

1—HISTORICAL PERSPECTIVES

1. The six reasons for preventing injuries and occupational illnesses, as given in the text, are:
 - a. Needless destruction of life and health is morally unjustified.
 - b. Failure to take necessary precautions against predictable accidents and occupational illnesses makes management and workers morally responsible for those accidents and occupational illnesses.
 - c. Accidents and occupational illnesses severely limit efficiency and productivity.
 - d. Accidents and occupational illnesses produce far-reaching social harm.
 - e. The safety movement has demonstrated that its techniques are effective in reducing accident rates and promoting efficiency.
 - f. Recent state and federal legislation mandates management responsibility to provide a safe, healthful workplace.
2. The four components of the factory system that emerged at that time:
 - a. Substitution of mechanical energy for animal sources of power, particularly steam power through the combustion of coal
 - b. Substitution of machines for human skills and strength
 - c. Invention of new methods for transforming raw materials into finished goods, particularly in iron and steel production and industrial chemicals
 - d. Organization of work into large units, such as factories or forges or mills. This made possible direct supervision of the manufacturing process and an efficient division of labor.
3. The textile industry introduced the factory system in the United States.
4. Fellow servant rule—Employer was not liable for injury to an employee that resulted from negligence of a fellow employee.
5. Contributory negligence—Employer was not liable if the employee was injured due to his own negligence.
6. Assumption of risk—Employer was not liable because the employee took the job with full knowledge of the risks and hazards involved.
7. Theodore Roosevelt
8. Wisconsin
9. The railroad industry was the first to realize that the actions of people were important in creating accident situations.
10. 1912
11. engineering, education, and enforcement
12. List the three trends in safety work and the safety profession that have emerged from the prevention and control measure concepts of the 1950s.
 - a. First, more emphasis is being placed on analyzing the loss potential of any organization or projected activity.
 - b. Second, industry is developing more factual, unbiased, and objective information about loss-producing problems and accident causation to help those who are ultimately responsible for worker health and safety make sound decisions.
 - c. Third, management is making greater use of the safety and health professional's knowledge and assistance in developing safe products.
13. List the necessary elements for a joint safety and health activity to be successful in any workplace.
 - a. A sincere commitment to the safety and health effort must be displayed by both labor and management leaders in the workplace.
 - b. Specific roles and responsibilities should be defined for all committee members.
 - c. An effective communication link with feedback to workers from committee members must be established between the committee members and all employees in the workplace.
 - d. Measurable, realistic goals and objectives should be established for committee activity.
14. a. Walsh-Healy Act
15. a. One or more employees
b. Businesses affected by interstate commerce
16. List four factors that have spurred the drive for international standardization of health and safety regulations.
 - a. Emerging global markets have intensified the need for international standardization.
 - b. Worldwide technological innovations result in changes to industrial methods and organizations that threaten worker and consumer safety.
 - c. The rapid pace of change in science and technology is outstripping standards development in most countries.

- d. Developing countries' efforts to industrialize means they may downplay safety and health regulations in favor of rapid economic growth.
17. List five employer obligations relating to the safety and health of workers stated in the Framework Directive (89/391/EEC) of ISO 9000 and ISO 14000.
- Taking the measures necessary for their safety and health, bearing in mind technical progress
 - Evaluating hazards and instructing workers accordingly
 - Setting up protection and prevention services—for example, the precision of safety and health practitioners—within the workplace, possibly by enlisting competent external services or persons
 - Organization of first aid
 - Evacuation of workers in the event of serious damage.
18. List three employee obligations relating to the safety and health of workers stated in the Framework Directive (89/391/EEC) of ISO 9000 and ISO 14000.
- 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. The death calendar used by the Russell Sage Foundation in Allegheny County, Pennsylvania, made it clear that the accident and death rate was serious and gave the safety movement a much-needed boost.
20. Since World War II, the growth of safety procedures and policies intensified, particularly as the federal government began encouraging its contractors to adopt safe work practices.
21. The purpose of an occupational safety and health committee is to make the workplace a safer, healthier environment. An independent committee can be important for several reasons:
- It allows representatives of the union to meet and consider the safety of the workplace, without any interference from management.
 - It gives the union its own forum to discuss and set priorities and strategies for dealing with workplace hazards.
 - It allows the committee members to gain appropriate expertise in researching hazards and seeking effective solutions. (Note that there is an important difference between gaining expertise and becoming an expert.)
 - It can be used to monitor the performance of a joint union-management committee, if one exists.
 - If a joint committee runs into roadblocks or becomes ineffective and the union side withdraws, the union will already have a structure for handling safety and health concerns.
22. Experience has shown that certain elements are necessary for a joint safety and health activity to be successful in any workplace:
- A sincere commitment to the safety and health effort must be displayed by both labor and management leaders in the workplace.
 - Specific roles and responsibilities should be defined for all committee members.
 - An effective communication link must be established between the committee members and all employees in the workplace. This includes feedback to workers from committee members.
 - Measurable, realistic goals and objectives should be established for committee activity.
23. Management must address serious emerging issues in worker health and safety law. These issues include off-the-job safety and ways to deal with the special problem of employees who are at risk in the work environment because of physical condition, language problems, or particular susceptibility to injury or disease. Another issue is the burgeoning paperwork required to comply with OSHA and other agency record-keeping regulations, with the Medical Access Standard, and with the Hazard Communication Standard. Industry accepts almost without question the concept of financial responsibility for work injuries. Not all of industry, however, is convinced of the cost effectiveness of government regulation of safety procedures.

2—THE SAFETY, HEALTH, AND ENVIRONMENTAL PROFESSIONAL

1.
 - a. Identification and appraisal of incident- and loss-producing conditions and practices and evaluation of the severity of the incident problem.
 - b. Development of incident-prevention and loss-control methods, procedures, and programs.
 - c. Communication of incident- and loss-control information to those directly involved.
 - d. Measurement and evaluation of the effectiveness of the incident- and loss-control system and the modifications needed to achieve optimum results.
2. “First, ensure reasonable protection for the health of individuals” may be the safety, health, and environmental professional’s guide to follow.
3. Increasing impact of global standards, and public concern that the workers in developing countries who make products for the U.S. market will be provided safe working conditions.
4. Establishing public trust, reducing costs, retaining good workers, and increasing productivity.
5.
 - a. Lawsuits against corporations do not usually include claims against the individual employees who acted for the company. Most corporate systems include provisions that indemnify or pay the costs of defense of employees who are sued when performing their assigned duties. In the event that an individual safety, health, and environmental manager is sued, the employer will probably pay the legal expenses to have the individual suit dropped.
 - b. Where the safety, health, and environmental professional is acting as a consultant, the vulnerability to lawsuits is a constant cost of doing business. An adequate insurance policy for professional “errors and omissions” should be maintained. The consultant upon whose advice a company relies has a possible vulnerability for professional negligence if he or she does not meet the normal standard of care for similar advisors within that area or subject of expertise.
6.
 - a. Opportunity to expand knowledge of potential hazards of new technology.
 - b. Opportunity to respond quickly to newly identified risk issues to maximize worker protections.
 - c. Opportunity to apply experience and knowledge of human-machine interactions to new product development in a product stewardship role.
 - d. Opportunity to be diplomatic, creative, and date-focused about indoor air quality issues.
 - e. Opportunity to shift focus to more subtle, more difficult to manage, tailored protection of health and safety.

3—SAFETY CULTURE

1. Expectations, support, mutual respect, progressive discipline where needed (open-ended question).
2. Management must show a leadership interest in positive encouragement of safe work practices, and an atmosphere that rewards and praises attention to safe work practices. Walking the talk is important; CEOs should show personal commitment toward safe workplaces.
3. Government gives information about risks and inspects and monitors training related to hazards.
4. Safe behaviors have a positive influence on holding down the experience-related premiums that employers must pay toward workers' compensation claims.

