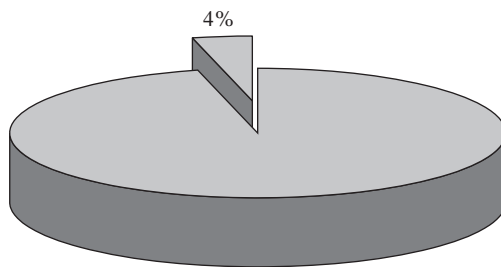


CHAPTER 2

Development of the Safety and Health Function



Percentage of OSHA General Industry citations addressing this subject

The safety and health function has both line and staff characteristics, and the safety and health manager needs to recognize which elements of the function belong to which category. The physical accomplishment of workplace safety and health is a line function. For example, operator work practices are the responsibility of the workers themselves, as directed by their line supervisor. In industries where maintenance departments are recognized as another line function, the correction of facilities' problems is again the direct responsibility of the maintenance operators and their line supervisors. The safety and health manager then performs a staff function by acting as a "facilitator" in assisting, motivating, and advising the line function in achieving worker safety and health.

The interest of line personnel in receiving this advice and assistance from the safety and health manager depends on how important the goal of safety and health is to top management. The successful safety and health manager will be keenly aware of this need for top management support. Respect and approval of top management must be won by responsible decisions and actions by the safety and health manager. A necessary ingredient of such decisions and actions is a recognition of the important principle stated in Chapter 1, that is, the goal is to eliminate unreasonable hazards, *not all hazards*. The respect and approval of top management may be difficult to win because safety and health managers are too often such emotional crusaders for the cause that they lose their credibility and with it their eligibility to be considered "managers." On the other hand, federal regulation has added a measure of urgency and credibility to those whose

efforts make industries safe and healthful, and this has substantially strengthened the position of the safety and health manager in the management hierarchy.

Similarities can be drawn between the safety function and other staff functions, such as quality control and production control. Like safety and health, quality and production goals must be achieved by line personnel, facilitated by the staff function. This principle is recognized in such clichés as “You can’t inspect quality into a product” and “Safety is everybody’s business.”

Once the approval of top management has been won, the safety and health manager is advised to document this approval in a written safety and health policy statement, issued by top management. This written policy becomes the documented authority to show line personnel that top management does have safety and health goals and wants these goals met. The everyday actions of management then reinforce the written policy, as discussed in Chapter 1. If, however, top management fails to practice what it preaches in the policy statement, it is the duty of the safety and health manager to go back to management and redetermine its level of commitment to safety and health.

Having established by word and deed management’s commitment to safety and health, the safety and health manager is ready to proceed with the staff function of facilitating the safety and health program throughout the plant. To do this, plant-operating personnel will have needs that the safety and health manager can satisfy. To make workers aware of hazards, supervisors and the workers themselves need regular training in hazard recognition and correction. Statistics and accident records are needed to keep management and operating personnel advised of how well the company and its departments are doing in achieving their safety and health goals. Sometimes the safety and health manager can provide a plantwide stimulus for worker safety and health through contests and awards for safety performance. Finally, the safety and health manager has a key role in dealing with safety and health standards and in assisting operating personnel in achieving compliance with these standards. The remainder of this chapter itemizes staff functions of the safety and health manager’s office with guidance for the development of each.

WORKERS’ COMPENSATION

One of the first questions that arises when one begins to study the field of industrial safety and health is “Who should be responsible when a worker is injured?” Many would answer, “The employer, because the employer gave rise to the job and will profit from the production.” However, the problem is not that simple. What if employees deliberately commit acts that result in their injury in violation of a company rule prohibiting such actions? Also, even if the employer should be responsible, must employees sue their employers to achieve compensation for their injuries? In the early days of the Industrial Revolution in the 1800s, this was indeed the system of compensation to injured employees. Unfortunately, the employee was usually ill-equipped to mount a lawsuit and found that getting justice was difficult, if not impossible. Another impediment to justice in these early cases was delay. Employers, who were usually more powerful than their opponents, used delay to postpone any compensation to injured employees. Many injured workers lost their competitive position in the labor market and were unable to provide for themselves or their families. The problem of compensation to injured employees was first addressed as a societal problem in Europe, and the idea soon was taken up in the United States and Canada. The first laws

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were introduced in state legislatures in 1909 and were known as *workmen's compensation laws*. Soon, all states in the United States had such laws. About 50 years later, the name changed to “workers’ compensation laws” to remove the gender designation for “workers.” The premise of the workers’ compensation system is that workers should be compensated for their on-the-job injuries in a fair and prompt manner, and that employers should be responsible for the compensation. Although employers usually use insurance to cover compensation claims, it is invariably the duty of the safety and health manager to implement the workers’ compensation system within the plant.

Workers’ compensation legislation has the ostensible purpose of protecting the worker by providing statutory compensation levels to be paid by the employer for various injuries that may be incurred by the worker. There is an ulterior feature, however, that provokes labor to be dissatisfied with the workers’ compensation system. This feature is the immunity from additional liability that the workers’ compensation system grants to the employer, except in cases in which “gross negligence” can be proved.

