include a person being struck by a forklift, by a wrench falling from a ladder, or by sparks from a cutting torch.

- **Struck-against accident.** This accident occurs when a part of the body strikes against something. A typical example of a struck-against accident is a hand slipping off a wrench under tension, and the hand then striking an object.

- **Contacted-by accident.** Examples of this type of accident include a splash from a chemical or perhaps contact by a loose and live electrical wire.

- **Exposure accident.** This accident results from a harmful dose of a chemical or toxic substance—carbon monoxide, welding fumes, or paint thinner, for example.

- **Strain/overexertion accident.** Examples of this type of accident include a back injured while lifting, a shoulder that becomes sore while pulling, or a wrist sore from bending.

Accident Investigation

1.36 All accidents are the result of multiple causes. When an accident occurs, it is important that an immediate investigation take place to gather the facts necessary to keep it from happening again. Company management investigates accidents—usually the first-line supervisor working in the department in which the injury took place. Keep in mind that the investigator is looking for fact (multiple causes or contributing factors)—not fault. If you are asked questions concerning an accident, cooperate with the investigation by answering questions truthfully and to the best of your ability.

1.37 Figure 1-7 shows a typical accident investigation report form. The investigation focus on what happened, why it happened, how any injuries occurred, and how the company can keep the accident from happening again.

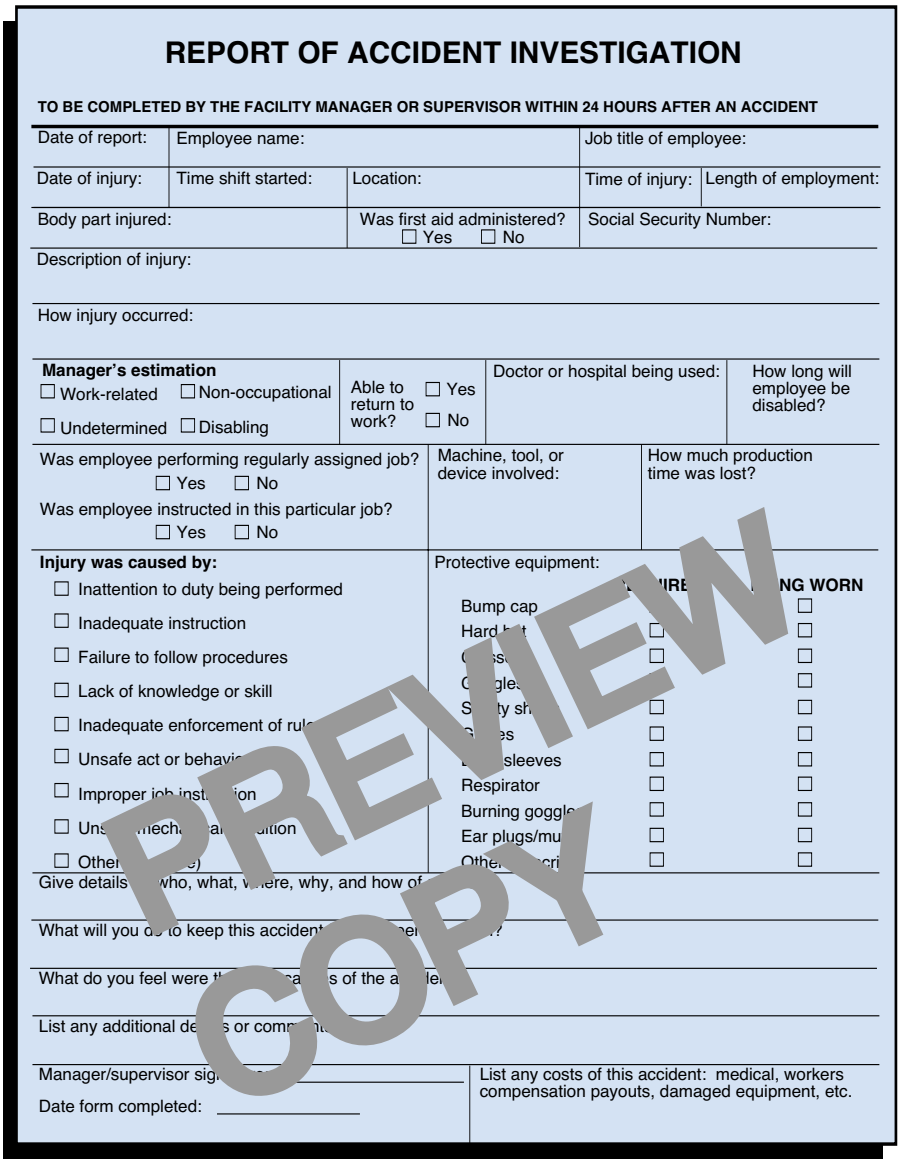
1.38 Once an investigation is completed, it is possible to correct those conditions that were responsible for the accident. Perhaps more training is needed, a machine guarding improvement must be made, or a new part or device needs to be ordered. Following up on the findings of the investigation can keep the same thing from happening again. Keep in mind that nothing is gained when any accident or injury goes unreported and uncorrected.

