CHAPTER 1

The Safety and Health Manager

Everyone wants a safe and healthful workplace, but what each person is willing to do to achieve this worthwhile objective can vary a great deal. As a result, the management of each firm must decide at what level, along a broad spectrum, the safety and health effort will be aimed. Some managers deny this responsibility and attempt to leave the decision to employees. This strategy seems to square with hallowed principles of personal freedom and individual responsibility. But such a denial of responsibility by management results in a decision by default, and usually the result is a relatively low level of safety and health in the workplace.

Is the foregoing an indictment on the judgment of the individual worker? Not really, because without a commitment on the part of management, the worker usually is unable to build safety into his or her job station single-handedly. The behavior of the worker is the most important determinant for his or her safety, but behavior alone cannot make a dangerous job safe. Furthermore, even if a given worker has a strong inclination to be careful and to guard his or her health, there are plenty of production motivations and other quite natural incentives to undermine safe attitudes when management has not made a commitment to safety and health.

One person, usually designated as safety director or industrial hygienist, sets the tone of the safety and health program within a firm. In fact, right at the start, it says something about the commitment of management when a firm decides to designate a person by title to the responsibility of safety and health. But naming someone safety director or manager of safety and health is just a beginning step. Many such persons have little authority and have been largely ignored by management and worker alike, especially in the past. It was not unusual for a safety director's work to be typified by public relations activities, such as posting motivational signs and compiling statistics. These are still important functions, but much more responsibility for this function is now recognized.

The year 1970 changed the history of worker safety and health in general and the safety manager's role in particular. The landmark change that year was the passage of the Occupational Safety and Health Act that created the federal Occupational Safety and Health Administration (OSHA). The federal OSHA agency was given the

authority to establish mandatory standards that would have a dramatic impact on the role of the typical safety director of those times. Chapter 4 discusses this impact in detail, but the balance of this chapter discusses the enlarged role of the person within a firm charged with industrial safety and health.

The field of occupational health has probably benefited even more from OSHA than has the field of occupational safety. Prior to OSHA, responsibility for occupational health rested principally upon the plant nurse. In addition, the plant nurse had little authority to influence policy or even to take action to prevent hazards. Prior to OSHA, the plant nurse was chiefly concerned with first aid, after the fact, and physical examinations, not with hazard abatement and prevention.

In describing the functions of today's executive charged with the safety and health responsibility, this text will use the designation safety and health manager, recognizing the dual nature of the job. Also, the term manager envisions the enlarged scope of responsibility, which includes analysis of hazards, compliance with standards, and capital investment planning, in addition to the conventional functions described earlier. The purpose of this book is to provide tools and guidelines to safety and health managers to help them execute the broad scope of their duties.

Dealing with applicable standards is one of the greatest challenges facing today's safety and health manager. Since only 10% of the standards generate 90% of the activity, safety and health managers need guides to the important parts of the standards. Frequently cited standards should receive prime attention because they indicate areas in which industries are having difficulty complying or areas to which enforcement agencies are giving a great deal of attention. In either event, safety and health managers have a need to know these frequently cited standards so that they can bring their facilities within compliance. Information technology has made this task easier, and today's safety and health manager can take advantage of the full text of OSHA standards on the Internet by accessing the OSHA website. Besides the frequency of citation, safety and health managers need to know the "why" behind the standards. Until the safety and health manager learns what hazards a particular standard is intended to prevent, he or she will have a difficult time persuading either management or employees that a given situation needs correction. In addition, national inspection statistics have been categorized and consolidated by chapter into a graph identifying the percentage of citations applicable to the materials in the chapter.

