

CHAPTER 1—HISTORICAL PERSPECTIVES

ANSWERS—Quiz 1

1. b
2. a
3. a
4. b
5. b
6. a
7. a
8. c
9. c
10. b
11. b
12. a
13. Student will list one of the following: spinning jenny, 1764; power loom, 1784; cotton gin, 1792.
14. Student will list two of the following: Substitution of mechanical energy for animal sources of power, particularly steam power through the combustion of coal. Substitution of machines for human skills and strength. Invention of new methods for transforming raw materials into finished goods, particularly in iron and steel production and industrial chemicals. Organization of work into large units, such as factories or forges or mills. This made direct supervision of the manufacturing process possible, as well as an efficient division of labor.
15. The lag between the emergence of new working methods and the creation of health and safety standards was probably inevitable. The tools of mass production had to be invented and applied before anyone could begin to imagine the problems they might create. In turn, the problems had to be known before corrective measures could be considered, tested, and proved. Thus, for some time, deaths and injuries were accepted as part of industrial progress—one of the costs of doing business.
16. Possible answers include: Clean Air and Clean Water Acts, Toxic Substance Control Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, Superfund Amendments, and Reauthorization Act.
17. Failure to comply with health and safety requirements can mean citations, which at the least create administrative costs but could also lead to serious monetary penalties. The federal government can also institute criminal sanctions against employers and even against individual managers who ignore or disregard the law.

18. Correct use of machinery; correct use of protective equipment; the need to report defects in equipment, defects in procedures, and potentially dangerous situations such as near-miss accidents.
19. Taking the measures necessary for the safety and health of workers, bearing in mind technical progress; evaluating hazards and instructing workers accordingly; setting up protection and prevention services within the workplace, possibly by enlisting competent external services or persons; organization of first aid; evacuation of workers in the event of serious damage.
20. In summary, here are six reasons for working hard to prevent accidents and occupational illnesses: Needless destruction of life and health is morally unjustified. Failure to take necessary precautions against predictable accidents and occupational illnesses makes management and workers morally responsible for those accidents and occupational illnesses. Accidents and occupational illnesses severely limit efficiency and productivity. Accidents and occupational illnesses produce far-reaching social harm. The safety movement has demonstrated that its techniques are effective in reducing accident rates and promoting efficiency. Recent state and federal legislation mandates management responsibility to provide a safe, healthful workplace.

ANSWERS—Quiz 2

1. b
2. a
3. a
4. a
5. b
6. c
7. a
8. c
9. d
10. b
11. Possible answers include: Emerging global markets have intensified the need for international standardization. Worldwide technological innovations result in changes to industrial methods and organizations that threaten worker and consumer safety. The rapid pace of change in science and technology is outstripping standards development in most countries. Developing countries' efforts to industrialize means they may downplay safety and health regulations in favor of rapid economic growth.
12. ISO 9000 provides general guidelines for applying ISO 9001-9003. ISO 9001 provides a quality system model for quality assurance in design, development, production, installation, and servicing. ISO 9002 provides a quality systems model for quality assurance in production and installation. ISO 9003 offers a quality systems model for quality assurances in final inspection and testing. ISO 9004 provides guidelines for quality management and quality system elements.

13. The basic goal of the ISO 9000 series is to give companies guidelines for achieving consistency and uniformity of products or services through the supply chain from primary supplier to the final customers. Companies can use ISO 9000 as an international benchmark against which they can measure their own performance.
14. This post-Industrial Revolution era is called the Information Age.
15. The Three E's of Safety are engineering, education, and enforcement. Their effect on industry today is as follows: engineering can prevent accidents, employees could be reached through education, and safety rules can be established and enforced.
16. The death calendar showed that in Allegheny County, Pennsylvania, in 1906 industrial accidents accounted for an average of nearly two deaths per day throughout the year. The number of crippling injuries was far higher.
17. The underlying objective of the National Safety Council was standardization by providing an avenue of communication, an exchange of views, and various solutions to common problems in accident prevention.
18. The student's answer should provide a general understanding of the key points in this chapter, and may provide specific examples such as the decrease in death/injury rates. Other factors might include decline of several high-risk industries and a shift toward the economy's service sector.

ANSWERS—Case Study

1. Substitution of mechanical energy for animal sources of power, particularly steam power through the combustion of coal; substitution of machines for human skills and strength; invention of new methods for transforming raw materials into finished goods, particularly in iron and steel production and industrial chemicals; organization of work into large units, such as factories or gorges or mills. This made possible direct supervision of the manufacturing process and an efficient division of labor. Paralleling these production changes were the altered technologies employed in agriculture and transportation.
2. Fellow servant rule—employer was not liable for injury to an employee that resulted from negligence of a fellow employee; contributory negligence—employer was not liable if the employee was injured due to his own negligence; assumption of risks—employer was not liable because the employee took the job with full knowledge of the risks and hazards involved.
3. Union and management should have an equal number of members serving on the committee; the union should elect or select the members who will serve as their representatives on the committee; the role of the committee chairperson should be rotated between labor and management or the committee may choose to have co-chairs; management should consider appointing committee representatives who have enough authority to make real decisions about projects or about spending money to avoid creating delays or unnecessary interference; the committee should be able to recommend corrections or request assistance with any occupational safety and health concern or issue;

union and management should have an equal voice in the decision-making process and in planning committee actions and agendas; there should be a method or procedure established to monitor and evaluate the effectiveness of the joint committee activities.

4. Management should issue a policy statement directly related to safety and health. Usually these statements cover issues like implementing committee decisions or responding quickly to employee concerns or complaints; the committee should be funded by the employer with committee members being compensated at their normal rate of pay for time spent on committee activities or projects; the committee should have the right to request assistance, such as environmental monitoring, from qualified specialized personnel; the committee should have access to useful information in company files, such as monitoring or exposure records, accident and injury reports, and records of lists of chemicals used in the workplace.

CHAPTER 2—THE SAFETY, HEALTH, AND ENVIRONMENTAL PROFESSIONAL

ANSWERS—Quiz 1

1. a
2. a
3. a
4. b
5. e
6. c
7. d
8. c
9. b
10. d
11. The phrase “shift to the subtle” is used in the chapter to describe a trend toward fewer acute hazards in the modern workplace and greater, more “subtle” hazards, such as chemical exposures, ergonomic risks, and other hazards that can be more elusive to safeguard against and more expensive than other more recognized hazards. Over time, the SH&E professional will need to shift focus to protecting workers in more specialized industries. Increasingly, more research is being dedicated to subtle health effects such as endocrine disruption and reproductive effects on workers exposed to chemicals.
12. Building a relationship with nongovernmental organizations (NGOs) is important to the SH&E professional in any organization because NGOs play a critical role in highlighting worker safety issues in developing countries, significant environmental issues, and newly discovered product safety concerns.

13. Generally speaking, the SH&E professional plays several critical roles in business and government settings. Some of these roles include: to save lives, to avoid harm to workers, to maintain productivity, and to encourage retention of productive workers by enhancing the perception that working at a particular facility is consistent with the individual's desire for a safe and healthy working environment.
14. In an organization, the responsibilities of the SH&E professional are more important than those of someone who deals only with assets or equipment because the SH&E professional touches the overall lives and health of the workers. When worker health issues are compromised by corporate costs demands it places a strain on the organization.
15. As discussed in the text, the SH&E professional serves as a "product steward" in that his or her experience with exposure assessment and risk communication can be invaluable to the product development process as well as in bringing new technologies from the laboratory to the workplace. This type of involvement by the safety professional helps to ensure the safety of a product throughout its life-cycle--from laboratory, through manufacturing, and finally to use by customers and consumers.

ANSWER—Case Study

1. Economic issues, ethical issues, effects of globalization, consulting and expert witness roles.
2. Specialized training; more generalist training to understand different tasks; more business training to link the professional with the goals of the business.
3. Technology changes, better control of risks, product stewardship roles, indoor air quality, regulatory agency influences, effects of ergonomics.

CHAPTER 3—SAFETY CULTURE

ANSWERS—Quiz 1

1. a
2. a
3. a
4. b
5. b
6. a
7. Student may give simple definition: the common and generally accepted way people behave in the workplace, as it relates to safe behavior. Safety Culture requires continuous improvement in three areas: 1) Environmental conditions, 2) Personal Factors including attitudes and beliefs and 3) Behavioral Factors. The culture is a group's feeling that everyone has to cooperate for safety, and that everyone in the group will try to behave in a way that protects the safety of

each other and takes responsibility for his/her safety as well as for others. If the workers believe in safety for themselves and others and then they act like safety matters in their everyday work, that is a workplace that has an active safety culture. Or student may give a more academic definition: the growth of a shared perception that the collective efforts of all employees and managers should preserve the health of all, reducing the potential that harm will come to any of the members of the workplace community

8. The ten elements of the Safety Culture Maturity model are:
 1. Management commitment and visibility
 2. Communication
 3. Productivity verses safety
 4. Learning organization
 5. Safety resources
 6. Participation
 7. Shared perception about safety
 8. Trust
 9. Industrial relations and job satisfaction
 10. Training

9. The Do not want to know

Messengers are trained	1
New ideas are welcome	3
Responsibility is shirked	1
New ideas present problems	2

10. Chaudron’s four major components, as discussed in the text problem, include for this change to begin
 1. Determine levels, goals and strategies – There are four levels of organizational change
 - a. Shaping and anticipating the future (level 1)
 - b. Defining what business(es) to be in and the core competencies of each (level 2)
 - c. Structurally changing or reengineering processes (level 3)
 - d. Incrementally improving the processes (level 4)
 2. Identify measurement systems – determine what type of measuring process (or processes) prior to the change to after the change to determine the effectiveness. The include but are not limited to:
 - a. Perception surveys of perceived culture change
 - b. Daily observations
 - c. Downstream measurements such as frequency of losses
 - d. Loss severity
 - e. Productivity numbers
 - f. Quality measurements
 3. Determine basic options – there are three or four basic options which can be implemented

- a. The whole organization is involved from the start and is intensively and simultaneously working on making the change
 - b. Divisions or business units for at their own pace and generally use an incremental approach
 - c. All business units implement the same program using the same time schedule
 - d. Use of a pilot project in a business unit of division so that the entire organization can learn from success as well as failure of process
4. Determine implementation and organizational change strategies by:
- a. What the management pays attention to, measures and controls on a regular basis
 - b. Reaction to critical incidents
 - c. The allocation of scarce resources
 - d. The use of role model, teach and coach techniques
 - e. The allocation of rewards and plentiful resources
 - f. The recruitment and selection of employees

ANSWERS—Quiz 2

1. a
2. a
3. a
4. b
5. c
6. List the five (5) levels of the safety culture maturity model?
 - a. Pathological
 - b. Reactive
 - c. Calculative
 - d. Proactive
 - e. Generative
7. A safety culture requires managers to work on earning workers' trust for safety programs by communicating effectively; focusing on safety, not just production output, as a goal; consistently acting in favor of safety when choices are made; and involving employees in developing programs for change.
8. Any of the following keys can be used to answer the question:
 - a. Keep the data anonymous
 - b. Decide before surveying how to analyze the data so that the proper demographic data for stratification can be included
 - c. Survey response rates will be highest – about 80% to 90% - if the survey is proctored by an outside party and taken on company time
 - d. Involve influential employees in the survey effort
 - e. Have management communicate the purposes and anonymity of the survey

- f. Use survey tools that are psychometrically sound and have good reliability and validity
 - g. Never survey without subsequently providing feedback and modifications based in the results
9. Increased job satisfaction is just as important to safety as the elimination of physical hazards in the workplace. Good job satisfaction shows a significant relationship with safety performance. Job satisfaction is related to trust and trust is positively related to safe job performance.
10. *Reporting culture* – reporting errors and near misses
- Just culture* – no blame – trust is present and individuals are encouraged or rewarded for providing safety information but also where there is a clear distinction between acceptable and unacceptable behavior
- Flexible culture*—one that can take on different forms but that shows evidence of moving from a conventional, hierarchical mode to a flatter structure
- Learning culture*—one that has the ability and the desire to draw correct conclusions from its safety information and seeks to implement major improvements when the need is evident.

ANSWERS—Case Study

1. In the simplest terms, a safety culture means the common and generally accepted way people behave in the workplace, as it relates to safe behavior. Safety Culture requires continuous improvement in three areas: 1) Environmental Conditions, 2) Personal Factors including attitudes and beliefs and 3) Behavioral Factors. The culture is the group's feeling that everyone has to cooperate for safety, and that everyone in the group will try to behave in a way that protects the safety of each other and takes responsibility for his/her safety as well as for others. If the workers believe in safety for themselves and others and then they act like safety matters in their everyday work, that is a workplace that has an active "safety culture." OR student might give a more academic answer: Growth of a shared perception that the collective efforts of all employees and managers should preserve the health of all, reducing the potential that harm will come to any of the members of the workplace community.
2. There are many ways to describe what comprises a safety culture including: 1) Management commitment and visibility, 2) Communication, 3) Productivity vs Safety, 4) Learning organization, 5) Safety resources, 6) Participation, 7) Shared perception about safety, 8) Trust, 9) Industrial relation and job satisfaction and 10) Training.. Some of the key participants in the development of a safety culture are the chief executive officer, the plant management team, the front-line supervisors, the workers, the union, the purchasing officials, and the safety professional.
3. Earning workers' trust for safety programs is the central role of a safety culture and includes: communicating effectively; focusing on safety as a goal and not just a production output; consistently acting in favor of safety when choices are

made; involving employees in developing programs for change and fostering the concept of being my brother's keeper. Answer might also include: providing a well-designed and clean work setting, clear communication within the plant; encouragement for employee safety feedback; positive values expressed to workers by management; a sense of moral and ethical concern toward worker health and safety.

4. The SMART system components include:
 - 1) Specific - concrete step by step actions needed to make a goal successful, 2) Measures - observable results from the goals accomplished, 3) Attainable - goals that are possible and done at the right time with sufficient attention and resources, 4) Realistic - the probability of success is good, given the resources and attention given, 5) Time-bound - the goal is achieved within a specific time period in a way that takes advantage of the opportunity before it passes by.

CHAPTER 4—REGULATORY HISTORY

ANSWERS—Quiz 1

1. a
2. b
3. b
4. b
5. a
6. b
7. c
8. c
9. d
10. b
11. d
12. The Occupational Safety and Health Act was signed into law December 29, 1970.
13. The Bureau of Labor Statistics (Department of Labor) is responsible for compiling injury and illness statistical data.
14. The three members of the Occupational Safety and Health Review Commission are appointed by the president and confirmed by the Senate.
15. The two levels of adjudication within OSHRC are the administrative law judge (ALJ) and the three-member commission.
16. Federal, state, and local government employees are excluded from coverage under the OSHAct unless the applicable jurisdiction has implemented a law requiring coverage.

17. The purpose of these programs is to emphasize the importance of, encourage the improvement of, and recognize excellence in employer-provided, site-specific occupational safety and health programs.
18. The three VPP programs are (1) the Star program for the most fully compliant sites, (2) the Merit program for sites that aspire to achieve OSHA Star status, and (3) the Demonstration Project program for sites where alternate means of compliance are being demonstrated.
19. Employers must maintain the following records: (1) log and summary of occupational injuries and illnesses (OSHA Form 300); (2) supplementary record of each occupational injury or illness (OSHA Form 301 or state form); and (3) annual summary of the total number of occupational injuries and illnesses, which must be posted by February 1 of the following year and remain posted until March 1.
20. The legislature must not only appropriate an adequate budget, but in many cases must pass legislation enabling the state agency to carry out all the functions incorporated in the state plan.
21. List any three of the following of OSHA's major areas of authority:
 - to promulgate, modify, and revoke safety and health standards;
 - to conduct inspections and investigations, and to issue citations, including proposed penalties;
 - to require employers to keep records of safety and health data;
 - to petition the courts to restrain imminent danger situations;
 - to approve or reject state plans for programs under the Act;
 - to provide training and education to employers and employees;
 - to consult with employers, employees, and organizations regarding prevention of injuries and illnesses;
 - to grant funds to the states for identification of program needs and for plan development, experiments, demonstrations, administration, and operation of programs; and
 - to develop and maintain a statistics program for occupational safety and health.
22. Each employer covered by the OSHAct has the general duty to furnish each employee with employment and places of employment free from recognized hazards causing or likely to cause death or serious physical harm.
23. OSHA's inspection priorities are as follows:
 - investigation of imminent dangers,
 - catastrophic and fatal accidents,
 - investigation of employee complaints,
 - programmed high-hazard inspections, and
 - re-inspections.