4—REGULATORY HISTORY

1. The purpose of the Williams-Steiger Act or OSHA Act (Public Law No. 91–596 found in 29 United States Code (USC) §§651-678) is “to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources.” The OSHA Act is regarded by many as landmark legislation because it goes beyond the present workplace and considers long-term health hazards in the working environment of the future.
2. Prior to the 1960s only a few federal laws directed any attention to occupational safety and health. Several pieces of legislation passed by the Congress during the 1960s focused industry attention on occupational safety and health. Each of these federal laws was applicable only to a limited number of employers. The laws were either directed at those who had obtained federal contracts, or they targeted a specific industry. Even collectively, all the federal safety legislation passed prior to 1970 was not applicable to most employers or employees. There was little attempt to establish the omnibus coverage that is a central feature of the OSHA Act.
3. Labor’s position was based on the following:
 - a. In general, states had inadequate safety and health standards, inadequate enforcement procedures, inadequate staff with respect to quality and quantity, and inadequate budgets.
 - b. In the late 1960s, approximately 14,300 were killed annually on or in connection with their job and more than 2.2 million employees suffered a disabling injury each year as a result of work-related accidents. The injury/death toll was considered by most to be unacceptably high.
 - c. The nation’s work-injury rates in most industries were increasing throughout the 1960s. Because the trend was moving in the wrong direction, proponents of federal intervention felt that national legislation would help to reverse this trend.
4. The two organizations that are vested with the administration and enforcement of the OSHA Act are
 - a. The Secretary of Labor and Assistant Secretary of Labor for OSHA
 - b. The Occupational Safety and Health Review Commission (OSHRC) as an appellate agency. With respect to the enforcement process, the Secretary of Labor, through the Assistant Secretary, performs the investigation and prosecution aspects, and the OSHRC performs the administrative adjudication portion, with possible appeal through the courts.
5. The Occupational Safety and Health Review Commission is a quasi-judicial board of three members appointed by the president and confirmed by the Senate. The principal function of the Commission is to adjudicate cases when an enforcement action taken by OSHA against an employer is contested by the employer, the employees, or their representatives.
6. The primary functions of NIOSH are:
 - a. to develop and establish recommended occupational safety and health standards
 - b. to conduct research experiments and demonstrations related to occupational safety and health
 - c. to develop educational programs to provide an adequate supply of qualified personnel to carry out the purposes of the OSHA Act.
7. The five main technical services provided by NIOSH are:
 - a. Hazard evaluation—On-site evaluations of potentially toxic substances used or found on the job.
 - b. Technical information—Detailed technical information concerning health or safety conditions at workplaces, such as the possible hazards of working with specific solvents, and guidelines for use of protective equipment.
 - c. Accident prevention—Technical assistance for controlling on-the-job injuries, including the evaluation of special problems and recommendations for corrective action.
 - d. Industrial hygiene—Technical assistance in the area of engineering and industrial hygiene, including the evaluation of special health-related problems in the workplace and recommendations for control measures.
 - e. Medical service—Assistance in solving occupational medical and nursing problems in the workplace, including assessment of existing medically related needs and development of recommended means for meeting such needs.
8. The final responsibility for compliance rests with the employer.

9. The two voluntary programs that have been established are Star and Merit. OSHA's Star Initiative, the agency's most demanding and prestigious voluntary protection program, is for work sites with outstanding workplace safety and health systems.
10. Federal safety standards are published in the Federal Register prior to their being brought up for formal consideration to be enacted into law.
11. The two types of variances that OSHA can grant are:
 - a. Temporary
 - b. Permanent
12. Employers must report to OSHA within eight hours after an accident occurs that is fatal to one or more employees or that results in the inpatient hospitalization of three or more employees.
13. b. No
14. The five categories of violations:
 - a. Willful
 - b. Serious
 - c. Repeat
 - d. Other than serious
 - e. De minimis (very minor)
15. The four steps a compliance safety and health officer must take to determine that a violation is serious are to evaluate:
 - a. The type of accident or health hazard exposure which the violated standard or the general duty clause is designed to prevent.
 - b. The type of injury or illness which could reasonably be expected to result from the type of accident or health hazard exposure identified in Step 1.
 - c. Whether the types of injury or illness identified in Step 2 could include death or a form of serious physical harm.
 - d. Whether the employer knew, or with the exercise of reasonable diligence, could have known of the presence of the hazardous condition.
16. In contesting an OSHA action, the employer must notify the Area Office which initiated the action that the employer is to contest the case. This must be done within 15 working days after receiving OSHA's notice of proposed penalty; it should be sent by certified mail. If the employer does not contest within the required 15 working days, the citation and proposed assessment of penalties are deemed to be a final order of OSHRC and are not subject to review by any court or agency. Employers should then request an informal conference with the Area Director or the Area Director's representative. Many times such informal sessions will resolve questions and issues, thus avoiding the formal contested case proceedings.
17. Employee medical records should be retained by employers for 30 years from the termination date of the employee.
18. The basic purpose of the HCS is to establish uniform requirements to make sure that the hazards of all chemicals produced, imported, or used within the United States are evaluated.
19. The quality of a hazard communication program depends on the accuracy of the initial hazard assessment.
20. The producer of the MSDS is responsible for the information on it and must ensure that all sheets are up to date.
21. With some exceptions, OSHAct applies to every employer in all 50 states and U.S. possessions who has one or more employees and who is engaged in a business affecting commerce. Specifically excluded from coverage are all federal, state, and local government employees. Employees of states and political subdivisions of the states are excluded from the federal OSHAct. However, states with approved state plans are required to provide coverage for these public employees. Public employees in states without approved plans are not covered by the OSHAct in any manner. The OSHAct also does not apply to those operations in which a federal agency (and state agencies acting under the Atomic Energy Act of 1954), other than the DOL, already has the authority to prescribe or enforce standards or regulations affecting occupational safety or health and is performing that function. Also excluded from the OSHAct are operators and miners covered by the U.S. Mine Safety and Health Act of 1977.
22. Employers have 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 (this is commonly known as the "general duty clause") and the specific duty of complying with safety and health standards

promulgated under the Act. Each employee has the duty to comply with the safety and health standards and with all rules, regulations, and orders that apply to employee actions and conduct on the job.

23. The purpose of OSHA's Voluntary Protection Program (VPP) is to emphasize the importance of, encourage the improvement of, and recognize excellence in employer-provided, site-specific occupational safety and health programs.
24. A firm's accident record must meet stringent criteria. In addition, the work site must have an effective, comprehensive safety and health program, including:
 - Management commitment and accountability—The agency has found that top-flight safety and health programs have strong corporate commitment and accountability, including written, clearly defined assignment of responsibility for worker protection at every level of management.
 - Hazard assessment—This means a comprehensive inventory of potential safety and health hazards and includes periodic review and updating, especially when processes are changed or new substances are introduced. Effective hazard assessment also includes an effective mechanism for inviting and responding to worker notices of possible hazards.
 - Safety rules and enforcement—Star participants have their own policies and procedures that go beyond the protection specified by OSHA standards.
 - Employee training—In addition to formal training, many participants have regular safety meetings and toolbox meetings where safety procedures are reviewed.
 - Self-evaluation—Comprehensive safety and health program audits ensure that the program continues to be an effective system for communicating to employees the company's commitment to safety and health and efficient procedures for responding to employee concerns and suggestions.
25. It provides the opportunity to discuss the issues raised.
26. The regulations pertaining to state plans for the development and enforcement of state standards are codified in Title 29 CFR, Chapter XVII, Part 1902. The basic criterion for approval of state plans is that

the plan must be at least as effective as the federal program.

27. The OSHA Act has given employees a significant role to play in occupational safety and health matters. It has raised occupational safety and health issues to a higher priority in business management. It has given new status and responsibility to professionals working in the occupational safety and health field. And, the Act has bestowed a new status to nationally recognized organizations that develop industry standards. The OSHA Act has encouraged greater training for professionals in occupational safety and health. The OSHA Act also gave new emphasis to the product safety discipline.

5—SAFETY PROFESSIONALS AND IMPACTS OF THE LAW

1. Worker safety rules may arise at the federal level and in states, as well. The 1970 OSHAct allows individual states to adopt their own occupational safety and control systems, which must be at least as effective as comparable federal standards.
2. Employers are responsible for becoming familiar with standards applicable to their industry and to ensure that employees have access to and use personal protective equipment when required for safety. In cases where OSHA has not promulgated a specific standard, the general duty clause applies, which states that each employer “shall furnish... a place of employment which is free from recognized hazards that are causing or are likely death or serious physical harm to his employees.”
3. Penalties may be used by regulatory agencies for violations that range from the least serious—a de minimis violation, to the most serious—a willfull violation. Citation and penalty procedures may differ in states with their own occupational safety and health programs.
4. OSHA regulations are adopted under the recommendation of the national Institute for Occupational Safety and Health (NIOSH). A branch of the Centers for Disease Control (CDC), NIOSH conducts research on safety and health issues, provides scientific and technical assistance to OSHA, and recommends to OSHA standards for adoption.
5. Memoranda and e-mails build a record that can be helpful or harmful to an incident investigation. The safety professional must be mindful that any written account of a safety topic in the workplace may be used in litigation.