A REASONABLE OBJECTIVE

Top management sometimes turns a deaf ear to the pleas of the safety and health manager for plant improvements. But the safety and health manager is sometimes a crusader with a one-track mind. Any safety and health manager who feels that elimination of workplace hazards is an indisputable goal is naïve. In the real world, we must choose among the following:

1. Hazards that are physically infeasible to correct
2. Hazards that are physically feasible, but are economically infeasible to correct
3. Hazards that are both physically and economically feasible to correct

Many hazards are physically infeasible to correct. An example is the airplane that took off from LaGuardia airport on January 15, 2009. During take-off, both engines were disabled by what is thought to have been birds entering the engine. This hazard is

currently impossible to eliminate because of the current mechanics of jet engines. However, millions of people fly every year, taking this risk. Other hazards include exposure to radiation during X-ray procedures. Although precautions are taken, it is impossible to completely eliminate exposure to undesired radiation.

Other hazards are physically feasible to correct, but economically infeasible. Consider the crosswalks on a university campus. There is always the chance that someone will be struck by an automobile while in the crosswalk. The hazard can be eliminated through construction of elevated walkways, gates, or other mechanisms. However, owing to the cost, inconvenience, and low probability of accident, these measures are generally reserved for only the busiest of crosswalks.

Other hazards are physically and economically feasible, and should be corrected. Technology has led to safety innovation in the auto industry, such as air bags and antilock brakes, which are considered indispensable and included on every automobile. In reality, every hazard must fall into one of these categories.

Until the safety and health manager comes to grips with this reality, he or she cannot expect to enjoy the approval of top management. Some safety and health managers have faced this reality on the surface, but within their hearts they may resent the attitudes of top executives who are unwilling to support their efforts to eliminate all workplace hazards. However, this resentment is unjustified because it is an unrealistic and naïve strategy to attempt to eliminate all hazards.

It may be surprising to some readers to discover that this book, which is supposed to be about safety and health, does not really advocate the elimination of all workplace hazards. Such a goal is unattainable, and to reach for it is poor strategy because it ignores the need for discriminating among the hazards that *can* be corrected. To see how such a naïve strategy is not even in the interest of safety or health, consider Case Study 1.1.

CASE STUDY 1.1

A safety and health manager receives three suggestions from three different operating personnel as follows:

1. Install a drain to remove water that occasionally collects around the die-casting area.
2. Post a warning sign that advises forklift truck drivers to slow down.
3. Improve sanitation by cleaning the rest rooms more frequently.

There is a safety or health rationale for the correction of all three of these problems. Should they be corrected?

Some managers would accept the safety and health rationale as *all they need* to begin action to correct the problems listed in Case Study 1.1. But this would be a naïve response. More data are needed to decide what to do. While busying the plant maintenance department to correct the foregoing three problems (which may or may not be consequential), a serious electrocution or respiratory hazard may be going unchecked or maybe even unnoticed. By reacting to every hazard or do-good suggestion that happens to arise, the safety and health manager may be missing opportunities to have a really significant impact on worker safety and health. At the same time, such overreaction

may also be deteriorating the safety and health manager's credibility with top management. Even the law does not call for the elimination of all hazards, just the ones that are "recognized." Therefore, let it be clearly understood that our objective is to eliminate unreasonable hazards, *not all hazards* in the workplace. The goal of this book, then, is to assist the safety and health manager in (1) detecting hazards and (2) deciding which ones are worth correcting. The goal is an ambitious one, and this book certainly claims no breakthroughs for solving this difficult problem. However, any light that can be shed on the mystery of which hazards are most significant and which standards, among the thousands, are most critical is sorely needed by safety and health managers everywhere.

SAFETY VERSUS HEALTH

This chapter has already implied that early "safety directors" did not emphasize health problems. It is essential that today's safety and health manager give sufficient attention not only to safety hazards but also to health hazards which are steadily gaining in importance as new data about industrial disease are being uncovered.

What really is the difference between safety and health? The words are so common that almost everyone has a firm image of the concept of safety versus the concept of health. There is no question that machine guarding is a safety consideration, and that airborne asbestos is a health hazard. But some hazards—such as those associated with paint spray areas and welding operations—are not so easy to classify. Some situations may be both a health *and* a safety hazard. This book will draw the following line between safety and health:

> Safety deals with acute effects of hazards, whereas health deals with chronic effects of hazards.