ANSWERS—Quiz 2

1. a
2. a
3. a
4. b
5. a
6. a
7. c
8. b
9. b
10. a
11. The four pieces of environmental legislation are as follows:
 - Resource Conservation and Recovery Act (RCRA)
 - Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund)
 - Clean Air Act
 - Clean Water Act
12. Labels, safety data sheets, and worker training are the three information components of a hazard communication program.
13. The plan should include a list of the major workplace fire hazards and their proper handling and storage procedures, potential ignition sources (such as welding, smoking and others), their control procedures, and the type of fire protection equipment or systems that can be used to control a fire.
14. The three primary characteristics are as follows:
 - limited or restricted means of entry or exit
 - large enough to enter and perform assigned work
 - not designed for continuous occupancy
15. Flammable, toxic, irritant and/or corrosive, and asphyxiating are the four categories of hazardous atmospheres that may be encountered in confined spaces.
16. The standard helps safeguard employees from the unexpected startup of machines or equipment or release of hazardous energy while performing servicing or maintenance.
17. The standard is intended to prevent or minimize the consequences of a catastrophic release of toxic, reactive, flammable, or explosive highly hazardous chemicals from a process.
18. The Mine Safety and Health Act was signed into law November 9, 1977.
19. The primary functions are as follows:

- to develop and establish recommended occupational safety and health standards
- to conduct research experiments and demonstrations related to occupational safety and health
- to develop educational programs to provide an adequate supply of qualified personnel to carry out the purposes of the OSH Act

20. Factors include any of the following:

- the number of worker fatalities, a work site catastrophe, or a large number of similar injuries or illnesses
- a violation that results in high rates of injuries or illnesses
- the organization has an extreme history of workplace violations
- the employer seriously disregarded workplace safety and health responsibilities
- a large number of violations is found at the work site

ANSWERS—Case Study

1. The OSH Act empowers OSHA to grant variances from the standards, providing that doing so would not degrade the purpose of the Act. OSHA can grant two types of variance—temporary and permanent.
2. Temporary variances are generally concerned with compliance with new standards. Employers may apply for an order granting a temporary variance if they can establish the following:
 - They cannot comply with the applicable standard because they do not have the personnel, equipment, or time to construct or alter facilities.
 - They are taking all available steps to protect employees against exposure covered by the standard.
 - Their own programs will bring them into compliance with the standard as soon as possible.
3. Variance orders can be granted if OSHA finds that employers have demonstrated, by a preponderance of evidence, that they will provide a place of employment as safe and healthful as the one that would exist if they complied with the standards.
4. Employer applications for a permanent variance order must contain at least the following:
 - name and address of the applicant,
 - address(es) of the place(s) of employment involved,
 - description of the countermeasures used or proposed to be used by the applicant,
 - statement showing how such countermeasures would provide a place of employment that is as safe and healthful as that required by the

standard for which the variance is sought,

- certification that the employer has informed employees of the application,
- any request for a hearing, and
- description of how employees were informed of the application and of their right to petition for a hearing.

CHAPTER 5—LEGAL AND REGULATORY ISSUES FOR THE SAFETY MANAGER

ANSWERS—Quiz 1

1. a
2. a
3. b
4. a
5. a
6. d
7. d
8. d
9. a
10. d
11. Generally speaking, the safety professional needs to know and understand the relationship between the safety professional and the federal and state government agencies as how safety powers are divided between the two. The safety professional also needs to be familiar with key regulatory terms and understand who the potential adversaries are within his or her industry.
12. a. law—created by a state legislature or by the U.S. Congress, a law is the basis on which administrative agencies can take action.
b. rule (or regulation)—an administrative agency’s published decision concerning policies or actions that implement an existing law. A rule may be required by law or it may be delegated by Congress as an option to be taken at the discretion of the administrative agency.
c. policy—often appears in a published statement, speech, or announcement in which the agency’s leader directs employers to undertake to ensure the worker protections that the agency seeks.
d. guidance document—may be used to send a message to affected firms to get to a particular outcome. These documents are not binding, so the agency is free to create exceptions or to allow other ways to apply the rule.
e. precedent—relates to final decisions or judicial opinions made by judges or administrative hearing officers in cases that are applied later to other cases based on similar fact patterns.

- f. standards—often technical documents published by organizations such as the American National Standards Institute (ANSI). Compliance with standards is typically voluntary; although standards can be incorporated into law and in some cases, precedent set by the judicial system could make compliance with a standard mandatory.
13. A safety professional well versed and educated in the safety regulations that apply to his or her industry can have a positive effect on the organization by stimulating extra effort toward reducing accidents in the workplace. Understanding the rules that apply to the workplace is a great beginning toward avoiding safety violations in the first place.
14. a. other than serious violation—that which has a direct relationship to job safety and health, but would not likely cause death or serious injury.
b. serious violation—one where there is substantial probability that serious injury or death could result and the employer knew, or should have known, of the hazard.
c. willful violation—one in which the employer knowingly commits or commits with indifference to the law.
d. repeated violation—one that violates any standard, regulation, rule, or order, where upon reinspection, a similar violation can bring a fine up to \$70,000 for each such violation.
e. failure to abate prior violation—one that may bring a civil penalty of up to \$7,000 per day the violation continues beyond the prescribed abatement date.
f. de minimis violation—violations of standards that have no direct or immediate relationship to safety or health.
15. It is the responsibility of OSHA to write and promulgate legally enforceable standards. In doing so, OSHA works with the National Institute for Occupational Safety and Health (NIOSH), which conducts scientific research and technical assessments of risks on various safety and health issues. In other words, NIOSH provides research and technical assistance to OSHA and recommends standards for OSHA adoption based on that research.

CHAPTER 6—LOSS CONTROL PROGRAMS

ANSWERS—Quiz 1

1. a
2. b
3. b
4. d
5. a
6. c

7. A hazard is any existing or potential condition in the workplace that, by itself or by interacting with other variables, can result in deaths, injuries, property damage, and other losses.
8. Debarment prevents a person who has violated certain laws, e.g., serious environmental violators, from performing any responsible job at a federal contractor's facilities. Disqualification means the company is "blacklisted" and cannot be a successful bidder for federal contracts.
9. Analysis may uncover hazards that (1) may have been overlooked in the layout of the plant or building and in the design of machinery, equipment, and processes; (2) may have developed after production started; or (3) may exist because original procedures and tasks were modified.
10. The three kinds of hazard control measures are administrative, engineering, and personal protective equipment.
11. A balanced approach looks at such weaknesses as inadequate training and education, improper assignment of responsibility, unsuitable equipment, or failure to fund hazard control programs. Because managers are responsible for the design, implementation, and maintenance of systems, management errors can result in system defects.
12. While making regular or random rounds of the plant, management or safety staff members record both the number and type of safety defects and unsafe practices they observe. Observations should be made at different times of the day and throughout the various parts of the plant. Their observations can be converted to a report showing specific unsafe conditions and which supervisors and foremen need help in enforcing good work practices.

ANSWERS—Quiz 2

1. b
2. a
3. a
4. b
5. d
6. b
7. Although useful for understanding human behavior, these models do not consider the interaction between the worker and the other parts of the system.
8. The four main components are as follows:
 - scheduling and performing periodic maintenance functions
 - keeping records of service and repairs
 - repairing and replacing equipment and equipment parts
 - providing spare parts control.
9. The three areas are as follows:

- unsafe practices or procedures, either the worker or another person
 - situational factors (e.g., facilities, tools, equipment, and materials)
 - environmental factors (e.g., noise, vibration, temperature extremes, illumination)
10. Some causes of situational problems are as follows:
- defects in design
 - poor, substandard construction
 - improper storage of hazardous materials
 - inadequate planning, layout, and design
11. The company can distribute publicity in-house that reinforces safety, both on and off the job (e.g., posters, pamphlets, press releases, and billboards). Employee-generated, original posters can be effective in personalizing safety efforts. Nearly every organization has some sort of in-house newsletter or magazine that is either given to employees at work or sent to their homes. This provides an excellent forum for safety education and safety program promotion since both employees and families see it.

ANSWERS—Case Study

1. An off-the-job safety program is a logical extension of the occupational safety program and meets the same needs: reduction of costly employee absences due to incidents, injuries, or deaths; and commitment to employee well-being.
2. According to National Safety Council estimates, three out of four deaths and more than half of the injuries suffered by workers occur off the job. Annual production time lost due to off-the-job injuries averages 120 million days compared with 75 million days lost by workers injured in the workplace.
3. Benefits from expanding a safety program to cover off-the-job safety include:
 - reduction in lost production time and operating costs from both on-the-job and off-the-job injuries
 - increased employee interest in the on-the-job safety program due to efforts in off-the-job safety
 - better public relations

CHAPTER 7—SAFETY, HEALTH, AND ENVIRONMENTAL AUDITING

ANSWERS—Quiz 1

1. b
2. a
3. b
4. c
5. a, c

6. Auditing is a methodical examination that involves analyses, tests, and confirmations of a facility's procedures and practices to verify whether it complies with legal requirements and internal policies to evaluate whether it conforms with good safety, health, and environmental practices.
7. Inquiry and observation are the two data-gathering methods most often used in Step 1 of the audit process.
8. Basically, working papers are the auditor's field notes to keep track of audit procedures undertaken, results achieved, and items requiring further information.
9. In transporting auditing programs to overseas locations, companies will have to consider the following:
 - diverse local regulatory systems
 - travel and logistical requirements
 - language and cultural barriers
 - different levels of company ownership and control
10. The three categories of audit procedures are as follows:
 - Inquiry: The auditor asks questions both formally and informally; audit questionnaires are common examples of formal inquiry.
 - Observation: The auditor collects evidence through what can be seen, heard, or touched. Because physical examination is often one of the most reliable sources of audit evidence, observation is a significant aspect of most S/H/E audits.
 - Verification testing: The auditor focuses on either the management system or physical equipment and performs systems tests. For example, retracing data would uncover errors in recording original data. Other common types of testing include verifying paper trails and equipment checks.

ANSWERS—Quiz 2

1. a
2. b
3. a
4. d
5. b
6. Companies have established S/H/E auditing programs to:
 - determine and document compliance status
 - improve overall S/H/E performance at operating facilities
 - assist facility management
 - increase the overall level of safety, health, and environmental awareness

- accelerate the overall development of S/H/E management control systems
 - improve the safety, health, and environmental risk management system
 - protect the company from potential liabilities
 - develop a basis for optimizing safety, health, and environmental resources
 - assess facility management's ability to achieve S/H/E goals
7. Background information includes regulatory requirements, corporate policies, and facility information (organization, processes, layout).
 8. Four indicators of strengths and weaknesses are as follows:
 - clearly defined responsibilities
 - an adequate system of authorizations
 - capable personnel
 - documentation
 - internal verification
 9. Three ways of gathering audit evidence are record reviews, examination of available data, and interviews with facility personnel.
 10. Environmental audits can be internal (conducted by the company) or external, conducted by an outside firm, and serve many purposes. They may be conducted to avoid costly cleanup charges, avoid or prevent fines, promote good labor relations, enhance a company's public relations with the community, and function as a "report card" on a firm's environmental management program.

ANSWERS—Case Study

1. Inadequate performance in the safety, health, and environmental arenas can have severe consequences for both an organization and its management. A company responsible for environmental damage is at risk for fines, legal liabilities, and/or economic losses.
2. In some organizations, the avoidance of generating potential legal liability from audit reports is a serious concern. For these entities, the draft audit report should be handled with the law department or with outside legal counsel, and copies should be carefully controlled so that the future claims of privilege may be asserted. Even in organizations that do not have a policy protecting the legal status of audit reports, the auditors' choice of wording for an audit report carries serious legal consequences. Selecting what words are to be used when the written audit report describes a dangerous condition or risk scenario will be an important part of the audit team leader's responsibilities.
3. The company's lawyers should advise about the federal and state laws that give specific incentives to make reports of detected violations and the corrective actions that follow. Some state laws encourage audits by granting a legal privilege against the use of an audit report in civil litigation or by granting legal

immunity from prosecution. But some federal agencies have important limits and qualifications. It is important to consult with experienced legal counsel.

CHAPTER 8—WORKERS' COMPENSATION

ANSWERS—Quiz 1

1. a
2. a
3. b
4. a
5. a
6. a
7. b
8. c
9. a
10. d
11. d
12. Workers and their families may suffer a loss of earnings and additional expenses.
13. An “occupational disease” is any disease arising out of and in the course of employment.
14. The three basic types of benefits are: loss of income, medical payments, and rehabilitation.
15. Social Security and private disability programs provided as part of fringe benefit packages by some employers are two other sources of medical benefits.
16. The four classes are temporary total disability, temporary partial disability, permanent partial disability, and permanent total disability.
17. The injured employee need not be completely helpless nor unable to earn a single dollar at a job. The person’s limitations need only preclude competing in the open job market and be such that no stable job market exists for a worker with this disability.
18. This policy covers the experience rating and the retrospective rating systems.
19. The FELA gives an employee the right to charge an employer with negligence and prevents the employer from pleading the common law defenses that the worker is a fellow servant or assumes part of the risk. Moreover, the act substitutes the principle of comparative negligence for the common-law concept of contributory negligence.
20. These proceedings are a drawback because the decision about whether benefits should be awarded for permanent partial or total disability (and how much) is based primarily on the worker’s inability to work and therefore may offer a strong incentive for the person to put off rehabilitation. Also, in many

compromise settlements, the employer's (or insurer's) main goal is to pay an agreed amount of money and prevent any future liability for needs arising from the injury. These settlements work against an all-out effort to restore the worker to full health and productivity.

ANSWERS—Quiz 2

1. b
2. a
3. a
4. b
5. a
6. d
7. c
8. d
9. b
10. b
11. d
12. The first piece of legislation was passed in Maryland in 1902.
13. These defenses are assumption of risk, negligence of fellow employees, and contributory negligence.
14. A “scheduled injury” is an injury listed in the law, such as the loss of specific bodily members; a “nonscheduled” injury is more general, such as a back or head injury.
15. They are the direct payment system and the agreement system.
16. A worker is assigned to vocational rehabilitation if medical treatment fails to restore him or her to the job held when he or she was injured.
17. If a worker is permanently partially disabled, he or she has attained maximum improvement without full medical recovery. He or she has benefited from medical and rehabilitative services as much as possible, but still suffers from a partial disability.
18. Under the class rating system, all employers engaged in similar business operations within a state pay the same rate per \$100 of payroll.
19. To be adequate, the program should replace lost earnings (present and projected, including fringe benefits), less those expenses such as taxes and job-related transportation costs that would not continue. The worker should share a proportion of the loss so as to provide incentives for rehabilitation and accident prevention. A two-thirds replacement ratio is set forth in most state statutes.
20. Under the dual capacity doctrine, an injured employee can sue an employer for an injury—even if it arose out of and in the course of employment—if the injury was caused by the employer's product or a service available to the public.

ANSWERS—Case Study

1. The “course of the employment” aspect of this test refers primarily to the time frame of the injury. Virtually every jurisdiction holds that employees are considered within the course of employment—barring unusual circumstances or unreasonable conduct—from the moment they step onto the employer’s premises at the start of the workday to the moment they leave at the day’s end. Although the definition of “course of the employment” appears to be relatively simple to apply, it has often proved difficult. For example, what is meant by the term premises? In some cases, a worker is not attached to particular premises.
2. Even though an injury occurs off premises, as in travel to and from work, the employee may be compensated if a sufficient employment relationship can be established. Perhaps the employer paid the worker for the time or expense of travel or provided a company vehicle for transportation. In these circumstances, the travel time to and from a worker’s home may be included in the course of employment.
3. The “arising out of” portion of the test is intended to establish a causal relationship between employment and the injury. For example, an employee cannot simply suffer a heart attack while at work and expect compensation. The person must show that the heart attack arose out of the employment (i.e., the stress and strain or exertion of the employment caused the heart attack and it was not a spontaneous breakdown of the cardiovascular system). The degree of employment relationship required varies from state to state, but generally the hazard-causing injury must be peculiar to the particular employment or be increased by the employment before the injury could be said to “arise out of the employment.”
4. Two additional theories have been developed to determine whether or not an injury meets the “arising out of” test: the “actual risk doctrine” and the “positional risk doctrine” or “but for” test. The “actual risk doctrine” requires that the hazard resulting in the injury be a risk of the particular employment regardless of whether it is a risk to which the general public is exposed. According to the “positional risk doctrine,” if the employment places the worker in a position where he or she is injured (“but for” the employment, the injury would not have occurred), the injury is considered to “arise out of the employment.”

CHAPTER 9—IDENTIFYING HAZARDS

ANSWERS—Quiz 1

1. b
2. b
3. a
4. b

5. b
6. d
7. d
8. a
9. a
10. c
11. c
12. The same problems that create the waste or cause the damage could also, under the right conditions, cause injuries.
13. The term for type of analysis is job safety analysis or JSA.
14. Identifying the hazards and potential injuries is the most critical step because only an identified problem can be eliminated.
15. Four factors to avoid are time consuming backtracking and repetitions, long walks between items, unnecessary interruptions of the production process, and distraction of employees.
16. TWA is the time-weighted average concentration for a normal eight-hour day or 40-hour week. It is believed that nearly all people can be exposed day after day to airborne concentrations at these limits without adverse effect.
17. Setting the action level at one-half the PEL helps to protect employees from overexposure with a minimum of burden to employers.
18. He or she must first eliminate or reduce an employee's fear and anxiety by establishing a good rapport with the individual.
19. The inductive method uses observable data to predict events and outcomes within a particular system. It postulates how the component parts of a system will contribute to the success or failure of the system as a whole. It considers a system's operations from the standpoint of its components, their failure in a specific operating condition, and the effect of that failure on the system.
20. The first type of report is the emergency report. It is filed without delay when a critical or catastrophic hazard is probable. This report would include any items marked IA or IIA. A periodic report covers those unsatisfactory nonemergency conditions observed during the planned periodic inspection. It should be filed within 24 hours of the inspection and can be initial, follow-up, final, or a combination of all three. A summary report lists all items of previous periodic reports for a given time.

ANSWERS—Quiz 2

1. a
2. b
3. a
4. b
5. a

6. a
7. d
8. b
9. c
10. c
11. d
12. The six elements are identify hazards, assess risks, develop and evaluate control measures, make decisions and assume residual risk, implement control measures, and evaluate effectiveness of control measures.
13. For maximum benefit, the hazard analysis should be done while the new equipment is in the planning stages.
14. Critics believe that continuous inspections are erratic and superficial, that they do get into out-of-the-way places, and that they miss too much.
15. The five questions include the following: (1) What items need to be inspected? (2) What aspects of each item need to be examined? (3) What conditions need to be inspected? (4) How often must items be inspected? (5) Who will conduct the inspection?
16. Time-weighted average (TLV-TWA), short-term exposure limit (TLV-STEL), and ceiling (TLV-C).
17. The three phases are the problem definition phase, the problem analysis phase, and the solution phase.
18. The six main outcomes are to determine direct causes, to uncover contributing causes, to prevent similar injuries, to document facts, to provide information on costs, and to promote safety.
19. A good hazard inspector has knowledge of the organization's incident experience, familiarity with incident potentials and with the standards that apply to his or her area, and the ability to make intelligent decisions for corrective action. A good inspector also can handle personnel and situations diplomatically and has an understanding of the organization's workflow, systems, and products.
20. The acute effects of a toxic substance involve a short exposure time period. They can be the result of sudden and severe exposure, during which the substance is rapidly absorbed. They can also be related to an incident that disrupts ordinary processes and controls. Chronic effects are usually the result of exposure over a long period of time. When the chemical is absorbed more rapidly than the body can eliminate it, the chemical begins to accumulate in the body. If the level of the contaminant is relatively low, the effects may go unnoticed, even if they are serious and irreversible, for long periods because of latency, the time between exposure and the observed health effect.