6—LOSS CONTROL PROGRAMS

1. The benefits of hazard analysis are:
 - a. It forces the conductors of the analysis to view each operation as a part of a system.
 - b. It identifies hazardous conditions and potential accidents.
 - c. It provides information so effective control measures can be established.
 - d. It can determine the level of knowledge, skill, and physical requirements workers need to perform specific tasks.
 - e. It can discover and eliminate unsafe procedures, techniques, motions, positions, and actions.
2. The purpose of ranking hazards by risk is to figure out which hazards are the worst. By doing so, a consistent guide for corrective action will be established. The ranking will specify which hazardous conditions warrant immediate action, which have secondary priority, and which ones can be addressed in the future.
3. Once a vendor takes on a responsibility within a workplace, the vendor is legally accountable for harm caused by its negligence, and the vendor can be sued either by the facility owner or by the worker who is injured. Types of negligence include the usual mistakes that allow accidental injuries; omissions of care that should have been taken such as loading containers properly; and negligence that results from the violation of an applicable law or rule.
4. Injured workers cannot usually sue their employers because of the legal barrier of workers' compensation as an "exclusive remedy." Some states allow exceptions where the employer's conduct was so bad that it knew or should have known that injury was "substantially certain" to occur to this worker; these are the so-called "intentional tort" laws.
5. Workplace safety is predominantly regulated by the Labor Department's Occupational Safety and Health Administration (OSHA) and the several states that administer OSHA "state plans."
6. No, "strict" liability means the prosecutor has no obligation to demonstrate fault or knowledge by the defendant, and the conviction can be obtained from the person's responsible relationship to the act or omission, whether or not the person knew that act was occurring.
7. The contract can be cancelled; the individual can be debarred from any future involvement with government contracts; and the company or organization can be disqualified from bidding on any future government contracts.
8. Hazardous conditions can be either eliminated or controlled:
 - a. At the source (substitute a less harmful agent for the one causing the problem, e.g., toxic to non-toxic, flammable to nonflammable).
 - b. Along its path (e.g., install machine guards to prevent unwanted contact by workers; put up protective curtains to prevent sparks and welding arc flash; install an exhaust system to remove toxic vapors from breathing zones of workers).
 - c. At the worker (e.g., employ automated or remote control options; provide a system of worker rotation or reschedule operations when there are few workers in the plant; provide personal protective equipment).

7—SAFETY, HEALTH, AND ENVIRONMENTAL AUDITING

1. A methodical examination of a facility's procedures and practices that verifies whether they comply with legal requirements and internal policies and evaluates whether they conform to good safety, health, and environmental practices.
2. Any six of the following:
 - a. To determine and document compliance status
 - b. To improve overall safety, health, and environmental performance at operating facilities
 - c. To assess facility management
 - d. To increase the overall level of safety, health, and environmental awareness
 - e. To accelerate the overall development of S/H/E management control systems
 - f. To improve the safety, health, and environmental risk management system
 - g. To protect the company from potential liabilities
 - h. To develop a basis for optimizing safety, health, and environmental resources
 - i. To assess facility management's ability to achieve S/H/E goals.
3.
 - a. Organizational boundaries—address which of the company's operations are included in the auditing program, such as manufacturing, R & D, and distribution.
 - b. Geographical boundaries—address how far or wide the program applies, such as state, province, regional, national, or international.
 - c. Locational boundaries—address what territory is included in a specific audit, such as activities within the facility boundary, off-site manufacturing or packaging, off-site waste disposal, local residences, and a nearby river or lake if there is a potential for environmental damage.
 - d. Functional areas—define which subject areas are included, such as air and water pollution control, solid and hazardous waste management, employee safety, industrial hygiene, occupational medicine, fire and loss prevention, process safety, and product safety.
 - e. Compliance boundaries—define the standards against which the facility is measured, such as federal, provincial, regional, and local laws and regulations; corporate or division policies, procedures, standards, and guidelines; local facility operating procedures; or standards established by an outside group.
4.
 - a. Audit planning
 - b. Understand management systems
 - c. Assess internal controls
 - d. Gather audit evidence
 - e. Evaluate audit evidence
 - f. Report audit findings
 - g. Audit follow-up
5.
 - a. Audit protocols—represent plans of how the auditor is to accomplish the objectives of the audit. They list the audit procedures that are to be performed to gain evidence about safety, health, and environmental practices. They also provide the basis for assigning specific tasks to individual members of the audit team, for comparing what was accomplished with what was planned, and for summarizing and recording the work accomplished. When well-designed, audit protocols can be used to train inexperienced auditors and reduce the amount of supervision required by the audit team leader, as well as help build consistency into the audit.
 - b. Working papers—document the work performed, the techniques used, and the conclusions reached by the auditors. These papers help the auditor achieve the audit objectives and provide reasonable assurance that an adequate audit was performed consistent with audit program goals. Working-papers should include documentation of compliance or noncompliance.
6. c
7. d
8. e
9. Any five of the following:
 - a. Increased growth
 - b. Broader scope
 - c. Increased rigor and depth of review
 - d. Increased effectiveness of field resources
 - e. Increased emphasis on basic skills
 - f. Expanded nature of reporting
 - g. Emergence of S/H/E auditing standards

8—WORKERS' COMPENSATION

1. a. Loss of earnings
b. Additional expenses
2. An effective loss control program benefits the entire economy by assisting in keeping workers from being injured on the job, and by reducing direct losses to the worker and the worker's family. In addition, an effective loss control program will mitigate society's losses from taxes that the injured worker would have paid, products they would have purchased, and public assistance benefits the family may have needed.
3. The Longshoremen and Harbor Workers' Compensation Act.
4. a. Provide adequate, equitable, prompt, and sure income and medical benefits to work-related accident victims, or income benefits to their dependents, regardless of fault.
b. Provide a single remedy and reduce court delays, costs, and workloads arising of the personal-injury litigation.
c. Relieve public and private charities of financial drains due to uncompensated industrial accidents.
d. Eliminate payment fees to attorneys and witnesses as well as time-consuming trials and appeals.
e. Encourage maximum employer interest in safety and rehabilitation through an appropriate experience-rating mechanism.
f. Promote frank study of accident causes and not faults, reducing preventable accidents and human suffering.
5. A compulsory law requires each employer to accept the provisions and provide for specific benefits, i.e. required compliance with the law.
6. Under quid pro quo of workers' compensation law, employers were required to accept responsibility for injuries arising out of and in the course of employment without regard to fault.
7. a. Expansion of the dual capacity doctrine
b. The international tort exception
8. a. Loss of income
b. Medical payments
c. Rehabilitation
9. 66 percent
10. a. Workers in farming, domestic service, casual employment, charitable or religious organizations
b. Employees covered under other types of compensation, such as FECA, Jones Act, and FELA
11. a. Temporary total
b. Permanent total
c. Permanent partial
d. Temporary partial
12. a. To prevent accidents
b. To control costs
c. To respond to accidents promptly and efficiently
13. To replace the wages lost by workers who are disabled due to job-related injury or illness.
14. The Federal Vocational Rehabilitation Act
15. a. Uncertainty about whether an accident arose out of and in the course of employment
b. The extent of the disability
16. Vocational rehabilitation prepares the injured worker for a new occupation or for ways of continuing in an old one. Vocational rehabilitation is assigned when medical treatment fails to restore the worker to the job held when the individual was injured.
17. a. Whole-person
b. Wage-loss
c. Loss of wage-earning capacity
18. a. Expansion of the dual doctrine—injury resulted from the employer's product that is available to consumers.
b. Employer commits an international tort

9—IDENTIFYING HAZARDS

1. Hazard analysis is an orderly process used to acquire specific hazard and failure data pertinent to a given system for the purpose of eliminating or controlling hazards.
2.
 - a. Inductive
 - b. Deductive
3.
 - a. What is the quantity and quality of information desired?
 - b. What information is already available?
 - c. What is the cost of setting up and conducting analyses?
 - d. How much time is available before decisions must be made and action taken?
 - e. How many people are available to assist in the hazard analysis, and what are their qualifications?
4.
 - a. Frequency of accidents
 - b. Potential for injury
 - c. Severity of injury
 - d. New or altered equipment, processes, and operations
 - e. Excessive material waste or damage to equipment
5. JSA is a procedure used to review job methods and uncover hazards that may have been overlooked in the layout of the facility or building and in the design of the machinery, equipment, tools, workstations, and processes; secondly, to uncover hazards that may have developed after production started; thirdly, to uncover hazards that resulted from changes in work procedures or personnel.
6.
 - a. Breaking the job down into successive steps or activities and observe how these actions are performed
 - b. Identifying the hazards and potential accident causes—a critical step since only an identified problem can be eliminated
 - c. Developing solutions—recommending safe job procedures to eliminate the hazards and prevent the potential accidents
7. To detect potential hazards so they can be corrected before an accident occurs
8.
 - a. Continuous inspections—informal inspections that do not conform to a set schedule, plan, or checklist, and are conducted by employees, supervisors, and maintenance personnel as part of their job responsibilities
 - b. Interval inspections—planned inspections at specific intervals that are deliberate, thorough, and systematic, and are conducted by safety professionals, certified or licensed inspectors, outside investigators, and government inspectors
9. c
10. Building codes, building inspection books, guides to building and facility maintenance, NFPA publications; other publications of the National Safety Council; the Federal Register and the Code of Federal Regulations (CFR), Title 29, parts 1900–1950 give OSHA regulations; the Occupational Safety and Health Administration; the Mine Safety and Health Administration (MSHA); the Federal Aviation Administration (FAA); the Nuclear Regulatory Commission (NRC); and the Environmental Protection Agency (EPA)
11.
 - a. The loss severity potential of the problem
 - b. The potential for injury to employees
 - c. How quickly the item or part can become unsafe
 - d. The history of failures
12.
 - a. Personal monitoring—measures the airborne concentrations of contaminants by placing the measuring device as closely as possible to the site at which the contaminant enters the human body.
 - b. Environmental monitoring—measures contaminant concentrations in the workroom in the general area adjacent to the worker’s usual workstation.
 - c. Biological monitoring—measures changes in composition of body fluid, tissues, or expired air to detect the level of contaminant absorption.
 - d. Medical monitoring—medical personnel examine workers to see their physiological and psychological response to a contaminant.
13. b
14. TLVs represent an exposure level of airborne concentrations of substances under which most people can work, day after day, without adverse effect. The term TLV refers specifically to limits published by the American Conference of Governmental Industrial Hygienists (ACGIH), and are reviewed and updated annually.
15. PELs represent the legal maximum level of contaminants in the workplace air. The General Industry

OSHA Standards currently list about 600 substances with established exposure limits in subpart Z, “Toxic and Hazardous Substances,” Sections 1910.1000 through 1910.1500.