Handling Emergencies

1.39 Your facility must prepare and plan for emergencies. Examples of emergencies include fires, medical emergencies, weather emergencies, and chemical spills. All employees should be informed of the company's plans for handling such emergencies.

1.40 One important aspect of fire protection consists of having an adequate supply of carefully placed portable fire extinguishers. Although

Fig. 1-7. Typical accident investigation report form



REPORT OF ACCIDENT INVESTIGATION

TO BE COMPLETED BY THE FACILITY MANAGER OR SUPERVISOR WITHIN 24 HOURS AFTER AN ACCIDENT

Date of report:	Employee name:		Job title of employee:	
Date of injury:	Time shift started:	Location:	Time of injury:	Length of employment:
Body part injured:		Was first aid administered? ☐ Yes ☐ No	Social Security Number:	

Description of injury:

How injury occurred:

Manager's estimation ☐ Work-related ☐ Non-occupational ☐ Undetermined ☐ Disabling	Able to return to work? ☐ Yes ☐ No	Doctor or hospital being used:	How long will employee be disabled?

Was employee performing regularly assigned job? ☐ Yes ☐ No Was employee instructed in this particular job? ☐ Yes ☐ No	Machine, tool, or device involved:	How much production time was lost?

Injury was caused by:

- ☐ Inattention to duty being performed
- ☐ Inadequate instruction
- ☐ Failure to follow procedures
- ☐ Lack of knowledge or skill
- ☐ Inadequate enforcement of rul
- ☐ Unsafe act or behavi
- ☐ Improper job inst on
- ☐ Uns echa ition
- ☐ Other)

Protective equipment:

	IRE	NG WORN
Bump cap		☐
Hard	☐	☐
	☐	☐
Gogle		☐
S ty sh	☐	☐
es	☐	☐
sleeves	☐	☐
Respirator	☐	☐
Burning goggle	☐	☐
Ear plugs/mu	☐	☐
Othe cri	☐	☐

Give details who, what, where, why, and how of

What will you do to keep this accident

What do you feel were th s of the a le

List any additional de s or comm

Manager/supervisor sig

Date form completed: _____

List any costs of this accident: medical, workers compensation payouts, damaged equipment, etc.

you should be trained in fire prevention basics, never become involved in fighting a fire that endangers you. This job should be left for the professionals. Your plant probably also relies on a sprinkler system as part of its fire protection system. Check around the plant for emergency maps that identify the locations of exits, fire-fighting equipment, gas shutoffs, and the escape paths you should take in the event of a fire. If you cannot find such information, ask your supervisor.

1.41 Proper evacuation of a facility is important for saving lives. In a fire or other emergency, knowing the safest and quickest way out of a building is vital. Evacuation routes should be posted. Your company probably conducts periodic drills with all employees.

1.42 Even though your plant probably has a medical department to handle medical emergencies, you and your fellow employees should be trained in first aid and CPR (cardio-pulmonary resuscitation) techniques. If your company does not presently offer such courses, discuss the possibility with your supervisor.

1.43 For natural emergencies, preplanning is essential. As an example, in earthquake zones, equipment and materials must be stored in a way that will prevent their movement during a quake. You should be informed of necessary procedures for protection during earthquakes, tornadoes, or any other weather-related emergencies.

1.44 If you work with chemicals, spills are always a possibility. If you cause or discover a spill, do not attempt to clean it up unless you have been specifically trained to do the job. Rather, report any spills to your supervisor immediately. Spill training includes proper clean-up and disposal procedures, use of personal protective equipment, and compliance with federal, state, and local environmental codes.

Safety Off the Job

1.45 Strange as it might seem, you are safer on the job than you are off it. The moment you leave the plant, your chances of being injured or killed triple. Statistics show that the most dangerous place to be is in an automobile. For this reason, many employers now give driver education and driver retraining courses. If one is available to you, take advantage of it.

1.46 Following a few simple rules can save lives and prevent many injuries in automobiles.

- Wear your seat belt.
- Stay calm and attentive when you are driving. Remember, your car is a machine. It can be as dangerous as any one at work if you do not use it wisely.
- Make sure you are in the right condition to handle a machine. Medicine used to relieve the effects of a cold or allergy can make you sleepy. Alcohol and other drugs slow down your responses, even when they do not make you feel groggy.
- Do not cut in and out of traffic in an effort to save a minute of time, or drive fast for the thrill of it.

1.47 The next most dangerous place, after the automobile, is your own home. Falls injure more people than any other home accident. Fire also accounts for a good part of the toll. People who have their own workshops at home or who use snow blowers or power lawn mowers are often among those seriously injured.

1.48 Safety is not a “sometimes” thing. Everything you learn about working safely on the job is something to remember when you get into your car and when you get home.