ANSWERS—Case Study

1. Fault trees are reverse images of positive trees, which show the requirements for success. Fault trees show ways troubles can occur. An analyst selects an undesired event, then diagrams in tree form all the possible factors that can contribute to the event. The branches of the tree continue until they reach independent factors. The analyst can then determine probabilities for the independent factors occurring. A fault tree requires a thorough analysis of a potential event and involves listing all known sources of failure. It is a graphic model of the various parallel and sequential combinations of system component faults that can result in a single, selected system fault. Fault trees are used more often than positive trees, which can easily become lists of “shoulds” and sound moralizing.
2. Analytical trees have three advantages: (1) They result in a thorough analysis without wordiness. Using known data, the analyst can identify the single and multiple causes capable of inducing the undesired event. (2) They make the analytical process visible, allowing for the rapid transfer of hazard data from person to person, group to group, with few possibilities for miscommunication. (3) They can be used as investigative tools. By reasoning backward from the incident (the undesired event), the investigator is able to reconstruct the system and pinpoint those elements responsible for the undesired event.

CHAPTER 10—INCIDENT INVESTIGATION, ANALYSIS, AND COSTS

ANSWERS—Quiz 1

1. b
2. a
3. b
4. b
5. a
6. a
7. c
8. b
9. c
10. d
11. c
12. The four Ms are man, machine, media, and management.
13. A safety and health professional should verify the supervisor’s findings because the supervisor may attempt to cover up a supervisory error.
14. The four factors are: (1) the study of all working areas to detect and control or eliminate hazards; (2) the study of all operating procedures and administrative controls; (3) education, training, and discipline to minimize human factors; and (4) thorough investigation and analysis.

15. The four contributing incident factors are equipment, environment, people, and management.
16. These two categories are incidents resulting in work injuries or illnesses and incidents causing property damage or interfering with production.
17. This is the cost of paying employees who stopped working to watch or assist after the incident or to talk about it, or who lost time because they needed the equipment damaged in the incident or because they needed the output or the aid of the injured worker.
18. A new worker does not produce at the same level as an experienced worker and his or her decreased productivity indirectly increases costs for the company.
19. A narrative description and incidence sequence provides information about the exact location of the incident and the investigator should include any maps or diagrams with his or her report. It also provides a complete, specific breakdown of the sequence of events leading to the injury or near-miss; what objects or substances were involved in the incident; conditions such as temperature, light, noise, and weather; and how the injury occurred and the specific object that was involved in the incident. The description should explain any preventive measures that had been in place and what, if anything, happened after the injury occurred. An investigator should include only the facts and not record any opinions or place blame.
20. There are two types of analysis that can be done. First, an investigator can examine the individual incident to determine the corrective action or actions to prevent further occurrences of this specific sequence of events. Second, the investigator can do a statistical analysis to examine a group of similar occurrences for patterns lending themselves to corrective actions. Over time, statistical analysis can show which corrective actions have been more effective than others.

ANSWERS—Quiz 2

1. b
2. b
3. a
4. b
5. a
6. d
7. a
8. c
9. d
10. b
11. a

12. An unintentional injury is the preferred term for accidental injury in the public health community. It refers to the result of an accident.
13. The dual purpose of an investigation is: first, to identify facts about each injury and the incident that produced it and to record those facts; and second, to determine a course of action to eliminate a recurrence.
14. These categories are: employer characteristics, employee characteristics, characteristics of the injury, a narrative description and incident sequence; characteristics of the equipment, characteristics of the task, time factors, task and activity factors, supervision information, casual factors, and corrective actions.
15. Employers should require the use of a permit system to ensure that workers have the skills to perform their jobs, understand the hazards of any equipment, chemicals, or processes, and know basic safety and emergency procedures.
16. The uninsured medical cost is usually that of medical services provided at the plant dispensary. Reducing the number of incidents could result in lower costs for the plant dispensary.
17. The purpose of a pilot study is to develop average uninsured costs for different classes of incidents that can be applied to future incident totals.
18. Generally, a supervisor should investigate an incident.
19. An investigator may decide to include an estimate of the costs associated with the incident, exposure data that can be used to calculate incidence rates for injuries associated with certain injuries, and management data for use in performance reviews. He or she may also include information required for special studies, such as monitoring corrective action, and information on incident patterns specific to a particular division, company, or industry.
20. A Class 3 incident involves injuries that are not OSHA-recordable (most first aid cases) and less than \$100 in property damage. From a cost perspective, they are the most difficult to analyze because the time lost is likely to occur repeatedly and only for short periods. Also, the injuries can occur so frequently that an undue burden is placed on the supervisor and safety director if a complete report form and data sheet are required for each case.

ANSWERS—Case Study

1. Information that is essential to the analysis includes the average amount of working time lost per trip to the dispensary, the average dispensary cost per treatment, the average number of visits to the dispensary per case, and the average amount of supervisor's time required per case.
2. For organizations with a dispensary, such as Goreman Manufacturing, this information can be determined by taking the following steps:
 - a. Secure an estimate of average working time lost per trip to the dispensary for first aid. Departmental time records should be consulted as they may show the amount of time each worker is absent from the job

while receiving first aid. If so, a random sample of 50 to 100 records of persons known to have received first aid should be selected from different departments. The average time lost per dispensary visit is calculated by adding the absence time for all visits in the sample and dividing by the total number of cases.

- b. If departmental records do not contain this information, assign an investigator to observe a random sample of 50 or more persons visiting the dispensary. To determine average time, add all estimated periods of absence and divide by the total number of persons observed.
- c. Estimate the average cost of providing medical attention for each visit by dividing the total cost of operating the dispensary for a year by the total number of treatments given during the year.
- d. Calculate the average number of visits to the dispensary per case by dividing the number of treatments of Class 3 injuries in a representative period by the number of Class 3 injuries reported during the same period of time.
- e. Calculate the average amount of supervisor's time required per case by observing the amount of time representative supervisors spend working on first aid cases.

CHAPTER 11—INJURY AND ILLNESS RECORD KEEPING, INCIDENCE RATES, AND ANALYSIS

ANSWERS—Quiz 1

1. b
2. a
3. b
4. a
5. b
6. a
7. c
8. d
9. b
10. b
11. a
12. a
13. Answers might include: state compensation authorities, insurance carriers, or other federal agencies such as MSHA or FRA.
14. An incident report should accomplish three things: establish all causes contributing to the incident; reveal questions the investigator should ask to determine all environmental and human causes; and provide a means of accumulating incident data.

15. Self-coding allows keying of data items directly from the form without the extra step of recoding the information for data processing equipment. By using self-coding forms, data-processing equipment can easily be used to enter the information into the system and to produce a variety of summary reports.
16. Monthly summary of injuries and illness and annual report are two types of periodic reports a company may generate to evaluate safety work and to identify principal incident causes.
17. No individual form or set of forms can possibly include all of the information necessary to fully investigate the causes of all incidents. With this in mind, and because long forms are rarely welcomed or accurate, bilevel reporting has arisen. These are additional separate forms used to gather very specific data about a particular type of investigation. This method requires only a minimum of time to fill out the forms in order to generate useful information.
18. Self-employed individuals, partners with no employees, employers of domestics in the employer's private residence for the purpose of housekeeping or child care, employers engaged in religious activities concerning the conduct of religious services or rites are employers and individuals exempt from having to keep OSHA injury and illness records.
19. Answer should be written in essay form, and may touch on the following points: Provide safety personnel with the means for an objective evaluation of their incident problems and with a measurement of the overall progress and effectiveness of their safety program. Identify high incident rate units, plants, or departments and problem areas so extra effort can be made in those areas. Provide data for an analysis of incidents pointing to specific causes or circumstances, which can then be attacked by specific countermeasures. Create interest in safety among supervisors or team leaders by furnishing them with information about their departments' incident experience. Provide supervisors and safety committees with hard facts about their safety problems so their efforts can be concentrated. Measure the effectiveness of individual countermeasures and determine if specific programs are doing the job they were designed to do. Assist management in performance evaluations.

ANSWERS—Quiz 2

1. a
2. a
3. a
4. a
5. b
6. b
7. d
8. c
9. c
10. a

11. d
12. a
13. Incident records furnish many items of interest to employees and posting the following statistics is one of the best ways to maintain employee interest in safety: no-injury records, unusual incidents, frequent causes of incidents, charts showing reduction in incidents, simple tables comparing departmental records.
14. Record keeping is the foundation of a scientific approach to occupational safety. Good record keeping can: (1) help the safety professional by providing a means for objective evaluation of incident problems and a measure of a safety program's overall progress and effectiveness. (2) identify high-incident-rate units, facilities, or departments so that extra effort can be made in those areas. (3) create interest in safety among supervisors or team leaders (4) assist managers in performance evaluation.
15. The record-keeping system discussed in the chapter is just one model that can be used to provide basic methods for record keeping. The system discussed provides a way to keep and analyze records that may be required by the OSHA Act. It takes into account that individual establishments are unique, but provides examples of common forms that may be used to gather basic data and methods and formulas for analyzing that data.
16. Quality control charts are used to help distinguish between random variations, which are "in control," and caused variations, which are "out of control." Managers can use a control chart to concentrate safety efforts on out-of-control variations in the systems. There are basically two important differences in the way control charts are used for safety purposes as opposed to for a manufacturing purpose: (1) if the incident rate falls below the lower control limit it does not make sense to encourage more incidents to return the system to "control" as one would in manufacturing. (2) While a "steady-state" system is ideal from a manufacturing standpoint, steady improvements are expected from an occupational safety and health program.
17. An incident report should: (1) establish all causing contributing to the incident, (2) reveal questions that the investigator should ask to determine all environmental and human causes for the incident, and (3) provide a clear means for accumulating the incident data.
18. Off-the-job disabling injuries have far exceeded on-the-job disabling injuries. Any unscheduled absence of employees can cause production slowdowns and delays, costly retraining and replacement, or costly overtime by remaining employees.
19. Student may discuss a trouble area such as hospitalization for observation, or differentiating a new case from the recurrence of a previous illness or injury. Regardless of the area discussed, student will provide evidence that they understand the issue at hand.

ANSWERS—Case Study

1. Some of the uses for such records are as follows: to provide safety personnel with the means for an objective evaluation of their incident problems and with a measurement of the overall progress and effectiveness of their safety program; identify high incident rate units, plants, or departments and problem areas so extra effort can be made in those areas; provide data for an analysis of incidents pointing to specific causes or circumstances, which can then be attacked by specific countermeasures; create interest in safety among supervisors or team leaders by furnishing them with information about their department's incident experience; provide supervisors and safety committees with hard facts about their safety problems so their efforts can be concentrated; measure the effectiveness of individual countermeasures and determine if specific programs are doing the job they were designed to do; assist management in performance evaluation.
2. Sunrise Enterprises should keep and maintain the following incident reports and injury records: First Aid Report, Incident Investigation Report, Employee Injury and Illness Record, the monthly summary of injuries and illnesses, and the annual report.

CHAPTER 12—OCCUPATIONAL HEALTH PROGRAMS

ANSWERS—Quiz 1

1. a
2. b
3. b
4. a
5. a
6. a
7. b
8. a
9. c
10. b
11. b
12. f
13. Students may answer this question with any valid example. The example in the book is this: Some industrial chemicals, when improperly handled, represent serious hazards to health, property, and the environment. Depending on workplace conditions, the vapor from a chemical can ignite, explode, or, if inhaled, cause symptoms ranging from dizziness to death. Safety precautions can reduce these risks.
14. The basic components of a good occupational health program include the following: maintenance of a healthful work environment through establishing a comprehensive occupational health and safety program; health examinations, including selective baseline and periodic surveillance for employees

- performing particular jobs as required by regulatory standards, fit-for-duty, return to work, and job transfer evaluations; diagnosis and treatment services for occupational injuries and illnesses; case management services; immunization programs; confidential health records kept separate from personnel records; health promotion, education, and counseling; open communication between the company's occupational health personnel and an employee's personal physician.
15. Worker education and improved management techniques are the two main ways safety and health professionals have demonstrated their ability to reduce the rates of accidental injury.
 16. The two kinds of first aid treatment are emergency and prompt attention. Emergency care must be given for immediate, life-threatening conditions. First aid staff provide care until proper medical treatment can be given. Prompt attention is used to treat minor injuries such as cuts, scratches, bruises, and burns. Ordinarily, the injured person would not seek medical attention for these injuries. But by requiring all employees to immediately report for treatment, the company can help reduce workers' infection, disability, and missed diagnoses.
 17. A first-aid program should include: properly trained and designated first-aid personnel on every shift; instructions for calling an ambulance or rescue squad; posted methods for transporting ill or injured employees; posted instructions for calling a physician and notifying the hospital that a patient is en route; first-aid unit and supplies or first-aid kit approved by the health care professional; first-aid manual with procedures; list of reactions to chemicals and routes of exposure; adequate first-aid record system and follow-up.
 18. Simply put, if employees are injured off the job, they are as much a loss to the operations as if they were injured on the job.
 19. Light duty is an adaptation of the employee's original job to reduce the worker's tasks. Limited duty is defined as a new job that is appropriate to an injured worker's skills, interests, and capabilities. It is designed for individuals who cannot return to their original work area and is crated for either temporary or permanent placement.
 20. Marsha will need to equip her first-aid room with the following equipment: examining table, cot for emergency cases, enclosed by movable curtain; dustproof cabinet for supplies; waste receptacle and biohazards-disposable containers; small table; chair with arms and one without arms; magnifying light on a stand; sink and washing facilities; dispensers for soap, towels, cleansing tissues, and paper cups; wheelchair; stretcher; blankets; bulletin boards; beds' appropriate medications in locked cabinet; oxygen and other resuscitating devices to be used by trained personnel.

ANSWERS—Quiz 2

1. a
2. a
3. a

4. b
5. b
6. a
7. b
8. b
9. a
10. c
11. b
12. a
13. The basic objectives of a good occupational health program are to: promote health and protect employees against health hazards in their work environment; facilitate placement and ensure that individuals are assigned work that matches physical and mental capabilities and that they can perform with an acceptable degree of efficiency without endangering their own health and safety or that of their fellow employees; promote adequate health care and rehabilitation of employees injured on the job; monitor the work environment for hazards and abate them; encourage workers to maintain their personal health.
14. First-aid treatment to the eye must be prompt and consists of prolonged irrigation of the exposed eye with low-pressure water.
15. Any victim of severe injury, such as a fall, head injury, spinal injury, or any injury resulting in unconsciousness should be secured to and transported on a rigid spine board with proper restraint for head and neck if they are in a life threatening situation, if not medical care should be provided at the location by professional medical personnel.
16. Periodic health examinations are conducted at intervals during employment to determine the worker's continued compatibility with the job assignment, and whether adverse health effects have occurred that may be attributable to the work or working conditions. A periodic exam permits early detection of highly susceptible individuals and of practice or procedures that workers use to circumvent safety devices and policies.
17. Wellness is way of life that promotes a state of health. Health promotion is defined as activities directed toward increasing the level of well-being and actualizing the health potential of individuals, families, communities, and society.
18. Students are not limited to the following examples and may come up with their own. Primary prevention takes place before disease or illness occurs and consists of programs to increase aware and knowledge of risks. Secondary prevention begins after a condition or disease is present. An example is blood pressure screening or medical surveillance. Tertiary prevention or rehabilitation begins when the disease or condition has stabilized and no further healing is expected. Examples include chronic illness monitoring.

19. The answer is complicated because of the variety of work-related exposure that can occur. Many chemicals, including pharmaceuticals, anesthetic gases, heavy metals, pesticides, and organic solvents can disrupt the menstrual cycle and affect the course of pregnancy or the development of the embryo or fetus. Of particular concern is that many women may not know when they first become pregnant and thereby remain at risk to potential exposure. In 1991, the Supreme Court decided that fetal protection programs were discriminatory toward women, and thereby unconstitutional.
20. Answer may touch upon the following points: reduction in attention span, chronic fatigue, sleep debt, microsleep, substance abuse, gastrointestinal and digestive problems, increased risk of heart attacks, and feelings of isolation and depression. Solutions may include the following: good lighting for shiftworkers, exercising, napping at work, music in the workplace, and hot meals.

ANSWERS—Case Study

1. Some of the problems are reduction in attention span, chronic fatigue, sleep debt, microsleep, substance abuse, gastrointestinal and digestive problems, increased risk of heart attacks, and feelings of isolation and depression.
2. Some of the easy fixes are good lighting for shiftworkers, exercising, napping at work, music in the workplace, and hot meals.
3. Some of the advantages of 12-hour shifts are that they allow management to maximize the amount of time off while still controlling salary costs.
4. The disadvantages of 12-hour shifts include the following:
 - Some jobs are too physically or psychologically demanding to be done for 12 hours.
 - Workers may have trouble staying alert and vigilant for extended periods.
 - Routine overtime is difficult or impossible to schedule.
 - Noise and chemical exposure standards must be modified to reflect the extended exposure period.
 - Pay periods including holiday and overtime pay may have to be recalculated if costs are to be controlled.
 - Older workers may not be able to handle extended hours.