An acute effect is a sudden reaction to a severe condition; a chronic effect is a long-term deterioration due to prolonged exposure to a milder adverse condition. Everyday concepts of health and safety fit this definition, which separates the two. Industrial noise, for instance, is usually a health hazard because it is usually the long-term exposure to noise levels in the range 90 to 100 decibels that leads to the permanent damage. But noise can also be a safety hazard because a sudden acute exposure to impact noise can *injure* the hearing system. Many chemical exposures have both acute and chronic effects and thus are both safety and health hazards.

Industrial hygienists, those who concentrate on health hazards, are known by their sophisticated instruments and scientific expertise. These tools are necessary to the industrial hygienist because of the tiny effects they must measure in order to determine whether a chronic hazard exists. By contrast, the safety specialist, instead of being an expert with precise scientific instruments, usually has more industrial process experience and practical on-the-job knowledge. This difference in backgrounds may generate some confrontation between safety professionals and health professionals—though they should be partners, they sometimes compete.

The bases of competition between safety and health professionals are classics: young versus old, new versus old, and education versus experience. Safety professionals

are usually older and have more industrial experience; their career field is more traditional and more entrenched in industrial organizations. Health professionals are typically younger, have more college education, and occupy newer job positions. In the twenty-first century, however, the distinctions between the career safety professional and the career health professional are disappearing.

It is difficult to say whether safety hazards or health hazards are more serious. Safety professionals can point to fatalities on the job and feel a sense of urgency in protecting the worker from imminent danger from accidents. Industrial hygienists use sophisticated meters and pumps to test for microscopic, insidious, and unseen hazards that can ultimately be just as lethal as a falling crane.

There are probably more occupational health fatalities than safety fatalities, but the statistics will not reflect this difference because the health fatalities are delayed and often are never diagnosed.

Another problem with identifying health hazards is that the signs of occupational illness are often identical to common symptoms arising from normally occurring illnesses encountered off the job. For instance, a common cold causes respiratory congestion, headaches, and perhaps fever. These same symptoms could also be the result of a dangerous exposure to a toxic chemical or other occupational hazard. The industrial hygienist is tasked with sorting out these symptoms and identifying occupational hazards to be controlled. Considerable expertise is required to do this, and the problem is often more subtle than that of the person charged with controlling common safety hazards alone.

ROLE IN THE CORPORATE STRUCTURE

Most safety and health managers wear several hats, especially in smaller firms. Often, they are responsible for security; some are also personnel managers, and even more frequently they report to the personnel manager. This is a fairly natural arrangement in that it emphasizes the importance of worker training, statistics, job placement, and the industrial relations aspect of safety and health. The growing importance of engineering to workplace safety and health, however, strains the placement of the safety and health manager within the personnel department, which traditionally has little interaction with engineering.

The safety and health manager is virtually never associated with the purchasing function, but one of the first goals of the safety and health manager should be to obtain some input into the purchasing process. Used-equipment dealers, even new-equipment dealers, often have bargain-priced machines, compressors, tractors, forklifts, and other pieces of equipment that fail in some way or another to meet minimum safety standards. The purchasing agent usually is not knowledgeable in safety and health standards and is easy prey for these dealers because the price is right. What is needed is a knowledgeable person to check specifications and prevent the costly purchasing error of buying equipment that does not meet current safety and health standards. When standards change, another category of equipment sometimes becomes obsolete, and the safety and health manager should warn the purchasing department when these changes occur.

One role of the safety and health manager is as a liaison with government agencies, a condition brought about by the arrival of OSHA. Some safety and health managers have a dual responsibility for environmental protection activities. Sometimes the safety and

health manager is considered a staff member in the legal department. This arrangement stresses an adversarial role and is not recommended because it tends to detract from both workplace safety and health and from constructive relations with enforcement agencies.