16.
 - a. Determines direct causes
 - b. Uncovers indirect causes
 - c. Prevents similar accidents
 - d. Documents facts
 - e. Provides information on costs
 - f. Promotes safety
17. Immediate, on-the-scene accident investigation provides the most accurate and useful information. The longer the delay in examining the accident scene and interviewing the victim(s) and witnesses, the greater the possibility of obtaining erroneous or incomplete information. The accident scene changes, memories fade, and people discuss what happened with each other.

10—INCIDENT INVESTIGATION, ANALYSIS, AND COSTS

1. The six (6) fundamental activities are needed for a successful incident prevention program:
 - a. Study of all working areas to detect and eliminate or control the physical or environmental hazards that contribute to incidents
 - b. Study of all operating methods and practices and administrative controls
 - c. Education, instruction, training, and enforcement of procedures to minimize the human factors that contribute to incidents
 - d. Thorough investigation and causal analysis of every incident resulting in at least a lost-workday injury to determine contributing circumstances
 - e. Implementation of programs to change or control the hazardous conditions, procedures, and practices found in the preceding activities
 - f. Program follow-up and evaluation to ensure that the programs achieve the desired control
2. The primary purpose of an incident investigation is to prevent future incidents. As such, the investigation or analysis must produce factual information leading to corrective actions that prevent or reduce the number of incidents.
3. All incidents should be investigated, regardless of severity of injury or amount of property damage. The extent of the investigation depends on the outcome or potential outcome of the incident. An incident involving only first aid or minor property damage is not investigated as thoroughly as one resulting in death or extensive property damage, that is, unless the potential outcome could have been disabling injury or death.
4. Depending on the nature of the incident and other conditions, the investigation is usually made by the supervisor, perhaps assisted by a fellow worker familiar with the process involved, the safety and health professional or inspector, the employee health professional, the joint safety and health committee, the general safety committee, or an engineer from the insurance company.
5. Each investigation should be conducted as soon after the incident as possible
6. A company can learn the following from incident and accident causation analysis:
 - a. Management can identify and locate the principal sources of incidents by determining, from actual experience, the methods, materials, machines, and tools most frequently involved in incidents, and the jobs most likely to produce injuries.
 - b. Investigations may disclose the nature and size of the incident problems in departments and among occupations.
 - c. Results will indicate the need for engineering revision by identifying the principal hazards associated with various types of equipment and materials.
 - d. The investigation can disclose inefficiencies in operating processes and procedures where, for example, poor layout contributes to incidents, or where outdated, physically overtaxing methods or procedure can be avoided.
 - e. An incident report will disclose the unsafe practices that need to be corrected by training employees or changing work methods.
 - f. The report also will enable supervisors to put their safety work efforts to the best use by giving them information about the principal hazards and unsafe practices in their departments.
 - g. Investigation results permit an objective evaluation of the progress of a safety program by noting in continuing analyses the effect of corrective actions, educational techniques, and other methods adopted to prevent injuries.
7. The minimum data that should be collected for each incident includes:
 - a. Data about employer characteristics
 - b. Employee characteristics
 - c. Characteristics of the injury
 - d. Narrative description and accident sequence
 - e. Characteristics of the equipment associated with the incident
 - f. Characteristics of the task being performed when the incident happened
 - g. Time factors
 - h. Task and activity factors
 - i. Supervision information
 - j. Causal factors
 - k. Corrective actions taken immediately after the incident to prevent a recurrence, including interim or temporary actions
8. The three (3) basic steps in a systematic approach to selecting corrective actions are (1) all major actions

are considered, (2) the analyst does not stop with familiar and favorite corrective actions, and (3) each corrective action chosen for implementation is carefully thought out.

9. Inadequate policies, procedures, or management systems might be suggested by thorough analysis of groups of incident investigation reports that were not evident when studying individual cases.
10. The two general categories of work incidents, for the purpose of cost analysis, are (1) incidents resulting from work injuries or illnesses and (2) incidents causing property damage or interfering with production. The inclusion of the no-injury incidents makes “work incidents” roughly synonymous with the type of occurrences a safety department strives to prevent.
11. A pilot study uses actual costs incurred by the organization and is fully justifiable. A fixed ratio of uninsured to insured costs such as Heinrich’s 4 to 1 ratio cannot be justified to management because it does not represent the organization’s actual costs.

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

1. Safety personnel must maintain records because:
 - a. It is required by law and by their management.
 - b. It is useful to an effective safety program.
2. The seven ways a good record-keeping system can help the safety professional are:
 - a. It provides the means to evaluate accident problems objectively and measures overall progress and effectiveness of the company safety program.
 - b. It identifies high incident rate units, plants, or departments and problem areas so extra effort can be made in those areas.
 - c. It provides data for an analysis of incidents pointing to specific causes or circumstances.
 - d. It creates interest in safety among supervisors by providing them with information about their department's incident experience.
 - e. It provides supervisors and safety committees with hard facts about their safety problems so their efforts can be concentrated.
 - f. It measures the effectiveness of individual countermeasures and determines if specific programs are doing the job they were designed to do.
 - g. It assists management in performance evaluation.
3. c
4. d
5. c
6. OSHA Form No. 300, Log and Summary of Occupational Injuries and Illnesses serves as the annual summary report that is used by any company subject to the OSHAct.
7. Incidence Rate of Recordable Cases:

$$\frac{(\text{No. of injuries and illnesses} \times 200,000)}{(\text{Total hours worked by all employees during period covered})}$$
 or

$$\frac{(\text{No. of lost workdays} \times 200,000)}{(\text{Total hours worked by all employees during period covered})}$$
8. 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.

12—OCCUPATIONAL HEALTH PROGRAMS

1. Any five of the following:
 - a. Maintenance of a healthful work environment
 - b. Health examinations
 - c. Diagnosis and treatment for occupational injuries and illnesses
 - d. Case management services
 - e. Immunization programs
 - f. Confidential health records
 - g. Health promotion, education, and counseling
 - h. Open communication between the health personnel and the employee's personal physician
2. a. To protect employees against health hazards in their work environment.
 - b. To facilitate placement and ensure the suitability of individuals according to their physical capacities, mental abilities, and emotional makeup in work that they can perform with an acceptable degree of efficiency and without endangering their own health and safety or that of their fellow employees.
 - c. To assure adequate health care and rehabilitation of the occupationally injured.
 - d. To encourage personal health maintenance.
3. Contact of a chemical with the worker's skin.
4. a. Worker education
 - b. Improved management techniques
5. c
6. a. Emergency treatment—given for immediate, life-threatening conditions; provided by the first aid staff until proper medical care can be given.
 - b. Prompt attention—treatment of minor injuries such as cuts, scratches, bruises, and burns that do not require medical attention.
7. To reduce the risk of infection, disability, and missed diagnosis.
8. Any five of the following:
 - a. Properly trained and designated first aid personnel on every shift
 - b. Instructions for contacting an ambulance or rescue squad
 - c. Posted method for transporting ill or injured employees
 - d. Posted instructions for calling physician and notifying the hospital that a patient is en route
 - e. Approved first aid unit and supplies
 - f. First aid manual
 - g. List of reactions to chemicals and routes of exposure
 - h. Adequate first aid record system and follow-up.
9. MSHA
10. Restoring disabled workers to their former earning power and occupation as completely and rapidly as possible.
11. The primary purpose of a replacement examination program is to aid in the selection and appropriate placement of workers.
12. Light duty is an adaptation of the worker's original job to reduce the worker's tasks. Limited duty is the placement of the worker in a new job that is appropriate to the worker's capabilities.
13. The primary purpose of exit examinations is to document the status of the health of the employee leaving the organization.
14. a. Selection, training, and supervision of auxiliary nursing and other personnel
 - b. Transportation and caring for the injured
 - c. Transfer of the seriously injured to hospitals
 - d. Coordination of these plans with the safety department, security, police, road patrols, fire departments, and other interested community groups
15. c
16. Any five of the following:
 - a. Job placement.
 - b. Establishing health standards.
 - c. Health maintenance programs.
 - d. Treatment and rehabilitation.
 - e. Workers' compensation cases.
 - f. Epidemiologic studies.
 - g. Helping management with program evaluation and improvement.
 - h. Establishing a health profile of each worker.
17. Wellness is defined as a way of life that promotes a state of health.
18. b