CHAPTER 13—INDUSTRIAL HYGIENE PROGRAM

ANSWERS—Quiz 1

1. b
2. a
3. b, c

4. c
5. b
6. The four classifications of environmental factors or stresses that can cause sickness in workers are chemical, physical, biological, and ergonomic.
7. Examples of physical hazards that might concern an industrial hygienist are excessive levels of ionizing and nonionizing radiations, noise, vibration, and extremes of temperature.
8. Frequency, amplitude, and acceleration are terms typically used in an evaluation of vibration exposure.
9. Occupational exposure and thermal comfort are the two types of exposure limits that are often used as guidelines for temperature-stress evaluations.
10. Risk factors that are frequently identified during ergonomic evaluations include repetitive motions; awkward work positions; excessive amounts of force used to perform jobs; repeated or improper lifting of heavy objects; cold temperatures; and vibration.
11. The American Industrial Hygiene Association defines industrial hygiene as the science and art devoted to the anticipation, recognition, evaluation, and control of environmental factors or stresses arising in or from the workplace which may cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers or among citizens of the community.

ANSWERS—Quiz 2

1. a
2. b
3. a
4. d
5. a
6. Toxicity is the capacity of a chemical to harm or injure a living organism by other than mechanical means.
7. Examples of corrective measures used by industrial hygienists to control health hazards include the following:
 1. substituting safer materials for harmful or toxic ones
 2. changing work processes to eliminate or minimize work exposure
 3. installing exhaust ventilation systems
 4. minimizing impact of a chemical contaminant by reducing time of exposure
 5. practicing good housekeeping (including appropriate waste disposal methods)
 6. providing proper personal protective equipment
8. The common routes of entry into the body for toxic substances are inhalation, skin absorption, ingestion, and injection.

9. The four possible actions that can result from a substance contacting skin are as follows: (1) The skin can act as an effective barrier; (2) the substance can react with the skin and cause local irritation or tissue destruction; (3) the substance can produce skin sensitization; or (4) the substance can penetrate to the blood vessels under the skin and enter the bloodstream.
10. Some sources of biological hazards are bacteria, viruses, insects, plants, birds, animals, and humans.
11. CIH certification is granted when a candidate shows education in the sciences equivalent to college graduation, successful performance in the field for a minimum of five years, recommendation by practicing industrial hygienists, and completion of a written 5.5 hour examination. A completed doctorate in a related physical, biological, or medical science or in a related engineering field can be substituted for two years of the five-year requirement, and a completed master's degree fulfilling the same criteria can be substituted for one year of the five-year requirement.

ANSWERS—Case Study

1. Industrial hygienists can be employed in a consulting capacity.
2. The consultant industrial hygienist is ordinarily called in only when problems arise, and the consultant may not be as familiar with the facility and company personnel as a full-time person would. The extent of this problem can be lessened, however, by scheduling regular industrial hygiene consulting visits to discuss policy issues and inspect the facility during normal conditions.
3. The minimum requirement should be certification (i.e., designation as CIH) and familiarity with the industry. As with other professional services, personal recommendations from satisfied users of consulting services are often the best source for information. In addition to the qualifications of the person being considered as a consultant, resources of his or her firm can also be important, such as the availability of an in-house lab.

CHAPTER 14—ENVIRONMENTAL MANAGEMENT

ANSWERS—Quiz 1

1. a
2. b
3. a
4. d
5. d
6. A value chain is the process by which products (or services) are conceived, produced, marketed, distributed, used, and recycled or disposed.
7. Waste minimization can be accomplished by source reduction and recycling.

8. Source reduction is usually preferable to recycling because it has a lower total effect on the environment.
9. Principle 21 holds that although countries have the right to develop, they have a responsibility not to damage the environment outside their borders. This includes the oceans and Antarctica, as well as other countries.
10. Agenda 21 emphasizes the development of processes and procedures that achieve a balance between the needs of both present and future generations of life on the planet.
11. The SEC has required that publicly traded companies disclose in annual and quarterly financial statements estimates of environmental liability. The SEC's persistence has resulted in improved reporting from industry and an indication that companies are looking closely at their environmental liabilities.
12. The advantages to using analytic tools are as follows:
 - The financial approach is understood by corporate decision makers who might otherwise wrestle with environmental measurements presented in parts per million/billion.
 - Linking corrective action costs to the potential future cost of a problem allows rational choices based on cost-effectiveness between competing demands for limited corrective action funds.
 - By trying to measure impacts (or externalities) rather than outputs, the true cost of an environmental problem is captured. Impacts consider not only the cost of reducing outputs but the social costs to environmental receptors.

ANSWERS—Quiz 2

1. a
2. a
3. a
4. c
5. a
6. b
7. The most important U.S. environmental regulations are the following:
 - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
 - Resource Conservation and Recovery Act (RCRA)
 - Underground Storage Tank Regulations
 - Clean Air Act of 1990
 - Clean Water Act
 - Safe Drinking Water Act

- Toxic Substances Control Act (TSCA)
 - Oil Pollution Act of 1990
8. A spill-reporting plan should detail the plant's procedures, telephone numbers of all agencies that should be notified, and who has the authority to report spills.
 9. The Superfund Amendments and Reauthorization Act of 1986 covered emergency planning, community right-to-know, and toxic release reporting, among other notification requirements.
 10. Some secondary regulations that may be of interest to the environmental manager include the Indoor Radon Abatement Act, the Lead-based Paint Poisoning Prevention Act, the Lead Contamination Control Act, and the Medical Waste Tracking Act, to name just a few.
 11. Gap analysis is a determination of where an organization is relative to the requirements of ISO 14001.
 12. The controversy over CERCLA or Superfund is due to its perceived cost/benefit ratio, that is, the costs of compliance and litigation have been staggering versus relatively modest cleanup of sites.
 13. Carbon dioxide, chlorofluorocarbons, methane, and nitrous oxide, produced in quantity by industrialized nations over the last 200 years, gather in the atmosphere and absorb the infrared waves emitted from the earth. This may be causing global warming, which could turn arable land in the higher latitudes into deserts and could melt polar icecaps, causing a rise in sea levels.

ANSWERS—Case Study

1. Environmental audits by outside consulting firms are sometimes used as the first step in determining what needs to be done to comply with regulations. An environmental consulting firm can be specifically contracted when there are serious concerns about compliance with environmental regulations and statutes. The consultants can perform a complete review of a company's compliance with all pertinent regulations, or they can focus on specific areas.
2. These audits often pay for themselves by reducing future compliance costs and avoiding costly penalties.
3. Because many corporate environmental issues are legal, companies need a close association with an appropriate attorney. Without such a relationship, the company may overlook key environmental data or legal facts that can plague it far into the future. An attorney can suggest preventive legal measures that will avoid problems that could prove costly both financially and in terms of corporate image and public relations.

CHAPTER 15—INDOOR AIR QUALITY

ANSWERS—Quiz 1

1. a
2. a
3. b
4. a
5. d
6. c
7. a
8. Factors that have contributed to increased exposures to indoor air pollutants include the following:
 - construction of energy-efficient (tightly sealed) buildings
 - decreased ventilation rates to reduce energy costs
 - increased use of synthetic building materials, furnishings, pesticides, and housekeeping supplies
 - poor building design
 - improperly maintained building mechanical systems
 - occupant activities
9. Value-added benefits to implementing an IAQ management plan include:
 - demonstrated ongoing efforts to provide a safe indoor environment provide a strong legal and ethical position if problems do arise
 - quicker and more cost-effective response if problems occur
 - minimized adverse publicity
 - greater peace of mind for management and building occupants and physical plant and equipment
 - better comfort for occupants
10. Pollutant source(s), a driving force to move the pollutant(s), a pathway for the pollutant(s) to travel, and a susceptible population are the four elements that are common to IAQ problems.
11. IPM uses a combination of pest prevention, chemical pesticides, and nonchemical pest controls to control pests and minimize the hazard to people, property, and the environment.
12. Four common elements of an effective IAQ management plan are as follows:
 - designated primary point(s) of contact
 - timely communication of relevant issues to all affected parties
 - written guidelines
 - identification of potential problems and solutions
13. HEPA stands for high efficiency particulate air.

14. Stack effect is the flow of air that results from the phenomenon of rising warm air creating a positive pressure area at the top of a building and, subsequently, a negative pressure area at the bottom of a building. The stack effect can overpower the mechanical system and disrupt ventilation and circulation in a building. Stack effect exists whenever there is an indoor-outdoor temperature difference, and it becomes stronger as the temperature difference increases.

ANSWERS—Quiz 2

1. b
2. a
3. a
4. b
5. b
6. d
7. d
8. Factors that might contribute to complaints about indoor air quality include:
 - cigarette smoke
 - dust particles
 - objectionable odors
 - airborne compounds generated from a variety of sources
 - microbial contamination
 - poor air circulation
 - thermal comfort
 - humidity
 - job pressures
 - lighting
 - workstation design
 - noise
9. The condition of a building's indoor environment is based on complex interactions of the following factors:
 - occupant activities
 - the surrounding climate and weather
 - building structure and mechanical systems
 - contaminant sources
10. Common pollutant sources include the following:
 - occupant activities (e.g., housekeeping, maintenance, remodeling and renovation, and painting)
 - outside sources
 - building systems
 - equipment, furnishings, and wall and floor coverings
11. The following strategies are acceptable for controlling pollutants that contribute to poor IAQ:

- manage pollutant sources either by removal, isolation, or controlling use
 - use ventilation to dilute and remove from the building
 - use filtration to clean the air
12. A body's cooling mechanism is based on the evaporation rate of perspiration. A high relative humidity reduces the evaporation rate of perspiration. As a result, the effect is similar to raising the temperature.

ANSWERS—Case Study

1. He shouldn't dismiss the tenants' complaints casually, but it is possible for those kinds of problems to be the result of:
 - illnesses contracted away from the workplace,
 - acute sensitivity (allergies),
 - stress, and
 - other psychosocial factors.
2. Building HVAC systems are designed to bring in outside air to control temperature, humidity, odors, and air quality. The weather, season, and neighboring structures can contribute to contamination of the incoming air. Other potential sources include loading docks, odors from dumpsters, unsanitary debris, or building exhausts located near outdoor air intakes.
3. Professional help might be necessary or desirable in the following situations:
 - Mistakes or delays could have serious consequences (e.g., health hazards, liability exposure, regulatory sanctions, adverse publicity).
 - Building management feels that an independent investigation would be better received or more effectively documented than an in-house investigation.
 - Investigation and mitigation efforts by in-house staff have not relieved the IAQ problem.
 - Preliminary findings indicate the need for measurements that require specialized equipment or equipment and training beyond in-house capabilities.

CHAPTER 16—ERGONOMICS YESTERDAY, TODAY, AND TOMORROW

ANSWERS—Quiz 1

1. a
2. b
3. a
4. b
5. b
6. c

7. d
8. b
9. d
10. a
11. b
12. MSD stands for work-related musculoskeletal disorder and involves conditions that affect the muscles, tendons, nerves, and supporting structures, such as the spinal discs.
13. These factors include wrist size or shape, pregnancy, oral contraceptives, gynecological surgery, acute trauma or injury, systemic diseases, and age.
14. The recommended method is to obtain data via periodic worker health surveys.
15. This rate is influenced by the physiological demands placed on a worker through the performance of a task and through the thermal environment (temperature and humidity).
16. The main issues to be considered are: the posture or position of the joints when the task is performed, the force exerted, and the repetition rate, or the amount of recovery time provided.
17. They are preferred because their primary focus is to design or redesign the job to accommodate the person, rather than making the person adjust to the conditions of the job.
18. It is recommended that a medical management program address the following issues: injury and illness record keeping; early recognition and reporting; systematic evaluation and referral; conservative treatment; conservative return to work; systematic monitoring; and adequate staffing and facilities.
19. The five goals of ergonomics are (1) to reduce the physical (and mental) stress associated with a given job; (2) to increase the comfort, health, and safety of a work environment; (3) to increase productivity; (4) to reduce human errors associated with a task; and (5) to improve the quality of work life. Ergonomics can also be described as making the most of the human/machine relationship to balance the capabilities of individual workers with the demands placed on them by the system.
20. A systematic evaluation can be done via direct observation or videotaping. The Keyserling method requires videotaping the job. Later the tape is analyzed in real-time to determine the percentage of time various body parts were in neutral and nonneutral postures. The Ovako Working Posture Analysis System (OWAS) is a direct observation method that evaluates the work performed by the worker.

ANSWERS—Quiz 2

1. b
2. a
3. b
4. a

5. a
6. b
7. d
8. b
9. c
10. c
11. b
12. Human factors engineering is another name for ergonomics.
13. The demands placed on a worker fall into the following three categories: physical demands, environmental demands, and mental demands.
14. This is an example of a population stereotype.
15. The three questions are as follows: Is there any lifting activity? Is material pushed or pulled? Is the material carried from location to location?
16. It is useful to do this when illumination is low or when a control needs to be identified and operated through touch only.
17. The ADA may require the employer to alter the conditions under which the task may be done if the worker requests an accommodation for his disability.
18. These issues are more critical for maintenance workers.
19. Passive surveillance refers to information that is gathered from existing records to identify potential patterns of disease within workplace. These records can be used to analyze trends in injury and illness rates in a particular department, job, workstation, or operation. Types of records that can be used for passive surveillance include OSHA Form No. 300 logs, workers' compensation records, plant medical reports, accident/incident reports, first report of injury, absentee records, and rate of turnover. These and other records should be reviewed periodically, but the frequency of review will depend on the degree of MSD problems in the workplace.
20. Management should consider whether the display intensity is higher than the lowest threshold level for sight or hearing because each sense has its own threshold level. It should question whether the sense is overloaded and the number of demands being made on sight and hearing at the same time. It should assess the display's compatibility with similar displays, controls, and machine movements and determine if any environmental factors could mask the display.

ANSWERS—Case Study

1. After setting up case management, the next step is to address training and education. These issues are critical to the success of an ergonomics program. Training should fit the role of each employee affected by the program.
2. The fourth, and most important step, is the workplace improvement process. The basic approach to this process is similar to the traditional quality improvement cycle and includes the following steps: assessing the process (identifying potential problem jobs/tasks), planning the activities (evaluating and assessing to identify potential controls), doing (implementing

controls/modifications in the job/process), and verifying the results (checking to make sure controls are effective).

3. In addition to MSDs, an ergonomics program typically addresses visual task interfaces (including illumination levels), thermal stress (heat/cold), physical workload, duration of work, and vibration. These issues can be classified into categories: risk factors and workplace characteristics, physiological demands, physical demands, environmental demands, and design of displays, controls, and dials.
4. To be successful a program should be an inherent part of the company, take a combined proactive and reactive approach, and involve all affected personnel.

CHAPTER 17—EMPLOYEE ASSISTANCE PROGRAMS

ANSWERS—Quiz 1

1. a
2. a
3. b
4. b
5. a
6. c
7. d
8. a
9. d
10. b
11. b
12. The “broad-brush” approach involves helping employees with a behavioral problem that may impair their productivity.
13. Confidentiality is vital to any EAP.
14. In a union-based EAP, trained union personnel provide services to union members.
15. It can reduce the frequency of relapse and motivate employees to return to sobriety if a relapse does occur.
16. They all assess client problems, provide referrals for treatment, offer employee training, and maintain records.
17. Some clients inevitably fail to follow through and do not get help.
18. Employers would be liable for defamation if, under the mistaken belief that an alleged perpetrator is violent, they warned their employees about the individual’s violent tendencies.
19. Constructive confrontation is a basic supervisory tool that has been a foundation of EAP work since it began. In constructive confrontation, the supervisor conveys to the troubled employee the adverse job consequences the employee may experience if his or her deteriorating job performance does not improve. The supervisor then refers the employee to the EAP. In this way, the

supervisor becomes a key factor in helping the employee to face his or her personal issues.

20. An appropriate provider network must include credentialed and trained EAP Assessors (licensed clinicians) who are available to all employees. All assessors should be subject to a formal credentialing process by the organization that includes verification of personnel's education, licenses, professional liability insurance, and experience. The EAP network should also include adequate means to identify and access all other helping resources in the employer's service area, such as those near all employer worksites.

ANSWERS—Quiz 2

1. a
2. b
3. b
4. a
5. b
6. c
7. d
8. c
9. d
10. d
11. a
12. The goal of an EAP is to enable employers to help their troubled employees (or their family members) resolve their personal problems as quickly and as cost-effectively as possible and to return them to peak productivity.
13. An EAP advisory committee should be created.
14. An internal EAP enables its staff to interact and cooperate easily with other departments because it is staffed by the corporation's employees.
15. The required national credential is the Certified Employee Assistance Professional (CEAP).
16. It is especially important because embarrassment or suspicion on the part of employees about EAP participation can severely hamper a program's efforts.
17. The two advantages of EAP-provided treatment are that more clients will receive help and fewer providers will bill the company's insurance plan for their services.
18. An employer must do everything that is reasonably necessary to protect the life, safety, and health of employees, including providing safety devices and adopting reasonably adequate practices, means, methods, operations, and practices.
19. An EAP is a worksite-based program designed to assist in the identification and resolution of productivity problems associated with employees impaired by

personal concerns, including, but not limited to, health, marital, financial, alcohol, drug, legal, emotional, stress, or other personal concerns which may adversely affect employee job performance.

20. Using an EAP provides many benefits. For example, morale improves as disruptive employees are helped and managers spend less time working with troubled employees. Valued employees with personal problems remain with the company rather than resigning. Safety improves and liability declines. An EAP saves money because management spends less time and resources on discipline and hiring and training costs are lower.

ANSWERS—Case Study

1. Creating an EAP advisory committee is a good first step in setting up a program. The committee should include representatives from management, human resources, the medial department, supervisory personnel, all labor unions, and the work force. Its role is to evaluate the need for an EAP, plan and implement the EAP, encourage its use, set goals, and evaluate the program and its progress.
2. Next a needs assessment must be conducted. It identifies the major employee problems and the kind of EAP services that are required to address those problems. The assessment should examine the type of organization and industry, the number of worksites, the type of work/jobs, the size of the work force and demographics, major employee problems, risk management issues, management and labor identification of issues, regulatory requirements, and available resources. The assessment may be jointly completed by the advisory committee, management, and even outside consultants.
3. After the assessment is complete, a plan identifying any barriers to establishing an EAP should be drafted. This plan should also detail the internal and external resources that will support the EAP, and the EAP design and structure that will best serve the company and its work force. In terms of design and structure, there are five major types of EAPs: internal, external, union-based, consortium, and blended. Choosing which EAP to use may be the committee's most important decision. Finally, the committee needs to draft general policies governing the creation of an EAP and the rights of employees.