A related field is consumer product safety. The Consumer Product Safety Commission (CPSC) is a federal agency whose enabling legislation is obviously patterned after OSHA's. The Product Safety and Liability Act was passed the year after the passage of the OSHA Act, and the wording of the two laws is remarkably similar. Although both fields consider the safety of machines and equipment, the CPSC concentrates on the responsibility of the manufacturers of products, whereas OSHA concentrates on the responsibility of the employer who places products into use in the workplace.

In 1984, in a shocking disaster in Bhopal, India, at least 2500 civilians were killed in a single industrial accidental release of deadly methyl isocyanate gas. Without doubt, this incident had its impact on public policy in the United States. Because of its close relationship to worker safety and health, the responsibility for compliance with Environmental Protection Agency (EPA) requirements is often made a part of the duties of the safety and health manager. Chapter 5 reveals more of this relationship between safety inside and safety outside the plant.

In the first decade of the twenty-first century, an increased awareness of global warming raised public consciousness of threats to the environment in general. Tobacco smoking was driven further from hazardous exposure to the public with the help of state and municipal legislated prohibitions. Progressive legislation mandating "green engineering" was aimed at reducing the use of carbon fuels and their contribution to the global warming problem. Adding to the concern for the environment was the threat of declining supplies of petroleum and other carbon energy sources. Not only do these shortages threaten the environment, but they also affect profitability. The summer of 2008 saw huge spikes in prices for these commodities, providing even more impetus for reduction in their usage. Many firms are experiencing bottom line cost savings through their environmental protection efforts. The challenges of environmental protection and energy consumption are closely intertwined, and they both impact the field of safety and health management. This book will address these relationships as it explores global warming, green engineering, and petroleum conservation from the perspective of the safety and health manager. Competence in these areas is proving to be a point of differentiation and competitive advantage for companies excelling in environmental protection.

RESOURCES AT HAND

The demands for training materials, the need for ideas for hazard correction, and the importance of the latest interpretations of standards guarantee that the successful safety and health manager will not try to work alone, insulated from the career field. A variety of resources have arisen to meet these needs of the safety and health professional.

Professional Certification

Safety and health managers can establish themselves with their peers as well as with their employers by achieving professional certification. This requires relevant work experience, letters of recommendation, and an examination. Education is also required,

but there is partial tradeoff between education and experience. Safety professionals should apply to

Board of Certified Safety Professionals of America
2301 W. Bradley Avenue
Champaign, IL 61821
(217) 359-9263
www.bcsp.org

Health professionals should apply to

American Board of Industrial Hygiene
6015 West St Joseph, Suite 102
Lansing, MI 48917
(517) 321-2638
www.abih.org

The examinations are quite difficult and the background screening process is stringent. Few people qualify for certification in both fields. Industry, government, and the public have come to recognize the professional designations: CSP for Certified Safety Professional and CIH for Certified Industrial Hygienist. To an increasing extent, professional certification, such as CSP or CIH, is mandatory for filling certain required positions. Many states are reforming their Workers' Compensation laws, and some are including requirements for accident prevention plans for "extra hazardous" workplaces (Zumar, 1993). These plans must be formulated by personnel or consultants who have such qualifications as the CSP or CIH credential. One objective of this book is to prepare students to complete the CSP and CIH examinations successfully.

Professional Societies

Two professional societies are foremost in the career field of occupational safety and health:

American Society of Safety Engineers (ASSE)
520 N. Northwest Hwy
Park Ridge, IL 60068
(847) 699-2929
www.asse.org

American Industrial Hygiene Association (AIHA)
3141 Fairview Park Drive, Suite 777
Falls Church, VA 22042
(703) 849-8888
www.aiha.org

Leading journals in the field, *Professional Safety* and the *American Industrial Hygiene Association Journal*, are published by these two professional societies, respectively. Each holds annual conferences, and local chapters often conduct seminars and workshops on topics of current interest.