13—INDUSTRIAL HYGIENE PROGRAM

1. Industrial hygiene is the science and art devoted to the recognition, evaluation, and control of environmental factors or stresses arising in and from the workplace. These factors or stresses may cause sickness, injury, or significant discomfort and inefficiency among workers or citizens in the community.
2. e
3.
 - a. Substitution of harmful or toxic materials with less dangerous ones
 - b. Changing work processes to eliminate or minimize work exposure
 - c. Installation of exhaust ventilation systems
 - d. Good housekeeping/appropriate waste disposal methods
 - e. Provision of proper personal protective equipment
4.
 - a. Anticipating and recognizing health hazards that arise from work operations processes by the industrial hygiene professional
 - b. Evaluating and measuring the magnitude of the hazard by the industrial hygiene professional
 - c. Control of the hazard
 - d. Commitment and support of the industrial hygienist by management
 - e. Recognition and trust of the industrial hygienist by the workers in the facility
5.
 - a. Chemical
 - b. Physical
 - c. Biological
 - d. Ergonomic
6. e
7. Any of the following:
 - a. Industrial hygienist
 - b. Safety professional
 - c. Occupational health nurse
 - d. Occupational health physician
 - e. Employees
 - f. Senior and line management
8. b
9.
 - a. Dermatologic
 - b. Allergic
 - c. Respiratory
 - d. Psychological
10. c
11.
 - a. Gastrointestinal problems
 - b. Sleep disorders
 - c. Psychological problems
12. Toxicity is the capacity of a chemical to harm or injure a living organism by other than mechanical means.
13.
 - a. Inhalation
 - b. Skin absorption
 - c. Injection
 - d. Ingestion

14—ENVIRONMENTAL MANAGEMENT

1. ISO 14010 is the general principles for environmental auditing, while ISO 14011 is a specific auditing protocol.
2. A gap analysis is a determination of where the company is relative to the requirements and development of a strategy to ensure ISO 14001 conformance.
3.
 - a. Legislative and regulatory requirements
 - b. Identification of significant environmental aspects
 - c. Examination of existing environmental management practices and procedures
 - d. Assessment of feedback from previous environmental incidents
4. The purpose is to create a publicly available registry of environmental effects that have been verified by a third party.

15—INDOOR AIR QUALITY

1. Sick-building syndrome” (SBS) is a condition described by general complaints of discomfort including headache; nausea; dizziness; dry or itchy skin; eye, nose, throat, and respiratory irritation; dry coughing; difficulty concentrating; muscle pain; sensitivity to odors, and fatigue. Usually, the specific causes of the symptoms are not known. Complaints may be associated with a particular room or floor or may be widespread throughout a building. The symptoms are usually associated with time spent in the building and often cease after the affected occupant(s) leaves the building. Most affected occupants report relief soon after leaving the building.

The term “building-related illness” (BRI) is used when symptoms of diagnosable illness are identified and can be attributed directly to building contaminants. Quite often symptoms such as coughing, chest tightness, fever, chills, and muscle aches can be determined clinically and are the result of clearly identifiable causes. A diagnosis results in a clinically defined illness of known etiology. Allergic reactions, hypersensitivity pneumonitis, and humidifier fever would fall into this category.

Affected occupants with BRI may require prolonged recovery times after leaving the complaint area.
2. Items not related to IAQ that can impact a building occupant’s health:
 - a. Illnesses contracted away from the workplace,
 - b. Acute sensitivity (allergies),
 - c. Stress, and
 - d. Other psychosocial factors.
3. Three acceptable strategies for controlling pollutants that contribute to poor IAQ are
 - a. Manage pollutant sources either by removal, isolation, or controlling use,
 - b. Use ventilation to dilute and remove the pollutant from the building, and
 - c. Use filtration to clean the air.
4. Elements common to every IAQ problem:
 - a. A pollutant source(s),
 - b. A driving force to move the pollutant(s),
 - c. A pathway for the pollutant(s) to travel, and
 - d. A susceptible population.
5. Occupant comfort is generally related to the following two parameters controlled by conditioned air supplied by HVAC systems:
 - a. Temperature
 - b. Relative humidity.
6. The following two natural forces can have a significant impact on IAQ: wind and weather patterns can cause infiltration and natural ventilation to move pollutants throughout a building.
7. An IAQ Manager should be responsible for coordinating all indoor air quality activities in the building.
8. A building IAQ Profile should be developed using the following sources of information:
 - a. Identifying and reviewing records, such as blueprints and operating instructions;
 - b. Conducting a walkthrough inspection to document information on IAQ-related activities and conditions of building systems;
 - c. Identifying possible pollutant sources throughout the building, and
 - d. Developing a non-complaint baseline for the building.
9. An IAQ investigation should use interviews to look at the following four areas:
 - a. Determine who has concerns or is exhibiting symptoms,
 - b. When the symptoms are occurring,
 - c. Where in the building the onset of symptoms is associated, and
 - d. What could be causing the problem.
10. Nonroutine measurements should not be conducted except
 - a. To characterize an identified pollutant source, or
 - b. In response to recommendations from a healthcare practitioner.
11. The following two preventative measures minimize the possibility of microbial contamination:
 - a. General good housekeeping practices and maintenance of building, adequate ventilation, and good air distribution help minimize the possibility of microbial contamination.
 - b. Higher efficiency air filters can also be effective in removing microbial contaminants.
12. The difference between arrestance and atmospheric dust spot tests:
 - a. Arrestance is used to evaluate low-efficiency filters. Arrestance is determined by passing a standardized dust made up of various size particles

through a filter and then determining the weight fraction of the dust removed. Arrestance values are usually high because most of the weight of the standardized dust is attributed to the larger particles. The arrestance values are of very little value when determining a filter's capability to remove the smaller particles that are usually implicated in indoor air quality scenarios.

- b. The atmospheric dust spot test is used to rate medium-efficiency air cleaners (both filters and electronic air cleaners). The test is conducted by passing atmospheric dust through a filter. The removal rate is based on the air cleaner's capability to reduce soiling of a clean paper target and is related to the removal of very fine particles from the air. As a result, this test does measure smaller particles. However, the variability of atmospheric dusts used for testing may result in different efficiencies for the same filter depending on geographic location and time. Until a new standard is proposed, filters of 25% to 30% (as rated by ASHRAE 52.1 Atmospheric Dust Spot Method) are recommended.
13. Five generally accepted methods for resolving IAQ problems are discussed below:
- Pollutant source removal
 - Increasing ventilation rates and air distribution
 - Exhaust contaminated air
 - Air cleaning
 - Education and communication

Pollutant source removal or modification is probably the most effective approach to resolving an IAQ problem when sources are known and control is feasible.

Increasing ventilation rates and air distribution often can be a cost-effective means of reducing indoor pollutant levels.

When there are strong pollutant sources, local exhaust ventilation may be appropriate to exhaust contaminated air directly from the building. Local exhaust ventilation is particularly effective in removing pollutants that accumulate in specific areas such as rest rooms, copy rooms, and printing facilities.

Air cleaning can be a useful but has certain limitations. Particle cleaning devices such as furnace filters are inexpensive but do not effectively capture

small particles; high performance air filters capture the smaller, respirable particles but are relatively expensive to install and operate. A shortcoming of mechanical filters is that they do not remove gaseous pollutants. Adsorbent beds can remove some gaseous pollutants. Air cleaners can be useful, but should be used in conjunction with other control methods.

Education and communication can be the two most important elements for both remedial and preventive indoor air quality management programs. When building occupants, management, and building staff understand the causes and consequences of IAQ problems and communicate effectively, problems can be prevented or solved if they do occur.

14. To help ensure mitigation of IAQ problems is successful, the following criteria should be evaluated:
- Permanence
 - Durability
 - Operating principle initial & operating cost
 - Control capacity
 - Ability to institutionalize the solution
 - Conformity with codes