CHAPTER 18—EMERGENCY PREPAREDNESS

ANSWERS—Quiz 1

1. b
2. b
3. a
4. b
5. a
6. d

7. c
8. d
9. b
10. b
11. a
12. To estimate potential damage to property, one should look at surroundings in addition to general structures.
13. The environmental problems that a fire or explosion can cause include toxic gases and dust resulting from combustion and decomposition, thermal plumes carrying materials substantial distances, and disposal problems involving large quantities of contaminated water used to extinguish the fire.
14. An emergency involving civil strife raises issues about the right to protect property versus individuals' legal right to assemble.
15. Priority checklists should be used so that if only short notice is give, at least the most vital precautions will have been taken.
16. In addition to having special training in fire prevention and protection, a fire brigade chief must also be able to command people.
17. The sequence is (1) water supply, (2) power facility, (3) machinery areas, (4) warehouse areas, and so on.
18. Some of the services a company has on standby may go instead to the highest bidder. As a result, management must have a contingency plan.
19. At predetermined locations, a specified alert condition becomes effective, and each supervisor completes a checklist for that alert. As the hurricane progresses toward the facility through the 100-mile (160-km) circle, 50-mile (80-km) circle, and so on, the facility is shut down in an orderly manner.
20. Members of a HAZWOPER team are an organized group of employees designated by their employer. They are expected to handle and control actual or potential leaks or spills of hazardous substances, including possible close approach to the substance. Their goal is to control or stabilize an incident. The HAZWOPER team is not a fire brigade and a typical fire brigade is not a HAZWOPER team; however, a HAZWOPER team may be a separate component of a fire brigade.

ANSWERS—Quiz 2

1. a
2. b
3. a
4. b
5. b
6. b

7. a
8. d
9. d
10. a
11. c
12. The basic plan will usually include: a chain of command, an alarm system, medical treatment plans, a communications system, shutdown and evacuation procedures, and auxiliary power systems.
13. The first step is determining what types of hazards may affect the organization.
14. It has increased due to the complexity of processes, the proliferation of industrial and agricultural chemicals, and the proximity of residential areas to industrial activities.
15. They are (1) keep the chain as small as is practical and (2) appoint personnel to crisis management positions based on their ability to respond to situations under extreme stress.
16. Alarms should be checked under a variety of wind and weather conditions to determine if the signal can be heard in all parts of the facility at all times.
17. A salvage squad is trained to protect as much stock and equipment as possible by controlling the flow of water, covering stock with tarpaulins, and spreading absorbent materials.
18. Companies often overlook the issue of who will pay any costs, such as repairs to equipment or workers' compensation for injured employees.
19. "Earthquake-resistant construction" consists of building a structure so that it "floats above the bedrock and ballasting it as a ship is ballasted, by making lower stories heavy and upper stories light." Utility lines and water mains should be flexible and laid in trenches that are free of the building, rising in open shafts, and connected to fixtures by flexible joints. Lockers, cabinets, shelves, etc., should be securely installed with seismic bracing and safety restraining strips on shelves containing bottles of chemicals.
20. A control room should be equipped with the following (needs to list at least seven types of equipment): telephones, sound-powered phones, public address system, maps of the facility, emergency lighting and electric power, sanitary facilities, reference books, emergency plans, material safety data sheets, a second exit, two-way radios for communicating locally and with emergency management authorities, if necessary. If communications break down during a disaster, panic and disintegration will quickly take over. A good communications plan should provide flexibility and control over the situation. It should have enough telephones, be able to handle incoming and outgoing calls, and use means of communication independent of normal telephone service, such as a battery-powered radio. In some cases, mobile phones may not work during a disaster.

ANSWERS—Case Study

1. An emergency manual often begins by addressing company policy and stating purposes, authority, principal, and control measures. An emergency organization chart showing positions and functions may also be provided. The manual should also describe potential disasters, in the case hurricanes and floods, and give a risk statement. A map of the facility showing equipment, medical and first aid supplies, fire control materials, shelters, the command center, evacuation routes, and assembly areas should also be included. The manual should describe the alarm system and the central communications center, including home contacts of employees as well as detail the shutdown procedure, including provisions for a security guard. Suggestions as to how to handle visitors and customers should be provided in addition to lists of locally related and necessary items and the availability and location of equipment and resources.
2. There are two basic guidelines to follow when establishing a chain of command: (1) keep the chain as small as is practical and (2) appoint personnel to crisis management positions based on their ability to respond to a situation under extreme stress, not on their title. The smaller a chain of command, the more effective and efficient its decisions and actions will be during a crisis.
3. Generally the ranking manager appears to be the best candidate for the position of crisis manager, however this may not be the best decision. Many people may be excellent managers under normal conditions because they have time to weigh the pros and cons of a situation. In a highly stressful, emergency situation, however, they may be incapable of making snap decisions. Individuals should be tested to see if they can perform under emergency conditions. If a ranking manager is not the best candidate, he or she should be a consultant to the position.

CHAPTER 19—WORKPLACE VIOLENCE

ANSWERS—Quiz 1

1. a
2. a
3. b
4. b
5. b
6. a
7. b
8. d
9. b
10. a
11. a

12. c
13. Workplace violence, as defined by the National Institute for Occupational Safety and Health (NIOSH), is violent acts, including physical assault and threats of assault, directed towards persons at work or on duty.
14. Four of the relationships between the assailant and the worker or workplace are violence by strangers, violence by customers/clients, violence by co-workers, and violence by personal relations.
15. A threat assessment team is responsible for the following functions:
- conducting an initial workplace violence analysis
 - recommending engineering and administrative controls
 - implementing employee training programs on workplace violence
 - assessing threats of violence and determining what steps are necessary to prevent the threat from being carried out
 - implementing plans for responding to acts of violence
 - auditing the workplace violence prevention program
16. A workplace hazard analysis should consist of a records review, in which the threat assessment team reviews records of previous workplace violence; an employee survey to identify the potential for violent incidents and the need for improved security measures; and a workplace security analysis to identify conditions, operations, and situations that could put employees at increased risk for violence.
17. The warning signs that someone may become violent include: direct or veiled threats of harm; intimidating, belligerent, harassing, bullying, or other inappropriate and aggressive behavior; numerous conflicts with co-workers and supervisors; bringing a weapon to the workplace, brandishing a weapon in the workplace, making inappropriate references to guns, or fascination with weapons; statements indicating fascination with incidents of workplace violence, approval of the use of violence to resolve a problem, or identification with perpetrators of workplace homicides; statements indicating desperation to the point of contemplating suicide; drug/alcohol abuse; extreme changes in behavior.
18. A health care or social service worker might be targeted for workplace violence because of the following factors:
- availability of drugs or money at hospitals, clinics, and pharmacies
 - situational and circumstantial factors, such as unrestricted movement of the public in clinics and hospitals
 - the increasing presence of gang members, drug or alcohol abusers, trauma patients, or distraught family members
 - long waits in emergency rooms leading to client frustration
 - isolated work with clients during examinations or treatment

- lack of training of staff in recognizing and managing escalating hostile and assaultive behavior
 - poorly lighted parking areas
19. Community workers include visiting nurses, home health aides, social service workers, child service workers, probation officers, gas and water utility workers, phone and cable TV installers, letter carriers. An employee can avoid violence by doing the following:
- learning how to recognize, avoid, or diffuse potentially violent situations by attending personal safety training programs
 - following procedures for alerting supervisors to any concerns about safety or security
 - collecting detailed information regarding the client's or patient's home situation
 - reporting all violent incidents in writing to the supervisor, even if there were no injuries
21. The student should touch upon the following general ideas:
- create a clear policy that expressly disapproves of workplace violence
 - define clearly the roles and responsibilities of managers and employees involved in the program
 - provide the necessary authority and resources for the responsible parties to carry out the program
 - hold managers and employees accountable for their performance
 - encourage employee participation
 - recognize the successes of the program
 - take all violent and threatening incidents seriously, ensuring that they are thoroughly investigated and the appropriate actions are taken

ANSWERS—Quiz 2

1. a
2. a
3. a
4. a
5. b
6. b
7. a
8. a
9. d
10. d
11. c
12. b

13. Answer might make mention of the following points:

- contact with the public
 - exchange of money
 - delivery of money
 - delivery of passengers, goods, or services
 - having a mobile workplace, such as a taxicab or police cruiser
 - working with unstable or volatile persons in health care, social services, or criminal justice settings
 - working alone or in small numbers
 - working late at night or during early morning hours
 - working in high crime areas
 - guarding valuable property or possessions
 - working in community-based settings.
14. The elements of an effective workplace violence prevention program include the following:
- management commitment and employee involvement
 - policy statement
 - threat assessment team
 - workplace analysis
 - hazard prevention and control
 - program evaluations
 - training
 - incident response
 - record keeping
15. Answer may mention some of the following practical examples of employee involvement:
- participation in surveys on workplace violence risks
 - developing and revising procedures and countermeasures
 - assisting in security analysis
 - evaluating prevention and control measures
 - training of new and current employees
 - prompt and accurate reporting of violent incidents
16. Student might mention the following ideas:
- management refuses to tolerate violence, including verbal and nonverbal threats, in the workplace
 - management will provide the necessary authority and budgetary resources to those responsible for program administration
 - management will encourage employee participation
 - management will require reporting of all violent incidents, whether or not physical injury has occurred
 - management will apply the workplace violence policies consistently and fairly to all employees
 - management will not discriminate against victims of workplace violence.
17. Factors to consider during a workplace security analysis include physical features of the building and environment, lighting deficiencies, lack of telephone/communication devices, areas of unsecured access, and areas with known security problems.

18. Figure 19-5 shows a sample incident report form. Students may make mention of any of the questions on this form, or come up with some that were discussed in class. The goal is to prove an adequate understanding of incident follow-up.
19. An incident response plan should cover the following procedures:
- how the response team is to be assembled
 - how employees will receive prompt and appropriate medical care, including who is responsible for the immediate care of the victims
 - how victims will be transported, if necessary
 - ensuring the safety of employees and others remaining in the area
 - securing the area where the disturbance occurred to safeguard evidence and reduce distractions during post-incident response
 - assessment of damaged work areas to verify they are safe for reentry
 - reporting the incident to the police
 - ensuring no critical work areas are left understaffed while others are assisting victims or helping to secure the area
 - who is responsible for reestablishing work areas and processes
 - communication of information to employees and the media
 - identification of trained mental health professionals in employee assistance programs or in the community who would be able to respond after an incident to provide critical incident debriefing to victims, witnesses, and other affected employees
20. If you are robbed at gunpoint, stay calm and speak to the robber in a cooperative tone. Do not argue or fight with the robber nor offer any resistance whatsoever. Hand over the money. Never pull a weapon during the event—it will only increase your chances of getting hurt. Always move slowly and explain each move to the robber before you make it. Make no attempt to follow or chase the robber. Stay where you are until you are certain the robber has left the immediate area, then lock the door of your store and call the police immediately. Do not touch anything the robber has handled. Write down everything you remember about the robber and the robbery while you wait for the police to arrive. Do not open the door of the store until the police arrive.

ANSWERS—Case Study

1. NIOSH defines workplace violence as violent acts, including physical assault and threats of assault, directed toward persons at work or on duty.
2. Examples of workplace violence include obvious physical violence such as beatings, stabbings, shootings, and rapes, but also include threats of harm, obscene phone calls, harassment of any kind (following, sworn at, shouted at), or an intimidating presence. These incidents may be categorized as follows: violence by strangers, violence by customers/clients, violence by co-workers, and violence by personal relations.
3. Factors that tend to increase a worker's risk for workplace assault include the following:

- contact with the public
- exchange of money
- delivery of money
- delivery of passengers, goods, or services
- having a mobile workplace such as a taxi cab
- working with unstable or volatile people in health care, social services, or criminal justice settings
- working alone or in small numbers
- working late at night or during early morning hours
- working in high-crime areas
- guarding valuable property or possessions
- working in community-based settings

CHAPTER 20—PRODUCT SAFETY MANAGEMENT

ANSWERS—Quiz 1

1. b
2. a
3. b
4. a
5. b
6. b
7. b
8. d
9. d
10. d
11. c
12. b
13. The three steps management must take to establish a PSM program are (1) become committed to the fact that it will be necessary to spend money and resources to save money in the long term, (2) select a program coordinator, and (3) select a program auditor.
14. Product safety, design/engineering, manufacturing, purchasing, quality assurance, service/installation, risk management/insurance, and legal should be represented on a PSM committee.
15. Some of the causes of product liability exposure are unsafe product designs, inadequate manufacturing and quality assurance procedures, inadequate preparation and review of consumer warnings and instructions, and misleading representation of products or services.
16. Management might show its commitment to the PSM program by a posted letter or bulletin, a formal statement of management policy on the subject, use of a PSM program coordinator and committee, and use of a PSM program auditor.

17. An auditor might use classifications identified as to the seriousness of the hazard, i.e., catastrophic, critical, occasional, remote, or improbable.
18. Critical parts or components are defined as those whose failure could cause serious bodily injury, property damage, business interruption, or serious degradation of product performance. Individual organizations, however, may have different criteria for defining critical parts.
19. Companies who choose to produce an instructional video should keep the following points in mind:
 - Show only the safe, proper way to assemble or use the product.
 - Review all warnings and cautions several times where appropriate.
 - Be sure to present the product's characteristics and capabilities without exaggeration.
 - List the product's limitations and the hazards of misuse.
 - Have the video and script reviewed by appropriate legal and technical staff, including the safety professional.
20. Students might work the following points into their essays:
 - function as a staff member for corporate management
 - assist in setting general PSM program policy
 - recommend special action regarding product recall, field modification, product redesign, special analyses
 - participate with other appropriate personnel in the review of product literature and warnings
 - conduct and review complaint, incident, or accident analyses
 - coordinate appropriate PSM program documentation
 - ensure an adequate flow of verbal and written communications
 - develop sources of product safety and liability prevention data for use by operating personnel
 - maintain a liaison with business, professional, and governmental organizations on matters pertinent to product safety and liability prevention
 - conduct PSM program audits, where appropriate

ANSWERS—Quiz 2

1. a
2. b
3. b
4. b
5. a
6. a
7. c
8. b
9. e
10. f
11. d
12. d

13. FDR stands for formal design review. Each designer/reviewer should ultimately ask, "Would I feel safe using the product or having family members use it?"
14. Packaging requirements must cover conditions affecting the product at the manufacturing site, during transit, and under normal storage at the customer's location.
15. For a warning label to be considered adequate, it must advise the user of hazards involved in the products use, how to avoid these hazards, and possible consequences of failing to heed these warnings.
16. Service contracts can significantly increase a company's product liability exposure because through them the company has extended its exposure beyond the controlled environment of its manufacturing facility.
17. The purpose of risk management is to protect the company's assets from loss of any kind.
18. The term quality assurance refers to the actions taken by management to ensure that manufactured, assembled, and fabricated products conform to design or engineering requirements.
19. The PSM audit report to management should begin with a summary of findings, contain adequate data to support all recommendations, and provide realistic, measurable implementation steps to correct deficiencies or to improve current procedures.
20. Records must be retained for the following reasons:
 - to satisfy government regulations
 - to prove the company's commitment to manufacture safe, reliable products and protect the consumer
 - to avoid wasting time and money redoing what has already been done
 - to establish a sound database for items such as insurance costs, sources of supply, and product or field-modification expense requirements
 - to trace customers and products should a product recall or field modification program become necessary

ANSWERS—Case Study

1. Some of the major responsibilities of a program coordinator are as follows:
 - function as a staff member for corporate management
 - assist in setting general PSM program policies
 - recommend special attention regarding product recall, field modification, product redesign, special analyses
 - participate with other appropriate personnel in the review of product literature and warnings
 - conduct and review complaint, incident, or accident analyses
 - coordinate appropriate PSM program documentation
 - ensure an adequate flow of verbal and written communications
 - develop sources of product safety and liability prevention data for use by operating personnel

- maintain a liaison with business, professional, and governmental organizations on matters pertinent to product safety and liability prevention
 - conduct PSM program audits, where appropriate
2. The purpose of a PSM program is to develop a means to perform an evaluation of the product during design and manufacture, distribution, sale, and consumer use and to control any accident and hazard potential through good product safety management techniques. The major goal of the program audit is to reduce or eliminate the causes of product liability exposure.
 3. Answers may vary. Refer to specific chapters related to these topics in the textbook.
 4. Some of the general questions that Bundle of Joy might ask the consumer include the following:
 - Who is the consumer?
 - What type of product is involved?
 - What is the problem?
 - How is the product being used?
 - Is the product being used in the manner intended?
 - What environmental conditions has the product been subjected to?
 - Has the product been altered or modified by the consumer?

CHAPTER 21—INDUSTRIAL SANITATION AND PERSONNEL FACILITIES

ANSWERS—Quiz 1

1. b
2. a
3. b
4. b
5. b
6. b
7. d
8. a
9. a
10. c
11. b
12. The general rules for sanitation are an approved piping and storage system, good housekeeping, personal cleanliness, and a good inspection system.
13. Backflow is a reverse flow condition created by a difference in water pressures. It causes water to flow back into the distribution pipes of a potable water source from an unintended source(s).
14. Chlorine can be added to water directly as a gas or as a soluble salt (calcium hypochlorite or chlorinated lime).