A somewhat narrower but influential organization is

American Conference of Government Industrial Hygienists (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
(513) 742-2020
www.acgih.org

An important committee of this organization is

Committee on Industrial Ventilation
1330 Kemper Meadow Drive
Cincinnati, OH 45240

This committee's publication *Industrial Ventilation* (Industrial Ventilation, 1978) is probably the best recognized manual of recommended practice in the field of ventilation.

Systems Safety

Until the mid-twentieth century, industrial safety was generally considered to be a worthwhile goal while accomplishing production objectives, but it did not receive the emphasis that product and process design, quality, and reliability received. Safety was considered something that could be achieved by being careful, but it did not require the kind of life-cycle planning and design that other aspects of the production process required. In the mid-1950s, a movement began in the aerospace industry in California to consider safety as a system to be planned for and considered in every step of the process. In 1964, the System Safety Society was chartered in California, and the concept soon spread throughout the United States and to foreign countries. Systems safety is considered essential in fields where an accident can be catastrophic, such as in airlines, aerospace, and hospitals. The Systems Safety Society encourages research and development of new safety technologies in the field of industrial safety management, as well as product safety and related fields. Systems safety recognizes that achieving safety requires more than being careful and following safety rules and observing safe behavior patterns. In many ways the systems safety concept is parallel to the central premise of this book—safety requires more than just following rules and involves engineering and hazards analysis and planning—concepts that will be covered in more detail in Chapter 3. More information about the Systems Safety Society can be found at

System Safety Society
P.O. Box 70
Unionville, VA 22567-0070
540-854-8630
www.system-safety.org

National Safety Council

More than a professional society, the National Safety Council (NSC) is an international, charitable, public service organization. The Council's headquarters are

National Safety Council
1121 Spring Lake Dr.
Itasca, IL 60143-3201
(800) 621-7615
(630) 285-1121
www.nsc.org

The NSC is broad in scope and encompasses all kinds of safety, not just occupational safety. The membership of the NSC consists principally of organizations and businesses. Founded in 1913, it has been in existence for over 100 years and was recognized by the U.S. Congress in 1953.

Corporate membership in the NSC affords many benefits for the safety and health manager. The Council is the principal focal point for information about safety hazards. The library at the Council's national headquarters contains a wealth of information, and although it is open to the public, companies who are members of the Council have special privileges for copying services and research. Each year, the Council publishes comprehensive summaries of accident statistics in its book *Injury Facts* (Injury Facts, 2016).

Standards Institutes

The age of OSHA enforcement has brought increased recognition of the national standards-producing organizations. The following are the most prominent among these organizations:

American National Standards Institute (ANSI)
25 West 43rd Street
New York, NY 10036
(212) 642-4900
www.ansi.org

National Fire Protection Association (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
(617) 770-3000
www.nfpa.org

American Society of Mechanical Engineers (ASME)
Two Park Avenue
New York, NY 10016-5990
(800) 843-2763
www.asme.org

American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive
P.O. Box C 700
West Conshohocken, PA 19428-2959
(610) 832-9585
www.astm.org

These organizations have standing committees that invite public comment and prepare voluntary standards for occupational safety and health. At the outset, OSHA issued many existing standards produced by these organizations, designating such existing standards as representing the "national consensus." Most of OSHA's national consensus standards are derived from either ANSI or NFPA standards.

Trade Associations

If a problem pertains to a specific industry or type of equipment, an association of manufacturers may be called upon to furnish safety and health data. Some people decry such use of trade-association data as biased, but many careful studies of safety and health problems have been performed by trade associations. The following are useful associations in this regard:

1. American Foundrymen's Society (AFS)
2. American Iron and Steel Institute (AISI)
3. American Metal Stamping Association (AMSA)
4. American Petroleum Institute (API)
5. American Welding Society (AWS)
6. Associated General Contractors of America (AGCA)
7. Compressed Gas Association (CGA)
8. Industrial Safety Equipment Association (ISEA)
9. Institute of Makers of Explosives (IME)
10. National Electrical Manufacturers Association (NEMA)
11. National Liquefied Petroleum Gas Association (NLPGA)
12. National Machine Tool Builders Association (NMTBA)
13. Scaffolding, Shoring, and Forming Institute (SSFI)
14. American Society for Industrial Security (ASIS)
15. Society for Chemical Hazard Communication (SCHC)

National trade associations are especially useful in providing audiovisual training materials if one is willing to accept the fact that such materials also serve to promote the industry's products.