16—ERGONOMICS YESTERDAY, TODAY, AND TOMORROW

1. f
2. Ergonomics is the realization and application of user needs, abilities, limitations, and characteristics to design proper machines, tools, jobs, and workplaces that can result in productive, safe, comfortable, and efficient use. A shorter definition is that it focuses on ways to fit the work to the worker.
3. Musculoskeletal disorders are a group of conditions that involve the muscles, tendons, nerves, and supporting structures such as spinal discs. These disorders are caused or aggravated by risk factors at work. Some common disorders are carpal tunnel syndrome, epicondylitis, tendinitis, bursitis, and tension neck syndrome.
4. Epicondylitis
5. The five goals of ergonomics are:
 - a. to reduce the physical and mental stressors associated with any type of job
 - b. to increase the comfort, health, and safety of a work environment
 - c. to increase productivity
 - d. to reduce human errors associated with a task
 - e. to improve the quality of work life as well as reduce the costs of doing business
6.
 - a. Physical demands—lifting, pushing pulling, reaching, exerting force to perform a task, the effort required to do the job, repetitive tasks; walking, standing, or sitting all day
 - b. Environmental demands—vibration, temperature, humidity, noise, lighting levels, work organization, pace, shift schedule, need for overtime
 - c. Mental demands—information needed to perform a particular task, mental calculations or computations, short-term memory demands, information processing, decision making
7. The four components of an ergonomics program are:
 - a. Management commitment
 - b. Case management process
 - c. Training and education
 - d. Workplace improvement process
8. Primary factors that are assessed during and ergonomics evaluation include:
 - a. Workplace characteristics and accessories
 - b. Physiological demands
 - c. Physical demands
 - d. Environmental demands
 - e. Design of displays, control, and dials
9. Occupational risk factors include:
 - a. Repetitive or sustained exertions
 - b. Forceful exertions
 - c. Awkward postures
 - d. Mechanical stress
 - e. Vibration
 - f. Extreme temperature
10. Passive surveillance refers to information that is gathered from existing records to identify potential patterns of disease within a workplace. Active surveillance incorporates a system for gathering data that can be used to determine trends of MSDs with greater sensitivity than a passive surveillance system. In contrast to passive surveillance, in which existing information sources are reviewed, active surveillance consists of operations involving the actual collection of relevant information and data.
11. Work-related musculoskeletal disorders may be prevented/controlled using engineering controls and administrative controls.
12. Any three of the following approaches may be used to reduce repetitiveness in job activities:
 - a. Use automation
 - b. Use power tools
 - c. Provide short breaks
 - d. Design for self-pacing
 - e. Job enlargement; more variety of tasks
 - f. Job rotation
13. Three controls for reducing awkward posture are selecting appropriate tools for the job, moving part of the work closer to the worker, and using mechanical aids to procure parts.
14. A neutral posture is one in which the back is naturally curved, the head is held erect, the shoulders are relaxed, the upper arms are close to the sides of the body, the wrists are straight, the elbows are bent at about 90 degrees, and the feet are well supported.
15. Workers become bored when performing below their abilities. Boredom can lead to lapses in concentration and attention, resulting in product defects, quality problems, and accidents.
16. a
17. a. Heights of object handled

- b. Location of work material
- c. Clearance required and accessibility of work
- d. Design of accessories

17—EMPLOYEE ASSISTANCE PROGRAMS

1. An employee assistance program (EAP) is designed to assist in the identification and resolution of productivity problems associated with employees impaired by personal concerns including, but not limited to:
 - a. health
 - b. marital
 - c. financial
 - d. alcohol
 - e. drug
 - f. legal
 - g. emotional
 - h. stress
2. a. 3–4 times
3. Assistance is provided through referrals to outside counseling or other treatment services in the community, treatment services provided by the EAP itself, or a wide variety of training and education programs available through the EAP. Services are available to both the employee and members of the employee's immediate family.
4. Confidentiality—employees need to feel that their employment is not threatened by participation in the EAP and that their problems will remain private.
5. Once the employee (or client) contacts the EAP for services, either voluntarily or by a supervisor's referral, the following steps should occur:

A professional assesses the client's problem and recommends treatment. The assessment and recommendation are recorded by the professional in confidential EAP files. Treatment or other services will be rendered, either through the EAP itself, by referral to providers under the employer's health plan, or through community services that are either free or must be paid for by the client. If the client is an employee who has taken time off work for treatment, the EAP may assist with reintegration to the work force as soon as practical. EAP staff will then conduct follow-up sessions with the client to support his or her recovery and to provide additional services if they are needed. When the client's problem (such as a drug problem) may impact safety in the workplace or when the client was a supervisory referral, the EAP may monitor recovery to ensure that safety in the workplace is not compromised.
6. Benefits that EAPs provide to employers include:
 - a. Morale improves as disruptive employees are helped.
 - b. Managers spend less time working with troubled employees.
 - c. Valued employees with personal problems remain with the company rather than resigning.
 - d. Hiring and training costs are lower.
 - e. Management spends less time and resources on discipline.
 - f. Safety improves and liability declines.
7. e
8.
 - type of organization and industry
 - number of worksites
 - type of work/jobs
 - size of work force and demographics (sex, age, ethnicity, education, special needs)
 - major employee problems (from benefits and workers' compensation data)
 - risk management issues (from safety, medical, and insurance data)
 - management and labor identification of problem issues
 - regulatory requirements of government agencies
 - resources available to EAP from the corporation.
9.
 - a. Internal—services delivered by professionals employed by the organization
 - b. External—services delivered by a contracted vendor
 - c. Union-based—services delivered by trained union personnel to union members
 - d. Consortium—a group of smaller companies banded together to jointly contract with an EAP
 - e. Blended—any combination of the above
10. e
11. b
12. Any five of the following:
 - a. Treatment services
 - b. Managed care
 - c. Treatment follow-up and monitoring of recovery
 - d. Substance abuse professional services and other regulatory compliance
 - e. Management of workplace threat and violence
 - f. Critical incident stress debriefing
 - g. Work/family services
 - h. Employee training
 - i. Management consultation and organization

development

13. Regularly scheduled calls or client visits to the EAP; regular reports to EAP staff from a professional after-care provider; and random drug or alcohol testing coordinated by the EAP.

18—EMERGENCY PREPAREDNESS

1. b
2. Any eight of the following:
 - a. Fire and explosion
 - b. Floods
 - c. Hurricanes and tornados
 - d. Earthquakes
 - e. Civil strife and sabotage
 - f. Work accidents and rumors
 - g. Shutdowns
 - h. Wartime emergencies
 - i. Hazardous materials
 - j. Radioactive materials
 - k. Weather-related emergencies
3. Any five of the following:
 - a. Historical knowledge and records of accidents
 - b. Fire statistics
 - c. National Weather Service logs
 - d. U.S. Geological Survey studies
 - e. Location of rail lines
 - f. Location of airports
 - g. Local U.S. Hazard Vulnerability Community Analysis documents
4. d
5. Any six of the following:
 - a. Chain of command
 - b. Training
 - c. Hazardous materials/spills emergencies (HAZMAT)
 - d. Command headquarters
 - e. Uniform incident command system (ICS)
 - f. Emergency equipment
 - g. Alarm systems
 - h. Fire brigades
 - i. Facility protection and security
 - j. Emergency medical services (EMS)
 - k. Warden service and evacuation
 - l. Transportation
6. Disaster training is essential in keeping a disaster-control plan functioning in good working order. Simulated disaster drills help key people and employees respond to emergencies with greater confidence and effectiveness. Feedback from training drills helps to improve emergency management plans.
7. The U.S. OSHA regulation entitled Hazardous Waste Operations and Emergency Response: Final Rule
8. The function of the HAZMAT team is to control and stabilize actual or potential leaks or spills of hazardous substances requiring possible close approach to the substances.

19—WORKPLACE VIOLENCE

1. At least \$500 million, according to Liberty Mutual Research Institute for Safety, “2006 Liberty Mutual Workplace Safety Index.” Boston: Liberty Mutual, 2007, page 2.
2. Workplace violence can be defined as violent acts, including physical assault and threats of assault, directed towards persons at work or on duty.
3. Among the risk factors of workplace violence are: contact with the public, exchange 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.
4. Elements of a workplace violence reduction program include: management commitment and employee involvement; a policy statement; a threat assessment team; workplace analysis; hazard prevention and control; training; incident response; program evaluations; and record keeping.
5. Employees can be involved in a workplace violence prevention program by: participating in surveys on workplace violence risks; developing and revising procedures and countermeasures; assisting in a security analysis; evaluating prevention and control measures; training new and current employees; and promptly and accurately reporting workplace violence incidents
6. Responsibilities of the threat assessment team include: 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; and auditing the workplace violence prevention program.

20—PRODUCT SAFETY MANAGEMENT

1. d
2. a. Making a commitment to spend money and resources to save money in the long term
 - b. Choosing a program coordinator
 - c. Choosing a program auditor
3. a. Engineering
 - b. Manufacturing
 - c. Service
 - d. Legal
 - e. Purchasing
 - f. Human resources
 - g. Risk management/insurance
4. Quality assurance refers to actions taken by management to ensure that manufactured, assembled, and fabricated products conform to design or engineering requirements and to customer acceptance and satisfaction.
 - a. Record keeping
 - b. Field-information system
 - c. Product recall or field modification
 - d. Independent testing
6. a. Complete and accurate records can be convincing evidence in a court of law.
 - b. Complete and accurate records can enable a company to identify and locate products that will be indicated in a product recall or field-modification program.
7. d
8. a. The auditor's opinion of the company's overall PSM program
 - b. The auditor's recommendations to correct deficiencies detected during the audit
 - c. The importance of each recommendation and the possible consequences if the company fails to comply
 - d. An estimation of a realistic time frame for compliance with the recommendations
9. a. Who is the customer?
 - b. What types of product are involved?
 - c. What is the problem?
 - d. How is the product being used?
10. The manufacturer of a product is responsible for ensuring that the product is both reliable and safe for the customer to use.