15. Extra heavy cast-iron bell-and-spigot pipes are less susceptible to clogging and much easier to clean than pipes made from other materials.
16. National Sanitation Foundation International (NSFI) and Underwriters Laboratory (UL) are the nationally recognized agencies that set standards for food-service equipment.
17. They should wash their hands frequently during preparation and after any interruption in preparation, after smoking, or after using the bathroom.
18. Flooring should be selected for durability and sanitation and to minimize the hazard of slipping and falling.
19. Collecting waste glass, metals, batteries, chemicals, and even cardboard can pose safety and health risks. In some cases, refuse collectors are exposed to blood and a bloodborne pathogen program is required. Glass and metal materials can cause cuts and lacerations; proper handling, storage, and disposal of waste batteries and chemicals prevents exposure, injury, and environmental damage. Workers are encouraged to use baling or compacting machines or other mechanical devices to minimize the risk of injuries caused by improper lifting or awkward postures. Nevertheless, these machines can be dangerous and workers should protect themselves against eye and compression injuries.
20. The soap used in washing facilities should have no free alkali or mineral abrasives and its pH should be less than 10.5. The proper type of soap is important for general hygiene as well as for protecting against dermatitis, which can be caused by cleaning agents. Management should provide individually dispensed soap in either paste, liquid, or powder form for common use. Liquid or powdered soaps are the best choices because they are easy to dispense and serve as an aid to housekeeping. Bar soaps should be avoided.

ANSWERS—Quiz 2

1. a
2. a
3. b
4. a
5. a
6. c
7. b
8. b
9. d
10. c
11. b
12. The water is safe and satisfactory for drinking and cooking.
13. Water can be disinfected using chlorine or chlorine products, ozone, ultraviolet radiation, and filtering.

14. Chlorine is the best available disinfecting agent for drinking water.
15. Ways to prevent pollution include reducing the source of pollution, reusing materials, substituting materials, and composting.
16. Two-one for work clothing and one for street clothing. Preferably they should be located on opposite sides of a shower room so employees will have to pass through showers before changing clothes.
17. HACCP stands for Hazard Analysis Critical Control Points. It is used to identify and eliminate food safety problems caused by biological, chemical, and physical contamination. Using HACCP, management can generate a list of points that can be controlled to reduce or eliminate foodborne illness hazards.
18. The main drawback is ensuring sufficient amounts of hot water.
19. Septic tanks are buried, watertight receptacles designed and constructed to receive wastewater, separate solids from liquids, provide limited digestion of organic matter, store solids, and allow effluent, clarified liquid to be discharged for further treatment. Retaining solids is essential to preventing the malfunctioning of the secondary treatment component, which may be a subsurface seepage field, a waste oxidation lagoon, an aerated treatment system, or another type of approved treatment system. Septic tanks are comparable to the primary treatment phase of a municipal sewage treatment facility.
20. Integrated Pest Management (IPM) is a popular alternative method for controlling pests and minimizing the use of pesticides. It is based on the collaborative efforts of housekeeping, maintenance, and pest control services. Operational and administrative intervention strategies are used to reduce the amount of pesticides needed to control pests. An IPM program tends to be site-specific and may not be feasible for all locations. Typically a successful IPM program covers sanitation practices, facility design and maintenance, record keeping, use of nonpesticide controls, and continuous program monitoring and evaluation.

ANSWERS—Case Study

1. Workers at Marlecks can disinfect the company's drinking water system by filling it with water containing no less than 100 mg/l of chlorine. The solution should remain for 24 hours in either a new system or one that has not previously carried treated water. For systems that have carried treated water and are being put back into service following minor repairs, 12 hours is sufficient. If management suspects that *Giardia lamblia* or *Cryptosporidium* are present in the water, other measures should be taken, such as filtering. Water can also be disinfected using ozone and ultraviolet radiation. The effectiveness of any of these methods is based on the dose of disinfection product used, temperature, contact time, and quality of the supply water.
2. To determine the success of a disinfecting job, workers can measure the residual chlorine in the solution at the end of the required time. Commercial

test kits can be used for this purpose. They will show residual chlorine if the system's biological chlorine demands have been met. Workers can connect the system to the drinking water supply, flush it out, and put it into service. If no residual chlorine is present, workers should drain the system and recharge it with new disinfectant solution and start again.

3. The chemical method of sanitizing utensils uses less hot water, but Marlecks must make sure the chemical chosen is approved for use on food-contact surfaces. The most common method of chemical sanitizing involves immersing utensils in a solution of hypochlorite containing at least 50 ppm available chlorine in water at least 75 F for one minute. Workers can use cationic quaternary ammonium and iodine germicides if this method achieves the same sanitary specifications as a hypochlorite solution. Any time chemicals are used, employees should test the parts per million concentration of the chemical in solution.

CHAPTER 22—OCCUPATIONAL MEDICAL SURVEILLANCE

ANSWERS—Quiz 1

1. b
2. a
3. a
4. d
5. d
6. a
7. Medical surveillance is an organized system for collecting and using information on diseases, injuries, or hazards to help prevent accidents and illnesses.
8. Sensitivity, specificity, and positive predictive value are the three factors that determine the quality of screening tests.
9. Early detection is beneficial only when the treatment used will likely improve the disease outcome as compared to conventional treatment administered when the disease would be diagnosed without screening.
10. The underlying assumption of the mixture rule is that the “combined” chemicals act on the same end-organ.
11. The two main legal issues are the rights of the people being monitored and the use of monitoring as a primary control strategy.
12. When designing a medical surveillance program, the following data need to be analyzed:
 - OSHA standards and surveillance requirements related to the hazardous substance
 - the worker's job description

- the worker's exposure history and industrial hygiene monitoring data
- data showing the use of personal protective equipment
- data from prior medical examinations

The analysis should aim to answer questions regarding the significance and extent of exposure and the exposure dose as well as the toxicity of the hazard(s) and the seriousness of the target condition(s). Once the analysis is complete the health professional must consider the balance of risks and benefits of surveillance.

ANSWERS—Quiz 2

1. b
2. a
3. b
4. c
5. b
6. d
7. The main purpose of surveillance is to detect changes in trends or distributions in order to initiate investigative or control measures.
8. Screening is more accurate because it does not involve epidemiologic analysis of data, the data collected is not used, and no changes are made in preventive policies.
9. Medical history/questionnaire, examination, and biological monitoring are three ways to clinically evaluate exposure to hazardous agents.
10. BEIs are biological exposure indices, reference values developed as guidelines to help health professionals evaluate potential health hazards.
11. The reason is because, given current state-of-the-art treatment, early detection of lung cancer does not appear to alter the course of the disease and a false positive test result can represent risks of its own.
12. Three fundamental issues need to be taken into account when implementing a medical surveillance program. First, the nature of the disease or "target condition." The safety and health professional needs to consider whether any known and proven medical treatments exist for the disease and whether early detection will result in improved health. Second, the accuracy, reliability, and acceptability of early detection tests need to be considered. Finally, the safety and health professional needs to examine the expected prevalence of the disease in the population that will be monitored. If the condition is rare, then most positive screening results will be false, reducing the benefits and increasing the costs and risks of surveillance.

ANSWERS—Case Study

1. Biological monitoring has many limitations. In general, it is a poorly understood science and the ability to identify and analyze biomarkers often far exceeds knowledge of how they affect humans. Once biological monitoring detects exposure, it is difficult to correlate health risks associated with that exposure. The short biological half-lives of some substances make it impossible to accurately assess exposure except within a limited period of time. Biological monitoring is not useful for surface active agents, such as hazards that cause skin or upper airway irritation. Tobacco, alcohol, and other agents may interfere with test results and, in some cases, measurements can reflect multiple exposure sources (air, food, water, soil, and skin contact), preventing an accurate determination of occupational exposure. It is also difficult to assess the environmental contribution of some substances commonly found in the body, such as copper or zinc. Biomarkers of effect are often not specific to a particular substance and abnormalities may reflect causes other than the substance being monitored. Biomarkers that are used to predict possible future conditions need to be validated with longitudinal studies. Finally, using biological monitoring in populations with low levels of exposure and low incidence of disease is a problem.

CHAPTER 23—WORKERS WITH DISABILITIES

ANSWERS—Quiz 1

1. b
2. b
3. a
4. b
5. d
6. a
7. This law applies to federal contractors and recipients of federal assistance programs.
8. Lack of access to company premises has been a principal factor preventing disabled persons from seeking jobs with some organizations.
9. Parking spaces should be 8 ft wide, next to a 5-ft-wide access aisle.
10. Title I makes it illegal to discriminate against an individual with a disability in hiring or promotion if the person is otherwise qualified for the job. An employer is required to provide sufficient accommodation to allow qualified individuals with a disability to attain the same level of job performance as co-workers having similar skills and abilities.
11. A disabled veteran is a “special handicapped individual” who:
 - is entitled to disability compensation under laws administered by the Veterans Administration for disability rated at 30 percent or more

- was discharged or released from active duty due to a disability incurred or aggravated in the line of duty

ANSWERS—Quiz 2

1. a
2. b
3. a
4. d
5. b
6. The U.S. Vocational Rehabilitation Act of 1973 was the first major civil rights law protecting the rights of persons with disabilities.
7. The disabled individual, the disabled veteran, and the qualified disabled individual are the three types of disabled persons seeking employment, as defined by the ADA.
8. The factors to be considered are physical requirements, working conditions, health hazards, and injury hazards.
9. Health hazards include air pressure extremes; radiant energy; silica, ETS, asbestos, dusts, and skin irritants; respiratory irritants; systemic poisons; and asphyxiants.
10. The burden of proof is upon the employer to show that the disabled individual is unqualified because of one or more of the following reasons:
 - The job would put the individual in a hazardous situation.
 - Other employees would be placed in a hazardous situation if the person were on the job.
 - The job requirements cannot be met by an individual with certain physical or mental limitations.
 - And (for all of the above) accommodation of the job cannot reasonably be accomplished.
11. To place a disabled worker properly, the following requirements should be observed:
 - The worker should meet the physical demands of the job. When necessary, the worker should receive the support of reasonable accommodation.
 - The worker should not be a hazard to himself/herself.
 - The worker should not be a hazard to others.
 - The task should not aggravate the known degree of disability.
 - To obtain valuable input, a conference with the individual should be held before job placement is made.

ANSWERS—Case Study

1. The safety and health professional should be a resource person to those responsible for job placement of qualified disabled individuals.
2. Juanita will perform a job safety analysis of existing work based on the job responsibilities and the abilities and limitations of the applicant. She will evaluate the work environment and assess whether Paul can perform the essential functions of the job.
3. The safety and health professional should also evaluate any proposed reasonable accommodation. Reasonable accommodation does not necessarily mean reinstalling machines; rather, it could mean minor relocation of a machine's controls so a disabled employee could operate them properly and safely. Juanita's job will be to coordinate with other involved departments, such as engineering, and evaluate all safety aspects of accommodations made.

CHAPTER 24—RETAIL/SERVICE FACILITIES LOGISTICS

ANSWERS—Quiz 1

1. a
2. a
3. a
4. a
5. b
6. b
7. b
8. b
9. c
10. b
11. d
12. b
13. The service industry is at risk for a high incidence of work-related injuries because many jobs are physically demanding and many positions are filled by inexperienced employees.
14. Student may mention any three of the following OSHA regulations that address specific safety issues within the service community:
 - occupational safety and health standards
 - general safety and health provisions
 - walking/working surfaces
 - means of egress
 - powered platforms, manlifts, and vehicle-mounted work platforms
 - occupational health and environmental control
 - hazardous materials
 - personal protective equipment
 - general environmental controls
 - medical and first aid

- materials handling and storage
 - machinery and machine guarding
 - hand and portable powered tools and other hand-held equipment
 - special industries
 - electrical
15. The notice must be posted in each store or work area in a conspicuous space where other postings are kept for employees to read. The notice can be obtained from the nearest Department of Labor.
16. Student may mention three of the following environmental designs recommended as a deterrent to robbery:
- time-controlled drop safes
 - carrying small amounts of cash
 - posting signs that limited cash is available
 - implementing cashless transactions
 - physical separation of workers from customers
 - making high-risk areas visible to others
 - increasing external lighting
 - controlling the number of entrances and exits, escape routes, and hiding places
 - use of security devices
17. Student must mention three of the following administrative controls recommended as a deterrent to robbery:
- staffing plans and work practices that prohibit unsupervised movement
 - increasing the number of staff on duty
 - using security guards or receptionists to screen persons entering
 - using photo I.D. badges
 - controlling access to work areas
 - establishing policies and procedures for reporting and assessing threats to employees
 - training employees on recognition of potential for violence and methods for defusing violent situations
 - using security devices
18. A theft prevention policy should include techniques used by shoplifters, how to detect a potential shoplifter, methods of surveillance; and how to apprehend a shoplifter.
19. Student may mention the following factors that may increase a worker's risk for a workplace assault, as reported by the NIOSH:
- contact with the public
 - exchange of money
 - delivery of passengers, goods, or services
 - having a mobile workplace
 - working with unstable or volatile persons in health care, social services, or criminal justice settings
 - working alone or in small numbers
 - working late at night or during early morning hours
 - working in high-crime areas

- guarding valuable property or possessions
 - working in community-based settings
20. Student should write an essay that proves an understanding of lockout/tagout procedures, and may mention the following:
- Develop a control program to prevent the unintentional start-up of machinery or equipment being repaired or serviced.
 - Use locks when equipment can be locked out.
 - Ensure that new equipment and overhauled equipment can accommodate locks.
 - When lockout procedures cannot be employed, tagout procedures should be in place.
 - Tagout procedures require that all switches, valves, levers, and so on be tagged to instruct all parties not to open or operate such controls until the tag is removed.
 - Identify and implement specific procedures for the control of hazardous energy, including preparation for shutdown, equipment isolation, lockout/tagout application, release of stored energy, and verification of isolation.
 - Institute procedures for release of lockout/tagout, including machine inspection, notification, and safe positioning of employees and removal of the lockout/tagout device.
 - Obtain standardized locks and tags that identify the employee using them.
 - Conduct inspections of energy control procedures at least annually.
 - Train employees in the specific energy control procedures and provide refresher training as part of the annual inspection of control procedures.
 - Adopt procedures to ensure safety when equipment must be tested during servicing.

ANSWERS—Quiz 2

1. a
2. b
3. a
4. a
5. b
6. b
7. d
8. c
9. c
10. b
11. a
12. c

13. The elements OSHA case law has established as necessary in order to prove a violation of the General Duty Clause include the following:
21. The employer failed to keep the workplace free of a hazard to which employees of that employer were exposed.
22. The hazard was recognized by the employer.
23. The hazard was causing or was likely to cause death or serious physical harm.
24. There was a feasible and useful method to correct the hazard.
14. The requirements for maintenance and workmanship of exits are as follows:
 - (1) Doors, ramps, passages, signs, and all other components of the exit shall be of substantial and reliable construction.
 - (2) All exits shall be continuously maintained free of all obstructions or impediments.
 - (3) Any device or alarm installed to restrict the improper use of an exit shall be so designed and installed that it cannot, even in cases of failure, impede or prevent emergency use of such exit. This prohibits the use of a lock and hasp on exit doors and sets requirements for push-bar alarm systems. Companies that handle large quantities of materials and have limited storage space are likely to violate these standards.
15. The main requirements of the hazard communication standard (HAZCOM) are written hazard communication program; labels and other forms of warning on containers of chemicals; Material Safety Data Sheets collected and available to employees; information and training provided for potentially exposed employees; and documents of training for all trained employees.
16. Near proximity is defined by OSHA as the ability to respond and start to administer first aid within 3 to 4 minutes in areas where unintended life-threatening injury or illness can be expected. In areas where a life-threatening injury is an unlikely outcome a longer response time is acceptable.
17. An employer must determine if a reasonable accommodation can be made so that a person with disabilities can perform the essential functions of the job. If the employer's efforts meet the specifications set by the Americans with Disabilities Act and the individual still cannot perform the work, the employer is justified in turning down the applicant.
18. Student may list any of the following:
 - natural disasters
 - violence in the workplace
 - product recalls
 - product tampering
 - power failures
 - chemical release spills
 - fires in the workplace or on the grounds
 - security for facilities and inventory

19. The four basic activities of a good ergonomics evaluation are (1) identify the problem, (2) study the physical demands of the high-priority jobs, (3) formulate a written action plan, and (4) maintain the effort.
20. Student might mention the following: (1) driver selection application review, (2) motor vehicle reports, (3) driving test, (4) documented orientation and training, (5) follow-up training, (6) incident reporting, and (7) vehicle inspections.