Government Agencies

A program of free consultation is usually provided by state agencies and in some states by private consulting firms. There is an understandable reluctance to call a government agency for help with a safety-standards problem, but the purpose of these consultation agencies is to assist in increasing workplace safety, not to write citations. In most states, the consultation function is performed by an agency that is completely separate from the enforcement agency. In states that have comprehensive state plans, with one

agency responsible for both enforcement and consultation, care is taken to maintain confidentiality of records.

The National Institute for Occupational Safety and Health (NIOSH) has a wealth of research data on the hazards of specific materials and processes. NIOSH uses these data to write criteria for recommended new standards. In addition to its research function, NIOSH acts as a source of technical information for questions about safety and health. NIOSH can be contacted through their hotline or online:

NIOSH
Hotline: (800) CDC-INFO
www.cdc.gov/niosh

OSHA itself can be of value to the safety and health manager seeking information. Some safety and health managers would never consider calling OSHA to discuss a problem for fear of precipitating an inspection. However, problems can be posed in a hypothetical setting, and OSHA personnel can understand the need for keeping such questions hypothetical. Most OSHA personnel will be glad to furnish whatever answers are available in the interest of encouraging employers to keep their facilities safe and healthful. OSHA has also opened the doors to its national training institute in Des Plaines, Illinois, for training the general public in "voluntary compliance." On the OSHA website, users can search all available information and tools by keywords or phrases. This will return applicable standards and interpretations as well as tools. While in the actual standards themselves, the user can also search for keywords or phrases. When more assistance is needed, OSHA can be contacted through the regional offices, local OSHA area offices, or applicable state assistance agencies, also available on the website. OSHA also has a hotline for immediate assistance or reporting:

OSHA
U.S. Department of Labor
Occupational Safety & Health Administration
200 Constitution Avenue, NW
Room Number N3626
Washington, D.C. 20210
Hotline: (800) 321-OSHA
www.osha.gov

The Consumer Product Safety Commission (CPSC) is a government agency tasked to ensure the safety of products going to end consumers. Besides its familiar role of protecting the public from dangerous toys and other consumer products, the CPSC has jurisdiction over the safety or products that may be used in industrial plants and other workplaces. The CPSC has a website and hotline for product safety information and reporting of product safety issues:

CPSC
Hotline: (800) 638-2772
www.cpsc.gov

SUMMARY

Safety and health management is a career field that has been both enhanced and made more challenging by the institution of the federal agency OSHA. In many respects, the field of safety and health management has outgrown the enforcement of standards imposed by OSHA. OSHA has had its impact upon the field, but increased hazards awareness and the rise of technical know-how to reduce these hazards has brought recognition to the profession of industrial safety and health management. The current chapter has provided a brief introduction to this career field and to some of the organizations and boards that have given the field both identity and assistance in fulfilling its mission. Chapter 2 proceeds to describe how safety and health managers can go about performing their responsibilities within their organizations. Chapter 3 addresses the principal goal of the safety and health manager—the reduction of workplace hazards—describing four basic approaches to solving this problem. OSHA has had such an impact on the field that it deserves a chapter of its own; Chapter 4 describes OSHA in general, including both the positive and the negative aspects of this controversial agency. The remaining chapters address specific hazard categories, advising safety and health managers on what to do to eliminate hazards while complying with established standards. Any factual data or approach strategies that can assist the manager in understanding the hazard mechanisms and in tackling the most significant problems first will be helpful, even if many questions are left unanswered.