21—RETAIL/SERVICE FACILITIES LOGISTICS

1. b
2. a. Policy statement
b. Employee manual
c. Safety committee
d. Safety audits
e. Training
f. Drills/practices
g. Investigation and action
h. Corporate safety culture
3. give specific instructions
4. The employer is responsible for providing employees with a safe place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm to the employees.
5. OSHA Form 300 serves as a log and summary of all occupational injuries and illnesses. OSHA Form 301 provides detailed information on each of the cases recorded on the OSHA Form 300.
6. a. exits sufficient to permit prompt escape in case of fire or other emergency
b. a building that is constructed, arranged, equipped, maintained, and operated to avoid undue danger to its occupants
c. exits that are of the proper type, location, and number for the building
d. exits that are accessible at all times, when it is occupied
e. exits that are clearly visible and marked in a conspicuous manner (lights, signs)
f. adequate and reliable emergency lighting for all exits
g. fire alarms in a building of such size, arrangement, or occupancy that individuals may not be immediately aware of the fire
h. training and drills in emergency exit procedures
i. at least two accessible exits that remote from each other in each building
7. A standard that provides, to the workers, the identities and hazards, and appropriate protective measures for the chemicals to which they are exposed.
8. a. written hazard communication program
b. labels and warning on containers of chemicals
c. Material Safety Data Sheets available for review
6. e
by employees
d. information and training for potentially exposed employees.
9. To safeguard employees from hazardous energy during equipment maintenance, tag out procedures require that all control surfaces be tagged to instruct all parties not to open or operate such controls until the tag is removed.
10. c
11. a
12. a
13. meet or exceed
14. a. employee responsibilities and discipline
b. safety rules
c. accident/incident reporting
d. general fire protection
e. emergency procedures
f. security alarms and inventory controls
15. materials handling
16. Ergonomics may be defined as the study of people at work and the use of various methods to create a good fit between the employee and the job.
17. a. identify the problems
b. study the physical demands of the job
c. create a written action plan
d. maintain the effort
18. a
19. a. crime-related violence
b. employment-related violence

22—TRANSPORTATION SAFETY PROGRAMS

1. a. Driver error
b. Vehicle failure
2. a
3. a. A written safety policy—developed, supported, and enforced by management
b. A person designated to create and administer the safety program and to advise management
c. A driver safety program, including driver selection procedures, driver training, and safety-motivating activities; proper supervision and implementation are mandatory for success
d. An efficient system for collision investigation, reporting, and analysis; determination and application of appropriate corrective action; and follow-up procedures to help prevent future collisions
e. A vehicle preventive maintenance program
4. a. The applicant's driving record
b. The applicant's personal traits
5. a. To prevent collisions and delays
b. To minimize the number of vehicles down for repair
c. To stabilize the workload of the maintenance department
d. To save money by preventing excessive wear, breakdown of equipment, and unscheduled down time.
6. e
7. U.S. Department of Transportation (DOT) rule 49 CFR part 40
8. a. The Federal Aviation Administration (FAA)
b. The National Transportation Safety Board (NTSB)
9. To ensure compliance with regulations and federal mandates
10. a. Training videos give emergency response organizations and understanding of an aircraft's specific procedures and assists them in tailoring response activities to various aircraft.
b. By providing speeches and audiovisual presentations to emergency response organizations, safety department personnel help promote a better understanding of their operations and enhance teamwork and goodwill.
c. By using information briefing cards and videos specific to a certain type of aircraft, safety depart-

ment personnel can assist in training airport rescue fire-fighting personnel. This information is especially helpful at fire stations in rural areas and developing countries.

23—OFFICE SAFETY

1. c
2. Any five of the following:
 - a. Stairways, exits, and doors
 - b. Lighting
 - c. Ventilation
 - d. Electrical equipment/outlets
 - e. Equipment placement
 - f. Floors
 - g. Parking lots and sidewalks
 - h. Aisles
 - i. Storage of materials
3. d
4. a. Select floor finishes that are durable, maintenance free, and slip-resistant.
 - b. Selecting carpeting instead of bare floors.
 - c. Repair defective tiles, boards, or carpet immediately.
 - d. Use slip-resistant floor wax.
 - e. At lobby and elevator entrances, use floor mats and runners.
5. Ergonomics may be defined as the science of optimizing a system of designing for the capabilities and limitations of the human interacting with it.
6. a. Visual demands
 - b. Reaches required
 - c. Muscular strength exerted to perform the task
7. a. The screen should be placed at or slightly below seated eye height.
 - b. The screen should be at a comfortable distance that suits the visual acuity of the operator so that he or she does not have to lean forward.
 - c. The screen should be far enough away so that the operator does not have to move his or her head to read the whole screen. The operator should be able to scan the screen by simply moving the eyes.
 - d. The screen should be placed directly in front of the operator to minimize twisting of the trunk or neck.
8. b

24—LABORATORY SAFETY

1. Within 10 seconds travel from areas where hazardous chemicals are used.
2. The four stages of the management system approach to safety are:
 - a. Plan
 - b. Do
 - c. Check
 - d. Act
3. The three key sources of chemical safety information are:
 - a. Material Safety Data Sheets
 - b. Chemical labels
 - c. Laboratory chemical safety summaries and other reference materials
4. c. concentration of the chemical solution.
5. Primary containment focuses on the protection of workers and the immediate laboratory environment from exposure to infectious agents. Secondary containment protects the environment outside the laboratory from contamination with infectious materials.
6. BSL-1: attained through standard microbiological practices
 BSL-2: attained through engineering controls such as biosafety cabinets
 BSL-3: attained through facility design beyond use of equipment in the lab
 BSL-4: requires use of high level personal protective equipment as well as facility design.
7. BSL-2
8. c. communicating with regulatory agencies on behalf of the company.
9. Four basic radiation protection methods are:
 - a. Maintaining distance from the source
 - b. Minimizing time of exposure
 - c. Shielding from the source
 - d. Minimizing the quantity of the radioactive materials used
10. light amplification by stimulated emission of radiation
11. d.
12. d.
13. Skin and eye irritation from dry environment, fatigue from ergonomic challenges, and psychological issues from unchanging environment.
14. c.
15. e.

25—CONTRACTOR AND CUSTOMER SAFETY

1. The employer must obtain and evaluate information regarding the contractor's safety performance and programs.
2.
 - a. Strong employer management
 - b. Effective coordination of job tasks
 - c. Employer emphasis on safety
 - d. Strong interpersonal skills of supervisors
 - e. Safe work environment in the employer's facility.
3. Does not
4. To determine equitable premiums
5. Good safety record
6. Before work begins
7.
 - a. Work site safety requirements, including safety manuals and standards related to the proposed work
 - b. Detailed outline of the safety responsibilities of the employer, outside management, and outside workers
 - c. Any special hazards at the work site, and review of hazardous materials and relevant MSDSs
 - d. Training requirements for outside personnel
 - e. Schedule to review safety auditing, performance, and training programs after the first few weeks of the job
8. An attractive nuisance is liability associated with a dangerous condition that is generally a threat to children, such as a swimming pool
9. The most important feature of a parking lot is that it is enclosed by a fence or curb.
10. Escalators should be examined daily.
11. Emergency stop buttons for an escalator should be placed at the top and bottom of the landing.
12. An elevator log book should contain the following:
 - a. Day, month, year, and time of inspection
 - b. Observations by mechanics or inspectors
 - c. All breakdowns, including causes and corrective actions
13. All elevators should have a balance test and contract load test every three years
14. The four stages of a fire are incipient, smoldering, flame, and heat.
15. Any of the following criteria may be used to designate a high-rise building:
 - a. Size of the building makes personnel evacuation impossible or impractical.
 - b. Part or most of the building is inaccessible by the fire department aerial equipment.
 - c. Any fire in the building must be attacked from within due to the building height.
 - d. Building has the potential for stack effect.
16. The advantages of a protected air-conditioning system is that without automatic smoke and heat detection, automatic fan shut down, and automatic fire dampers, smoke and toxic fumes can be drawn into the exhaust or return air duct and distribute to all floors and areas served by the air-conditioning system.
17.
 - a. Tell employees to all security and/or management.
 - b. Arrange for two or more key personnel to assume assigned positions at entrances and other key points.
18.
 - a. Advise employees to avoid comments or antagonism and to answer all questions courteously.
 - b. Direct employees to stop selling, lock their drawers and remain as calm as they can.
 - c. Arrange for frequent cash pickups in areas still doing business.
 - d. Key employees take their assigned places.
 - e. Employees do not try to apprehend looters or thieves.
19.
 - a. Unmarked glass doors, panels and windows
 - b. Parking lots
20. A ph test should be done before allowing swimmers into a pool after chemical treatment.