ANSWERS—Case Study

1. Correct answers might include a discussion of the following: housekeeping, floor loading protection, stairway railings and guards, fixed stairways, dockboards, portable ladders, fixed ladders, aisles and passageways, general condition of floors, open-sided floors, railings, and toeboards.
2. Some of the other types of emergencies/incidents for which Cola Cola should develop a contingency plan are as follows:
 - fires in the workplace or on the grounds
 - security for facilities and inventory
 - chemical release spills
 - natural disasters other than tornadoes, including earthquakes, hurricanes, floods, etc.
 - product recalls/tampering
 - power failures
 - bomb threats
 - riots/strikes
2. The following recovery procedures should be considered mandatory for all emergencies:
 - definition of responsibilities of those involved in the recovery
 - computer backups to allow for the continuance of operations
 - guide for successful recovery of operations after an emergency
 - procedures to ensure continued review and update of the emergency preparedness
 - business continuity plans

CHAPTER 25—TRANSPORTATION SAFETY PROGRAMS

ANSWERS—Quiz 1

1. a
2. b
3. a
4. b
5. a
6. d

7. c
8. A motor vehicle collision is any incident in which the vehicle comes in contact with another vehicle, person, object, or animal in a way that results in death, any degree of personal injury, or any extent of property damage, regardless of where the incident took place or who was responsible.
9. To ensure timely reporting of collisions, management can require a documented vehicle inspection before and after each trip.
10. To practice defensive driving, drivers must assume that other drivers will do the unexpected and will fail to observe normal traffic laws and safe driving practices.
11. Benefits of keeping a monthly record of a fleet's collision frequency rate include the ability to:
 - analyze changes in group safety performance
 - compare records from several years to find seasonal or other trends
 - compare the fleet's performance with similar fleets
 - establish safety performance goals
12. A company can investigate a prospective employee's driving record by checking the state motor vehicle department or license bureau for collision reports, and the National Driver Register service either for out-of-state or for two or more in-state license violations. A number of private services can provide motor vehicle record information electronically via computer within 24 hours.
13. The two federal agencies responsible for investigating air transportation incidents are the Federal Aviation Administration and the National Highway Transportation Safety Board and the Department of Transportation.
14. Typical indirect costs of a vehicle collision include the following:
 - salary paid and loss of service of employees injured in a collision
 - added workers' compensation costs resulting from a disabling injury
 - vehicle's commercial value while it is out of service, the cost of the replacement vehicle, or rental costs
 - cost of supervisory time spent in investigating, reporting, and cleaning up after the collision
 - poor customer and public relations resulting from a company vehicle having been involved in a collision
 - cost of replacing or retraining an injured employee
 - time lost by coworkers while discussing the nature of the collision and the extent of the victims' injuries
15. The five basic collision-prevention procedures include:
 - initiate a driver training program
 - develop standards to determine ways that collisions can be prevented
 - require immediate reporting of every collision

- recommend performance goals to management, compute and publish the fleet collision record
- establish competency, physical capacity, and skills levels; set objectives; and maintain a collision record for each driver

ANSWERS—Quiz 2

1. b
2. b
3. a
4. a
5. b, c
6. d
7. c
8. b
9. The objectives of a preventive maintenance program are to prevent collisions and delays; minimize the number of vehicles down for repair; stabilize the work load of the maintenance department; save money by preventing excessive wear and breakdown of equipment and unscheduled downtime.
10. The best jack for maintenance garage work is the hydraulic-over-air type.
11. Under DOT rules, transportation employers who must conduct drug-testing programs are required to test employees for marijuana, cocaine, opiates, amphetamines, and phencyclidine (PCP).
12. An organization's vehicle collision-prevention efforts should focus on driver error and vehicle failure.
13. The five elements that should be included in a vehicle safety program are as follows:
 - a written safety policy, developed, supported, and enforced by management
 - a person designated to create and administer the safety program and to advise management
 - a driver safety program, including driver selection procedures, driver training, and safety-motivating activities; proper supervision and implementation are mandatory for success
 - an efficient system for collision investigation, reporting, and analysis; determination and application of appropriate corrective action; follow-up procedures to help prevent future collisions
 - a vehicle preventive maintenance program

ANSWERS—Case Study

1. Workers in the lubrications area should never put their hands or face in front of the grease gun nozzle when the handle is pulled. There have been reports of quantities of grease being forced under the skin of workers by high-pressure grease guns. Workers should also be warned of the danger of inhaling sprayed or atomized oils. And they should know that tops of grease cylinders should be securely fastened into place; otherwise, covers may blow off and seriously injure anyone nearby.
2. Management should train workers to observe safety procedures whenever they are servicing or charging a battery. The principal hazards of battery charging operations are acid burns, back strains from lifting, electric shocks, slips, falls, and explosions from buildup of hydrogen gas. Employees should wear appropriate safety apparel.
3. The new employee, having been indoctrinated and trained to work safely, must be motivated to observe accepted safe practices while performing job tasks. Many motivational methods are available to accomplish this, including safety supervision; job safety analyses; job safety observations; and meetings, posters, safety bulletins, and pamphlets.

CHAPTER 26—OFFICE SAFETY

ANSWERS—Quiz 1

1. a
2. a
3. b
4. b
5. d
6. b, c
7. Falls are the most common office incident and account for the most disabling injuries.
8. The ANSI/NFPA National Electrical Code® requires ground-fault circuit interrupters to be used in restroom areas.
9. Employees can get bumped heads from getting up too quickly under open drawers, mashed fingers from improperly closing drawers, and hand injuries and strains from moving the cabinets.
10. When a fire is discovered, an employee should:
 - turn on the alarm
 - alert fellow workers
 - use the proper firefighting equipment (but only if the employee has been trained to do so and always has a safe path of escape while fighting the fire)
11. Office workers should receive training that focuses on incident prevention, fire prevention, fire emergency response, and medical emergency response.
12. Solid doors present a hazard because they can be approached from both sides at the same time and one person can be struck when the door opens. The

proper way to approach a solid door is away from the path of the opening door; reach for the door knob so that, if the door is suddenly opened from the other side, the hand receives the force of the impact rather than the face; open the door slowly if it opens outward.

ANSWERS—Quiz 2

1. b
2. a
3. b
4. a
5. c
6. a
7. Three factors to be considered when designing a seated workstation are visual demands, reaches required, and the muscular strength exerted to perform the task.
8. Rather than bifocals, the computer operator can use “computer glasses,” a full-frame prescription for the distance that is comfortable for viewing the screen. An option for those who need or prefer to use bifocals while at the computer is to lower the monitor so that they can see it comfortably through the bottom half of their bifocals without having to tilt their head.
9. Studies revealed a substantial increase in the number of injuries in the first year after a company moved into a new office building. The change upsets established routines and presents unknown hazards.
10. Occasionally even good quality desks and file cabinets will have a sharp burr or corner that must be removed. Also, drawers should have safety stops to prevent workers from pulling them out of the drawer slot.
11. Some waste containers made from plastic or other flame-resistant material may actually be combustible if subjected to fire or intense heat. Such fires can generate dangerous toxic gases and dense smoke that can easily endanger the whole office. To control for this hazard, use only metal or fire-safe tested materials designed to contain fire.

ANSWERS—Case Study

1. The primary components of an individual workstation are a computer, a desk or table, a telephone, and a chair.
2. The computer screen should be placed at or slightly below seated eye height and at a comfortable distance for reading. If the monitor is placed on top of the CPU, it can often be lowered by taking it off the CPU and placing it on the desktop. Then, if necessary, it can be raised a couple of inches by using risers.
3. Back/leg concerns are related primarily to the chair and the space under the work surface. There should be sufficient room for the operator’s legs so that the

operator doesn't have to lean forward to reach the keyboard. Some studies have shown that sitting increases the intradiscal pressure, and thus possibly the risk of back injury. The natural curves of the back should be maintained while sitting so that the pressures on the discs remain even from front to back. This means that the chair should have a convex curve that matches the small of the back. If the chair does not have such a curve, a back support pillow can help. The chair height should also be adjustable.

CHAPTER 27—LABORATORY SAFETY

ANSWERS—Quiz 1

1. a
2. a
3. b
4. b
5. d
6. d
7. a
8. a, d
9. d
10. The most cited OSHA standard covering laboratories is 29 CFR 1910.1450.
11. Poisons should be stored separate from all other chemicals and secured from unauthorized access.
12. Variables that impact the effectiveness of a fume hood are the sash-opening height, the amount of equipment in the hood, storage within the hood, air velocity, and hood location.
13. The Laboratory Standard covers workplace laboratories where relatively small quantities of hazardous chemicals are used on a nonproduction basis.
14. Gas-filled detectors and scintillation detectors are the two common types of portable radiation survey equipment.
15. The acronym "ALARA" stands for "as low as reasonably achievable."
16. "Laser" is an acronym for "light amplification by stimulated emission of radiation."
17. The three types of control measures that companies can use for laser hazards are engineering controls, administrative controls, and personal protective equipment.
18. Laser energy is the principal hazard of fiber optic devices.
19. Usually, laboratories are designed so that the HVAC system can maintain a negative pressure inside the lab in relation to the surrounding environment. This type of pressure relationship ensures that air moves from offices, hallways, and other nonlaboratory spaces into the laboratory. This relationship

will serve to minimize potential exposure to odors or contaminants generated by laboratory operations.

20. Clean room ventilation hoods typically push air away from the product and toward the worker, thereby potentially increasing employees' exposure to chemical vapors. The hot, dry, and windy environment is associated with a number of potential medical problems for workers, including dermatologic, allergic, and respiratory ailments. Also, it is not surprising that workers who operate in a constant, unchanging environment that is completely isolated physically and emotionally from the outside should report a myriad of psychological problems.

ANSWERS—Quiz 2

1. a
2. a
3. b
4. a
5. b, d
6. a
7. b
8. b
9. Some of the more common types of hazards that may be encountered in laboratories include biohazards, physical hazards, chemical hazards, and ionizing and nonionizing radiation.
10. Common safety interlocks that should be found on autoclaves include control lock-out switches that prevent cycles from starting if the door is not closed and locked, and mechanical steam pressure locks to prevent operators from opening a door while the chamber is under positive pressure.
11. Biological hazards, or biohazards, consist of pathogenic (disease-causing) microorganisms that could pose a risk to the health and physical well being of humans, animals, or other biological organisms.
12. The three elements of containment are laboratory practice and technique, safety equipment, and facility design.
13. Cryogenic liquids are extremely cold (below -130 F/90 C) refrigerated liquids normally stored at low pressures in specially constructed, multi-walled, vacuum-insulated containers.
14. An efficient, cost-effective means of controlling laboratory exposures to hazardous contaminants is by using local exhaust ventilation to remove contaminants at the source. Laboratory fume hoods function in this manner.
15. Time, distance, shielding, and quantity are the four basic concepts for radiation protection methods.

16. The Nuclear Regulatory Commission sets radiation protection standards and rules for radioactive materials.
17. Suitable emergency eyewash facilities should be available to all laboratories where there is the possibility of a hazardous material exposure. Laboratories using strong acids or caustics should locate an eyewash unit immediately adjacent to the hazard. In all other cases, eyewash units should be located on the same level as the hazard, and the path of travel should be free of obstructions that might inhibit the immediate use of the equipment. The eyewash facilities should be in accessible locations that require no more than 10 seconds to reach. An eyewash station should be capable of providing a flow of tepid water for at least 15 minutes at a flow rate of at least 0.4 gallons per minute.
18. Methods of controlling radiation exposures (doses) include posting signs marking radiation areas, restricting access to these areas or to radiation-emitting equipment, and training the users in safe procedures and practices. Workers can also be separated from the radiation hazard by distance or shielding with appropriate materials to reduce radiation received to below the maximum permissible dose.

ANSWERS—Case Study

1. The Occupational Exposure to Bloodborne Pathogens standard limits occupational exposure for all employees who could be “reasonably anticipated” as the result of performing their job duties to face contact with blood and other potentially infectious materials.
2. Universal precautions (treating body fluids/materials as if infectious) along with engineering and work practice controls are the primary control measures. The standard sets forth procedures to minimize needlesticks, minimize splashing and spraying of blood, ensure appropriate packaging of specimens and regulated wastes, and to decontaminate equipment or label it as contaminated before shipping to servicing facilities.
3. The training must include the following:
 - making accessible a copy of the regulatory text of the standard and explanation of its contents;
 - general discussion on bloodborne diseases and their transmission, exposure control plan, engineering and work practice controls, personal protective equipment, and hepatitis B vaccine;
 - response to emergencies involving blood;
 - how to handle exposure incidents;
 - the post-exposure evaluation and follow-up program; and
 - signs/labels/color-coding.

CHAPTER 28—CONTRACTOR AND CUSTOMER SAFETY

ANSWERS—Quiz 1

1. a
2. a
3. b
4. a
5. a
6. b
7. d
8. d
9. a
10. a
11. d
12. They should cover such items as new contractor employees, documentation of training given, summary of injuries and lost workdays, safety meetings conducted, and number of attendees.
13. Job safety inspections should be conducted by contractor or subcontractor managers, safety personnel, and supervisors.
14. Contributory negligence bars any financial recovery by an injured party if the victim contributed to the original incident in any way.
15. A hold-harmless clause in a contract agreeing that one party will assume all liabilities, losses, or expenses involved with an incident.
16. Some plastics have a higher impact resistance than glass. As a result some workers may find it harder to break plastic if they need to escape from an area.
17. The four basic criteria used to designate a high-rise structure are (1) the size of the building makes personnel evacuation impossible or impractical; (2) part or most of the building is beyond the reach of fire department aerial equipment; (3) any fire within the building must be attacked from within because of the building's height; (4) the building has the potential for "stack effect."
18. They are members of the public who like to watch construction projects. After consulting with local authorities and insurance representatives about regulations, some contractors build safe observation areas for them.
19. EMR stands for experience modification rate. It is used by the insurance industry to determine equitable premiums to charge companies for workers' compensation insurance. It takes into consideration average incident losses for a type of work and amount of payroll and predicts the dollar amount of expected losses due to work-related injuries and illnesses that an employer will pay over a set period of time. Generally, the lower a firm's rates, the better its safety record.
20. Handrails should be designed so that employees and patrons can grasp them firmly and slide their hands along them without encountering any obstructions. When designing handrails, keep in mind that a simple round profile allows the fingers to curl around the rail, "locking" the hand in place. The recommended maximum diameter for a typical handrail is two inches. A handrail should be in

a lighter color and kept clean. People seem more inclined to use light-colored railing than dark railing that looks dirty and greasy. A handrail should be continuous, extending from the top to the bottom of the staircase so that it may be grasped before stepping on the first step or leaving the last step. It should not extend into a passageway.

ANSWERS—Quiz 2

1. a
2. b
3. b
4. b
5. a
6. c
7. a
8. b
9. a
10. b
11. d
12. By recognizing the individuality of workers and respecting their experience, ideas, and feelings, a supervisor can enhance a contractor's adherence to safety practices.
13. Contractor safety practices and policies, experience modification rates (EMR) for workers' compensation insurance, and OSHA incidence rates for recordable injuries and illnesses are three sources of objective information on the safety performance of an outside contractor.
14. The plan should cover safety inspections, enforcement, staffing, permits required, testing for substance abuse, basic safety training, and incident reporting and investigation.
15. Comparative negligence requires a court to limit the recovery of an injured party based upon how much their own action contributed to the original incident.
16. An alternative is to keep straight lanes short and to provide sharp curves that force drivers to reduce their speed.
17. It should provide the safest vehicle, maintaining the vehicle in proper working order, and operating it with a trained, professional driver.
18. Either a lightweight, strong pole with blunt ends at least 12 ft (3.7 m) long or a ring buoy with a long throwing rope is a basic piece of life saving equipment that should be available at a pool.
19. Bumpers prevent drivers from driving forward through facing stalls and proceeding in the wrong direction down one-way aisles. They break up the huge expanse of an open parking lot that drivers may be tempted to cut across,

endangering pedestrians and other drivers. They also block cars from rolling down inclines or running through walkway areas. In terms of disadvantages, bumpers may require maintenance and may interfere with drainage or snow removal. They may reduce the flexibility of traffic flow and cause pedestrians to trip and fall.

20. Falls can occur many different ways for many different reasons. The primary mechanical causes of falls on floors are unobserved, misplaced, or poorly designed moveable equipment, fixtures, or displays; poor housekeeping; and defective equipment. The condition of a person's shoes or the type of soles or heels can be major factors in falls. Inadequate illumination can also lead to falls. Light values at floor level should be uniform with no glare or shadows and there should not be great contrasts in light levels between the floor and windows, for example. Personal factors might include age, illness, emotional disturbances, fatigue, lack of familiarity with the environment, and poor vision.

ANSWERS—Case Study

1. During its safety orientation with H.G. Electrix, Cornelia Manufacturing should address safety requirements at its facilities, including safety manuals and standards related to the proposed work. It should provide a detailed outline of its safety responsibilities, those of H.G.'s management, and those of H.G.'s workers. It should discuss any special hazards that may exist in the outbuildings and provide a list of hazardous materials and relevant MSDSs. Cornelia also needs to address training requirements and orientations for H.G. workers as well as a schedule for reviewing safety auditing and performance after the first few days on the job.
2. In addition to the inspections and weekly safety reviews that are already included in its safety monitoring program for contractors, Cornelia can require safety progress reports and summaries of the steps taken to correct problems. Progress reports can cover new contractor employees, document any training, summarize injuries and lost workdays, and note any safety meetings that were conducted and the number of attendees. A monitoring program may include a chemical screening program that is at least as strict as Cornelia's, as well as an annual evaluation, if applicable. In some cases, contractors may be audited to ensure they are complying with safety obligations. Finally, Cornelia should investigate any injury or illness that occurs at the facility, share the results with the contractor, and keep detailed files in the event of third-party litigation.
3. The owner, contractor and all sub-contractors are all ultimately responsible for the safety at a multi-employer site.

CHAPTER 29—HOMELAND SECURITY COMPLIANCE IN THE WORKPLACE

ANSWERS—Quiz

1. b
2. a
3. b
4. d
5. a
6. d
7. a. Toxic—refers to chemicals with the potential to create a toxic cloud beyond the facility, if released.
b. Flammable—refers to chemicals with the potential to create a vapor cloud explosion that would affect populations beyond the facility.
c. Explosives—chemicals with the potential to affect populations within and beyond the facility, if detonated.
8. Some challenges for the high-risk facility safety manager include being able to understand the rules of the Department of Homeland Security and tying those rules to the facility's accident prevention system already in place. In order to reduce the risk of accidents, some high-risk facilities must also implement site security plans and register them with DHS. Safety managers must study and be knowledgeable of the most final regulations (currently, Title 6 CFR, Part 27), and must know when to seek advice of an expert consultant on site security plans.

CHAPTER 30—MOTIVATION

ANSWERS—Quiz 1

1. a
2. b
3. a
4. a
5. b
6. b
7. c
8. a
9. b
10. a
11. c
12. Traditional approaches involved top/down communication, minimal employee participation, and dependence on discipline to influence behavior.
13. The “personal equation” is the known fact that people differ from one another. It is also referred to as “individual differences.”