EXERCISES AND STUDY QUESTIONS

1.1 Why are some safety and health standards cited more frequently than others?
1.2 What else, besides frequency of citation, does a safety and health manager need to know about safety and health standards?
1.3 Should safety and health managers attempt to eliminate all workplace hazards? Why or why not?
1.4 Identify three categories of hazards with respect to feasibility of correction.
1.5 Describe at least two disadvantages of overreacting to minor hazards in the workplace.
1.6 How does a safety hazard differ from a health hazard?
1.7 Name three safety hazards and three health hazards.
1.8 Name some chemicals that are both health and safety hazards.
1.9 Name some physical agents that can be both health and safety hazards.
1.10 Why does an industrial hygienist need more scientific instruments to evaluate hazards than does a safety specialist?
1.11 Which type of hazard appears to be more grave: safety or health?
1.12 What aspects of the safety and health manager's job are related to the personnel department?
1.13 What disadvantage is associated with placing the safety and health manager within the personnel department?
1.14 What disadvantage can be seen in placing the safety and health manager within a firm's legal department?
1.15 Compare the missions of the following two federal agencies: OSHA and CPSC.

1.16 What national, but nongovernmental, safety organization is officially recognized by an act of the U.S. Congress?
1.17 What is ANSI, and what relationship does it have to the field of safety and health?
1.18 Compare the missions of OSHA and EPA. Why might the same person within a given industrial plant have the responsibility for dealing with both agencies?
1.19 What is the federal government's telephone hot line for technical information on safety and health? What agency responds to this number?
1.20 What event occurred in 1970 that enhanced the authority of the safety director in a typical industrial firm?
1.21 Compare attitudes before and after the passage of the OSHA Act with regard to occupational health and the job of the plant nurse.
1.22 Describe the 1984 tragedy that changed public awareness and public policy for both the environment and public safety and health.
1.23 Discuss instances where environmental protection can have a positive impact on a firm's bottom line.
1.24 Identify four environmental issues that have received major public emphasis in the first decade of the twenty-first century.
1.25 Explain the relationship between "green engineering" and "global warming."
1.26 Identify some industries in which "system safety" has been recognized as essential. Explain why.
1.27 In the 1960s, a movement within the field of safety began to recognize the benefits of life-cycle planning and design. What name has been used to identify this movement? What society has been recognized to be dedicated to this movement?
1.28 What is the difference between a chronic effect and an acute effect?
1.29 Using occupational noise exposure, what would be an example of a safety hazard versus a health hazard?
1.30 Why is it more difficult to diagnose occupational health fatalities than occupational safety fatalities?
1.31 What is a good source for audiovisual training materials for safety and health managers?
1.32 What can be a disadvantage of using national trade association audiovisual training materials?
1.33 What government agency is the source for many new recommended standards for OSHA?
1.34 Which government agency offers training to the general public in "voluntary compliance" to safety and health standards?
1.35 Which two organizations are the source for most national consensus standards?
1.36 Why would a safety and health manager be reluctant to call OSHA and what have they done to address this?
1.37 In what industry did the safety movement take a dramatic turn in the mid-1950s?
1.38 In the mid-1960s what safety society was chartered in California and quickly moved throughout the nation and to foreign countries?

RESEARCH EXERCISES

1.39 Check the Internet for web pages for the National Safety Council, the American Society of Safety Engineers, and the American Industrial Hygiene Association. What resources to help the safety and health manager can be found through these websites?

1.40 Browse the Internet to learn about current requirements to become certified as a CSP. Also check requirements to become a CIH.

1.41 Find the home pages of several CIHs on the Internet. Check to see whether any job openings are listed on the Internet for CIHs.

1.42 Find the home pages of several CSPs on the Internet. Check to see whether any job openings are listed on the Internet for CSPs.

1.43 Do research to determine the percentage of CSPs working in various industries. What percentage are consultants? What percentage are government employees? What percentage are employed by insurance companies?

1.44 Go to the OSHA website and check out the Voluntary Protection Program (VPP).

1.45 Check the latest news releases from OSHA as posted on their website.

1.46 Explain the three principal reasons that health hazards are more difficult to identify than safety hazards.