26—PROCESS SAFETY MANAGEMENT

1. The proactive identification, evaluation, and mitigation or prevention of chemical releases that could occur as a result of failures in processes, procedures, or equipment.
2.
 - a. Identify hazardous materials in the workplace
 - b. Inform employees and consumers of the hazards presented by their manufacture, use, storage, and handling
3. The OSHA regulation deals with process safety within the workplace, while the EPA regulation focuses on releases primarily affecting areas outside the workplace.
4. d (the PSM standard deals with weight of flammable liquids and gases, not volume)
5.
 - a. Identify hazards
 - b. Maintain safe facilities
 - c. Minimize the hazards of accidental releases
6.
 - a. Someone thoroughly familiar with the process begin analyzed
 - b. Someone competent in the hazard analysis methodology being used
7.
 - a. Extent of the process hazards
 - b. Number of potentially affected employees
 - c. Operating history of the process
 - d. Age of the process
8. Fault tree analysis works backwards from the incident to identify the operations errors and/or equipment failures; event tree analysis works forward from events to identify those that could result in hazards and to calculate the probability of an incident.
9. Hazards and Operability study
10.
 - a. Potential failure mode of each system or piece of equipment
 - b. Effect of each potential failure on system or unit
 - c. Criticality of each failure to system integrity
11. When analyzing proposed changes to materials, processes, equipment, or facilities.
12. b
13.
 - a. Initial startup and startup after turnaround
 - b. Normal startup and shutdown, and normal and temporary operations
 - c. Emergency operation and emergency shutdown
 - d. Startup after emergency and/or temporary operation
 - e. Conditions requiring emergency shutdown and assignment of shutdown responsibilities
- f. Nonroutine work
- g. Operator/process and operator/equipment interface
- h. Administrative controls versus automated controls
14.
 - a. Before startup of new process facilities
 - b. Before introduction of hazardous chemicals into a new facility
 - c. Following major turnaround
 - d. When facilities have had significant process modifications
15.
 - a. Date of inspection or test
 - b. Name of person performing test
 - c. Identification of equipment
 - d. Description of work performed
 - e. Acceptance limits/criteria and results
 - f. Steps required/taken to correct/mitigate deficiencies
16. To measure facility performance and ensure compliance with internal and external process safety management requirements.
17. c
18.
 - a. Inspection resulting from response to accidents or catastrophes
 - b. Unprogrammed inspection
 - c. Programmed general industry inspection
 - d. Program quality verification inspection
19.
 - a. Evaluate employer's and contractor's PSM programs
 - b. Compare the quality of the programs to acceptable industry practices
 - c. Verify effective implementation of the programs
20.
 - a. Gather all relevant documentation covering process safety management requirements at a specific facility
 - b. Determine program's implementation and effectiveness by following up on their application to one or more selected processes
21. c

27—HOMELAND SECURITY COMPLIANCE IN THE WORKPLACE

1. The categories are toxic, flammable, and explosive releases.
2. Their chemical types and volumes make the sites “high risk.”
3. Some sites are excluded because they already have plans. Facilities excluded from the rule are those with extensive federal controls already in place; these include railroads, public water systems, and certain port activities.
4. Plant sites will negotiate site security plans with the Department of Homeland Security.
5. ISAC is a group of companies that receives and shares terrorism avoidance data from the government concerning threats and potential attacks.

28—MOTIVATION

1. Motivation is moving people to action that supports or achieves desired goals.
2. Any five of the following:
 - a. Individual differences
 - b. Motivation
 - c. Emotions
 - d. Stress
 - e. Attitudes
 - f. Behaviors
 - g. Learning processes
3.
 - a. Positive reinforcement—such as personal recognition or performance awards—is more efficient in achieving higher levels of safety performance than forms of disciplinary action focused on eliminating unwanted behaviors.
 - b. A reinforcement should be associated with a behavior as soon as possible for the effect to be greatest.
4.
 - a. The present situation—is the employee rushed, stressed, fatigued, or in poor health?
 - b. Past experiences—were accidents avoided in the past; what amount of training did the employee receive?
 - c. Workplace and methods of design—were job procedures and the work setting designed to promote safety and healthy behaviors?
5. Abraham Maslow developed a hierarchy of needs depicting how certain needs have a higher priority than other needs in people’s lives.
6. c
7.
 - a. Theory X—assumes the worker is uninterested and unmotivated to work
 - b. Theory Y—assumes the worker has the potential to be interested and motivated to work
8. a
9.
 - a. Feeling
 - b. Knowing
 - c. Action
10. Direct personal experiences from the past
11. Any four of the following:
 - a. Organize the job to give each worker a complete and natural unit of work.
 - b. Provide new and more difficult task to each worker.
 - c. Allow the worker to perform specialized tasks in order to provide a unique contribution.
 - d. Increase the authority of the worker.
 - e. Eliminate unneeded controls on the worker while maintaining accountability.
 - f. Require increased accountability of the worker.
 - g. Provide direct feedback through periodic reports to the worker.
12. Behaviors are observable actions that can be measured. Attitudes are not observable, and therefore cannot be measured. It is easier to change behaviors than it is to change attitudes.
13. Any seven of the following:
 - a. Reinforcement
 - b. Knowledge of results
 - c. Practice
 - d. Meaningfulness
 - e. Selective learning
 - f. Frequency
 - g. Recall
 - h. Primacy
 - i. Intensity
 - j. Transfer of training

29—SAFETY AND HEALTH TRAINING

1. a. Reinforcement of the operational goals of the organization
- b. Improved performance
- c. Fewer incidents/accidents
- d. Reduced costs
2. Any seven of the following:
 - a. Task procedures
 - b. Material safety data sheets
 - c. Flowcharts
 - d. Checklists
 - e. Diagrams
 - f. Troubleshooting guides
 - g. Decision tables
 - h. Reference manuals
 - i. Help desks or hotlines
 - j. Reward systems
 - k. Improved physical work environments
 - l. Improved work processes
3. Performance-based training 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.
4. a. Assess the knowledge and skills workers need to develop.
- b. Design the objectives based on the needs assessment.
- c. Develop training materials.
- d. Deliver the training.
- e. Evaluate training based on feedback from those involved in the training.
5. b
6. a. Adults need to know why they are learning a particular topic or skill so they can apply learning to immediate, real-life challenges.
- b. Adults need to apply experience to all new learning.
- c. Adults need to be in control of their learning.
- d. Adults need to know that what they learn will make them more effective and successful.
7. a. On-the-job training
- b. Group methods
- c. Individual methods
8. e
9. Computer-assisted training allows an individual to receive information by reading or watching a video

presentation and then respond to situations and questions.

30—MEDIA

1. A medium is a channel of communication. It can be anything that carries information between a source and a receiver, such as television, films, diagrams, printed materials, computers, and trainers. The purpose of media is to facilitate communication.
2. Training should train workers in specific competencies and document that such training has been effective.
3. Media can help support training objectives
 - a. when areas of weaknesses are identified through accident investigations
 - b. whenever personnel changes occur
 - c. To enhance effective communication of safety and health issues to higher levels of management.
4. Some of the roles a trainer uses include expert, mentor, and facilitator.
5. As a facilitator, a trainer is a resource person or guide who helps to match individual student needs with appropriate materials.
6. To determine whether the cost of a training medium is justified, 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. Management must always rely on personal judgment to determine if the return on investment (ROI) is appropriate for the organization and its needs.
7. The factors to consider in choosing between professionally developed or homemade materials include:
 - a. The number of showings
 - b. How many people will be delivering the training
 - c. Size and composition of the audience(s)
 - d. Degree of customizing (is this aid for general use, or is the information for a particular department or facility only?)
 - e. The importance of the message
8. The basic purpose of media is to communicate a message.
9. In designing color charts or graphs, remember that 10% of the population is red/green colorblind or color poor.
10. Use no more than four colors in a visual.
11. The disadvantages of slides are that they can easily become disordered, stick in the tray, be projected upside down, or, if poorly designed, be distracting.
12. A photographer working from heights should use a fall-arrest harness and lifeline.

31—SAFETY AWARENESS PROGRAMS

1. The main objective of a safety awareness program is to maintain interest in safety by involving management and employees in accident prevention
2.
 - a. Company policy and experience
 - b. Budget and facilities
 - c. Types of operations
 - d. Types of employees
 - e. Basic human-interest factors for promotional activities
3.
 - a. An increased rate of injuries, accidents, and near-accidents
 - b. Deteriorating housekeeping
 - c. Incomplete or missing accident reports, indicating decreased supervisory interest
4. f
5.
 - a. Contests must be planned and conducted by a committee representing all competing groups.
 - b. Competing groups must be composed of natural units.
 - c. Methods of grading must be simple and fair.
 - d. Awards must be worth winning.
 - e. Contests should be well publicized and promoted.
6.
 - a. General posters concerned with broad safety topics
 - b. Special industry posters that apply only to specific industries
 - c. Special hazard posters emphasizing particular hazards
7.
 - a. Keep press releases brief, timely, accurate, and complete.
 - b. Be familiar with the publication or radio/TV station and know which editor or news director to contact.
 - c. Tailor press releases for the audience.
 - d. Include captions with photographs.
 - e. Leave script writing to the professionals, but make sure all facts are accurate.
8.
 - a. Clearly define the objectives and purpose of the publication.
 - b. Determine how general or restricted the message will be.
 - c. Decide what form of publication is best.
 - d. Estimate costs of preparing and printing the publication.
9. c
10. d