14. Employees need to integrate these objectives into their job assignments with the same degree of mental and emotional effort they expend for other work objectives.
15. This approach is concerned with changing the environment in which a person works, including the circumstances surrounding the person on the job and the incentives given in exchange for work.
16. According to Mager and Pipe, the three questions that should be asked in identifying performance are What is the issue? Is it important? If yes, is it a skill deficiency?
17. This kind of attitude can generate counterproductive stress and lead to abuses in reporting or in the proper handling of employee injuries and illnesses.
18. Most learning is lost immediately after it takes place.
19. The behavior sampling technique, or activity sampling technique, is used to assess potential accident-producing behavior. It involves observing workers' behaviors at random intervals and classifying those behaviors according to whether they are safe or unsafe. Then calculations are made to determine either the percentage of time the workers are involved in at-risk practices, the percentage of workers involved in at-risk practices during the observation period, or the percentage of unsafe versus safe behavior observed. Management can apply various components of a safety program and, using this technique, see their effect on workers' behavior.
20. The first step is to identify critical behavior. This involves writing, in observable terms, what employees should do to properly perform their jobs. The next step is to conduct measurement through observation. In this step, trained observers watch the workplace to determine if the listed behaviors are performed safely or unsafely. The total number of observed behaviors is divided into the number of safe behaviors to obtain a percentage figure for safe behaviors. The final step is to give performance feedback. The figure for safe behaviors can be displayed in the workplace and updated at regular intervals after follow-up observation. Praise, recognition, and peer pressure can also encourage and reinforce safe behavior.

ANSWERS—Quiz 2

1. b
2. a
3. b
4. a
5. a
6. b
7. d
8. a

9. c
10. b
11. b
12. Individual differences, motivation, emotions, stress, attitudes, behaviors, and learning processes are the psychological factors that most directly affect the success of safety programs.
13. Whether or not an employee works safely depends on the present situation, past experiences, and workplace and methods design.
14. Validity is how well a test or an instrument measures what it is supposed to measure.
15. First, positive reinforcement is more efficient in achieving higher levels of safety performance than disciplinary actions focused on unwanted behaviors. Second, the closer in time reinforcement is associated with a behavior, the stronger its effect.
16. The main argument is that receivers may block out or suppress the message and that the effects of scare tactics are not long lasting.
17. Problems can arise when employees fail to report an injury or incident for fear that a promised incentive will not be awarded to them or to their work group.
18. Management leadership, supervision involvement, employee responsibility, safety support activities, and safety support climate are the five basic factors that an employee survey should cover.
19. In reality people are highly unlikely to be average. If body dimensions are taken as an example, less than 4% of a test group will have three common average dimensions and less than 1% will be average in five or more dimensions at the same time. Therefore, an appeal targeted at the “average person” misses much of the population. A better approach is to use percentiles and design a system to fit all but the upper 5% and lower 5% of a population. Then, it will apply to 90% of a population.
20. Affiliation-motivated people need to be accepted by others and feel they belong. They are motivated by needs that gain them acceptance by the group or retain their membership in the group. Achievement-motivated people are more concerned about the outcome of a task. They are not extreme risk takers and will try to offer solutions to problems rather than leaving the outcome to fate or chance. Employers can develop achievement-motivated workers by creating a need that has clear objectives, a reasonable probability of success, and measurable feedback.

ANSWERS—Case Study

1. Theory Y was developed by McGregor in 1985 in an attempt to analyze how management regards human motivation. It assumes the worker has the potential to be interested and motivated to work. As a result, management must organize work so the worker’s job coincides with the goals and objectives of the

company. In effect, management views the job as constructively using the worker's self-control and self-direction. By emphasizing responsibility and goal orientation, management capitalizes on the motivation already present within a worker. Conflicts between workers and management are resolved through mutual exploration and discussion. Theory Y assumes that the worker's inherent motivation is essential to accomplish a company's goals. If a company's goal is to provide a safe working environment, then a worker will naturally be motivated to do just that.

2. Frequency is the idea that people do best those things they practice most. The Human Resources Director feels that frequency is essential because it emphasizes the need to frequently apply safety practices in training programs and on the job. Of course, safety professionals and instructors must also emphasize following the correct method. By using safe methods on a daily basis, workers will develop safe habits that will become routine.
3. Recall is related to frequency, but also includes the idea that what was learned last usually can be most easily recalled. In other words, workers who were given a safety handbook months ago may not remember all the rules. The safety and health staff should make sure workers are constantly reminded of these rules through additional training, safety reviews, job safety analyses and observations, etc.
4. The law of primacy affects safety programs in two ways. First, a worker's initial contact with safety procedures must be positive and of major importance. If it is negative, a new worker will feel safety is unimportant. Second, in training programs, developing habits using safe methods is vital. The manager must be certain the worker does not learn how to work any other way than by the safe method.

CHAPTER 31—SAFETY AND HEALTH TRAINING

ANSWERS—Quiz 1

1. b
2. a
3. b
4. b
5. a
6. b
7. c
8. d
9. c
10. b
11. b
12. d

13. Training is one specific way to meet a safety or health need caused by lack of appropriate behavioral skills, related knowledge, and/or attitudes. It focuses on the present, providing information on the process necessary to accomplish task, objective, or goal. It focuses on improving performance through learning skills for behavioral change in the proper accomplishment of a task. Benefits of safety and health training include reinforcement of the operational goals, policies, and values of the organization; improved performance; a safer work environment with fewer incidents/accidents; increased morale; increased safety and health awareness; and reduced costs.
14. Students may use specific or general examples. A specific example is as follows: a supervisor may offer a bonus to the employee with the best overall safety record. General examples include the following: job aids, reference manuals, help desks or hotlines, reward systems, improved physical work environments, and improved work processes.
15. The four parts of an effective objective (sometimes referred to as the ABCD method of objective writing) are (1) always identify the learners (audience), (2) identify what learners must do in order to demonstrate mastery (behavior), (3) identify what learners will be given or not given in order to do the behavior (condition), and (4) specify how well the audience members must perform the behavior (degree).
16. The ground rules for a brainstorming session are as follows: ideas presented are not criticized, freewheeling creative thinking and building on ideas are positively reinforced, as many ideas as possible should be presented quickly, and combining several ideas or improving suggestions is encouraged.
17. The four steps of job instruction training (JIT) are preparation, presentation, performance, and follow-up.
18. OJT is widely used because it allows the worker to produce during the training period. Considerations to address include the following: (1) the trainer must possess proper training skills, (2) a training program should be developed to ensure that all workers are trained in the same way to perform their tasks in the safest and most productive manner, and (3) adequate time must be allotted to the trainer and trainee to be sure the subject is well covered and thoroughly understood.
19. The four needs common to all adult learners are as follows: (1) Adults need to know why they are learning a particular topic or skill because they need to apply learning to immediate, real-life challenges. (2) Adults have experience that they apply to all new learning. (3) Adults need to be in control of their learning. (4) Adults want to learn things that will make them more effective and successful. Examples for how these needs can be met can be taken from class discussion, from personal experience, or from one of the situations as described in the text.

ANSWERS—Quiz 2

1. a
2. b
3. b
4. a
5. b
6. b
7. a
8. a
9. c
10. c
11. c
12. d
13. Performance-based training is a learning experience that is implemented to solve a specific, on-the-job problem or to encourage a specific behavioral change, and can be evaluated by analyzing a worker's performance.
14. Student must name and describe one of the following: instructor-led training; self-paced training; computer-based training; structured on-the-job training.
15. A needs assessment is important to an organization because it helps to distinguish between training and nontraining needs; understand the problem or need before designing a solution; save time and money by ensuring that solutions effectively address the problems they are intended to solve; identify factors that will impact the training before its development.
16. A major advantage of a home-study course is that the worker does not lose any time from work and can complete the course at his or her own pace. Another advantage is the low cost of home-study programs.
17. Trainers may be selected for their availability rather than for their training skills. Each trainer may have his or her own way of performing the tasks being taught; this lack of continuity can make it difficult to control hazards in the workplace and lead to many accidents. Key elements of orientation can be overlooked in the training program and may not be realized until an incident or accident occurs. Poor techniques or bad habits can be spread from one worker to another. Safety performance may not be emphasized during the training.
18. This fact is attributed to the inexperience of new employees, their unfamiliarity with procedures and facilities, and their zealotry to do the work.
19. Text, graphics, examples, job aids, checklists, graphs, tables, data, reports, relevant articles, glossary, table of contents are types of materials that help workers organize and remember the important facts.
20. Company orientation: history and goals; policy statements; benefit packages; organized labor agreements; safety and health policy statement; acceptable dress code; personnel introductions; housekeeping standards; communications about hazards; personal protective equipment; emergency response

procedures; incident reporting procedures; near-miss incident reporting; incident investigation; lockout/tagout procedures; machine guarding; electrical safety awareness; ladder use and storage; confined space entry; medical facility support; first aid/CPR; hand tool safety; ergonomics principles; eyewash and shower locations; fire prevention and protection; access to exposure and medical records.

ANSWERS—Case Study

1. Some of the subjects that should be covered as part of an orientation program include the following:
 - company history and goals
 - policy statements
 - benefit packages
 - organized labor agreements
 - safety and health policy statement
 - acceptable dress code
 - personnel introductions
 - housekeeping standards
 - communications about hazards
 - personal protective equipment
 - emergency response procedures
 - incident reporting procedures
 - near-miss incident reporting
 - incident investigation
 - lockout/tagout procedures
 - machine guarding
 - electrical safety awareness
 - ladder use and storage
 - confined space entry
 - medical facility support
 - first aid/CPR
 - hand tool safety
 - ergonomics principles
 - eyewash and shower locations
 - fire prevention and protection
 - access to exposure and medical records
2. Some of the group training methods are conference, brainstorming, case study, incident process, facilitated discussion, role playing, lecture, question and answer, and simulation.
3. Some individual training methods are drill, demonstration, testing, video-based training, computer-assisted training, reading, independent study, seminars, and short courses.
4. The four-point method of job instruction training is preparation, presentation, performance, and follow-up.

CHAPTER 32—MEDIA

ANSWERS—Quiz 1

1. a
2. a
3. b
4. b
5. d
6. b
7. Expert, mentor, and facilitator are three roles the trainer can use.
8. Management must consider what the expenditure will buy, how quickly the material will be outdated, how it will be used, and how many students will view it.
9. Titles, lists, organization charts, and tables are the four styles of text charts.
10. Some advantages are: programs can be tailored for each audience; the user can integrate words, pictures, video, and audio; such programs allow for automatically generating handouts of the presentation so that the audience can follow and take notes as needed.
11. Some criteria to be considered when evaluating media materials are appearance, audio, and props. Did the media help make the presentation more clear? Did it reinforce what was being taught?
12. Trainers should consider using a production firm specializing in translations to do voice-overs, or narration, for the video. For maximum effectiveness, use a competent, experienced organization that is sensitive to nuances of language and cultural differences.

ANSWERS—Quiz 2

1. b
2. b
3. a
4. c
5. a, c
6. b
7. A medium is a channel of communication. It can be anything that carries information between a source and a receiver.
8. These factors include the number of showings, how many people will be delivering the training, size and composition of the audience(s), degree of customizing, and the importance of the message.
9. The advantages of videos and DVDs for technical training include the following:
 - it allows for the job site to be brought to the classroom
 - it is an easy-to-use and familiar format

- it provides instant replay
 - it is a readily available format
10. Conceptualization and simulation are two types of interactive materials often stressed in computer learning.
 11. Aerospace, electrical, firefighting, and NASA are industries that have used simulations in training.
 12. Three advantages of interactive training are reduced learning time, reduced delivery costs per student, and reduced risk.
 13. The benefits of computer-based training include more efficient learner-centered training; more timely training; and an increased student-to-instructor ratio. Drawbacks include the cost and time necessary to develop or purchase high-quality training based on specific training needs; its standardization (if used without an instructor, students may learn to respond with the “correct” answer but not understand the answer); and its impersonal nature.
 14. Trainers can choose to use computer-managed training with computer-based training. Under computer-managed training, computers monitor students on their learning time, attendance, and participation; the training materials students have used; tests taken; and the final results achieved. The computer can keep track of how a student performs and suggest additional materials or extra drill, if the performance needs improvement. If some students complete the modules ahead of schedule and are ready for a higher level of training, the computer can generate a list of names for the instructor’s review.

ANSWERS—Case Study

1. To get the most out of training, managers must establish clear objectives early in the development of training programs. Once they know what they need to accomplish, they can begin to concentrate on the details of how to achieve the objectives.
2. The four components of behavioral objectives are as follows: (1) audience: describes learner characteristics; (2) behavior: describes what learners must do to demonstrate mastery; (3) condition: describes what learners will and will not be given to perform behavior; and (4) degree: describes how well learners must perform (standard performance).
3. Management must consider what the expenditure will buy, how quickly the material will be outdated, how it will be used, and how many students will view it.

CHAPTER 33—SAFETY AWARENESS PROGRAMS

ANSWERS—Quiz 1

1. a
2. b
3. a

4. b
5. b
6. d
7. b
8. d
9. b
10. c
11. b
12. The six basic human interest factors that can be used to create interest in a safety campaign are fear, pride, recognition, participation, competition, and financial gain.
13. First, managers should learn how to keep working conditions as safe as possible. Second, they must know how to motivate workers to follow safe procedures consistently, as part of good job performance.
14. Public utility crews hold this kind of meeting around their work trucks before starting a new job. They discuss the job, lay out the tools, and agree on each person's responsibilities.
15. Workers are kept on their toes for longer periods of time and, as a result, safe working practices are more likely to become habits.
16. A stunt that ridicules may give the people who were the objects of the stunt just cause to blame management for not setting up safe procedures or providing safe facilities and equipment.
17. They are the company workforce, the people who buy the company's products, and the people who may help the company in some other direct and profitable way.
18. The basic guidelines are use short sentences, simple words, and brief paragraphs.
19. The basic role of a safety and health committee is to create and maintain interesting safety and health and help reduce incidents. However, some companies believe there are drawbacks to formal committees. They feel the committees require a disproportionate amount of administrative time, appear to pass the buck, and sometimes stir up more trouble than they are worth. In some cases, they may turn out to be a scapegoat for supervisors who want to unload their responsibilities. In these cases, the role of the committee needs to be reexamined and constructive changes implemented to lead the committee back to its original goal. Rotating membership on the committee might be one way to do this.
20. To offset differences between departments, management can establish handicaps based on annual rates set by insurance companies or on average incident frequency for the different kinds of work the departments do. OSHA is a reliable, impartial resource for these numbers; an issue that is important to workers who want to be sure the criteria are fair. Another way to overcome

differences between departments is to base standings on improvement over past records. Using this method, the percentage change will indicate a department's progress. Usually an average of rates for the previous three to five years is used.

ANSWERS—Quiz 2

1. b
2. a
3. a
4. b
5. a
6. d
7. c
8. a
9. d
10. b
11. c
12. The three main indications that a safety campaign is needed in a workplace are an increased rate of injuries, incidents, and near-misses; deteriorating housekeeping and unused protective equipment and guards; and incomplete or missing incident reports.
13. He or she is responsible for translating management's policies into action and for promoting safety activities among the employees.
14. First, management wants to use all available resources to increase productivity and quality in the face of growing competition and, second, management understands employees want to accept new challenges and participate in activities that affect their work life.
15. A housekeeping walk offers visibility to the members of the safety committee and may prompt discussion on specific topics that need correcting.
16. When a safety professional evaluates a company's PR efforts, he or she needs to ask (1) whether the company has a PR department and (2) whether there is an employee publication in the company.
17. Awards for these suggestions are usually made in proportion to the saving derived by the company.
18. The foremost warning is do not cover up bad news. Good media relations are of utmost importance.
19. The measure of safety performance for an injury rate contest is OSHA's incidence rate. These kinds of contests should not be based on injury severity or a combination of severity and frequency. Determining severity is subjective and does not really contribute to incident prevention. Contests should not be based on reducing the amount of injuries because employees will simply stop reporting them. For this reason, injury rate contests carry an inherent risk of

possible abuse. In addition to these drawbacks, peer pressure may cause some people not to report injuries and some administrators may feel pressure not to record injuries. These issues tend to make management focus more on the contest than on safety. As a result, the entire program is discredited.

20. A report on the progress of a safety program might include the cost of incidents and the costs of prevention in terms that are significant to management. These costs include medical and compensation costs, production losses, sales losses, and increased maintenance costs incurred by incidents in the workplace. They also cover the hidden costs involved in administration problems and in affected public, customer, and employee relations. The report might describe safety achievements and compare incident rates and losses among departments. The fact that a company compiles and possibly publicizes safety information is an incentive to supervisors and employees. It reminds them that incident costs are as much a part of profit and loss as production, sales, maintenance, distribution, and advertising.

ANSWERS—Case Study

1. The six basic human interest factors are fear, pride, recognition, participation, competition, and financial gain. Visual materials, such as shocking posters or dramatic film, may play on workers' sense of fear. Trophies, awards, and letters of appreciation for safe workmanship could be used to appeal to the workers' sense of pride. Newsletters or photos that publicize safe work practices are one way of appealing to the desire for recognition. Having groups or individuals join in safety committees or campaigns plays to the desire to participate and "be one of the gang." Contests with attractive prizes appeal to competitive interests; monetary awards, including promotions and profit-sharing plans, appeal to workers' desire for financial gain.
2. Safety circles are a way to get employees actively involved in safety issues. Companies use them to reduce the number of unintentional injuries by keeping safety and all its important features foremost in the minds of employees. This implies a change in the employee's role from passive to active, while management's role becomes less negative and more positive. In many cases, safety circles are set up on a plant-wide and departmental level. They are generally held monthly for approximately one-half hour to one hour. Each meeting is generally preceded by a presentation covering the successes and problems the team experienced during the preceding month. The team reviews all injuries, including first-aid cases, as a means of measuring safety progress and pinpointing trouble areas. Usually each member is assigned a specific responsibility to review. Companies that use the safety circle concept report an improvement in their incident and injury experience.
3. Award presentations help build better employee relations and promote interest in safety issues, so it is important they are successful. They require planning and should be in keeping with the importance of an occasion. The chosen location should be appropriate, not noisy or crowded. An individual award

might be made in an executive office, for example, while a group award might be made in a conference room. Participants should know the agenda and those making the presentation should familiarize themselves with the significance of the award, the achievement it recognizes, and the background of the individual who earned it. In some cases, press coverage might be appropriate. Inviting VIPs to a presentation not only adds prestige, it shows their interest and commitment to safety.