Table 2.1 lists examples of statutory compensation levels for various types of permanent injury. Note that the table is independent of price indices or inflation because

TABLE 2.1 Sample Statutory Compensation Levels for Permanent Injuries
(Compensation at 66 $\frac{2}{3}$ % of Average Weekly Pay)

Type of permanent injury	Compensation level ^a (weeks)
Arm amputated	
At or above the elbow	210
Below the elbow	158
Leg amputated	
At or above the knee	184
Below the knee	131
Hand amputated	158
Thumb amputated	63
Finger(s) amputated	
First	37
Second	32
Third	21
Fourth	16
Foot amputated	131
Toe amputated	
Great toe	32
Other toes, per toe	11
Loss of sight in one eye	105
Loss of hearing in one ear	42
Loss of hearing in both ears	158
Loss of a testicle	53
Loss of both testicles	158

^aThese compensation levels are in addition to any compensation paid for the healing period. The sample compensation levels were obtained from workers’ compensation levels for Arkansas and are intended only as an approximate guide. Exceptions and special cases exist, and tables vary somewhat from state to state.
Source: Arkansas Workers’ Compensation Commission (Arkansas Workers’).

the unit of measure is “weeks” of compensation, not dollars. To most people, the various levels seem too low to compensate adequately for the permanent injury to the worker. Historical evolution of the rates is slow, and it can be seen that public sensitivity to worker injuries has increased over the years. This sensitivity has resulted in outcries for reform of the workers' compensation system. On the other side of the issue is management's position that industry can never fully compensate monetarily for everything that may happen to workers in the course of their duties. Since some risk is inescapable in any line of work, management's general position is that in consideration of the salary and wages that workers receive, part of the normal risk of injury must be borne by the workers.

Typically, the firm does not pay the workers' compensation payments directly; rather, it carries insurance against compensation claims. The insurance company is vitally interested in the safety and health within the plant, and this provides a major impetus to the development of the safety and health program. The accident experience of the firm is reflected in the levels of the insurance premium, which can be adjusted up or down depending on plant safety experience. The insurance industry applies an “experience rating” expressed as a decimal fraction to be multiplied by the standard premium rate. The experience rating is based on a 3-year average of the firm's actual claims experience and can be less than or greater than 1.00. An experience rating of 1.00 would represent no modification at all and would be applied to a firm that is estimated by the insurance company to have a standard, typical risk. A large company with an experience rating of perhaps 0.80 can save thousands of dollars in annual workers' compensation insurance premiums. Even in the first year of coverage under workers' compensation insurance, a company can profit from an effective safety and health program because the insurance underwriter depends upon prior loss data and an initial assessment of the firm's hazards before setting the initial annual premium. A good insurance company will make regular inspections of facilities to be sure that installations and practices are safe. This is a direct and measurable monetary stimulus to the safety program.

Some companies choose to self-insure against workers' compensation claims. This may make economic sense when claims experience and premium levels are compared. But the intangible benefits provided by the insurance company must also be considered in order to make a rational decision. Besides the regular inspections mentioned earlier, the insurance companies are valuable sources of technical advice to their clients. Many insurance companies provide training films and other valuable aids regarding the conduct of the safety and health program. Insurance companies even have research centers for the purpose of reducing workers' compensation claims by studying such hazards as cumulative trauma, low back pain, biomechanics, acoustics, and work physiology (Lorenzi, 1995). If safety and health managers do not receive these aids and services from the insurance company, they should request for these and also consider alternative vendors when policy renewal time presents itself.

The number of companies that have elected to self-insure has led to a new type of consultant called a *loss-control representative*. This consultant's objective is to keep workers' compensation claims low by supplying the type of services normally provided by an insurance carrier. A significant part of these services is maintaining close relationships with employees who do file claims. This serves the purpose of showing an

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interest in the well-being of, and providing encouragement to, the honest claimant, while at the same time uncovering evidence of fraudulent claims in the case of the dishonest worker who is either malingering or truly injured, but whose injury occurred off the job.

In the twenty-first century, state workers' compensation programs have undergone a significant change. Added to labor's dissatisfaction with the system is management's alarm over the sharply rising costs of workers' compensation insurance premiums. Historical norms for workers' compensation premiums were around 4 to 5% of payroll until near the end of the twentieth century. Recent figures are much higher, with some industries in the area of 20 to 30% of payroll. Such high costs are focusing attention on the importance of safety and health in the overall equation of industry in general and manufacturing in particular. At the same time, states are groping for ways to reduce the costs of workers' compensation premiums while improving worker protection against injury and illness.

The various state reforms for workers' compensation can be roughly divided into four categories:

1. Managed care programs
2. Reduction of false claims
3. Prevention of injury and illness
4. Privatization of the state system

The concept behind "managed care" is to reduce the cost of claims by close supervision of each claim, with the objective of getting the worker back on the job as soon as is practical. The objective of the second approach is to detect instances in which workers are attempting to take advantage of the system by malingering or by blaming their employers for injuries or illnesses they actually incurred off the job. The incidence of workers' compensation fraud is significant. Insurance fraud is now considered the second-largest white-collar crime in the United States, behind income tax evasion (Fraud, 1997). Therefore, it is appropriate that the workers' compensation system focus on this problem.

The third approach, prevention, constitutes the most dramatic change in the concept of workers' compensation programs. The original purpose of workers' compensation—to ensure financial compensation for injured employees—is seen to be broadened to include general regulation and enforcement of workplace safety and health. The experience modifier adjustment for workers' compensation premiums, described earlier in this section, is being replaced with more forceful incentives for employers, including mandatory inspections and establishment of safety improvement programs. Since such an approach pertains more to enforcement and regulation, the new workers' compensation developments will be discussed later in Chapter 4.

The most recent development in the evolution of state workers' compensation systems is experimentation with privatization. The State of West Virginia privatized its system at the beginning of 2006, when a new private mutual insurance company was formed. The state loaned the new company \$200 million to set up a surplus to start insurance operations. The plan is for the insurance company to repay the state with operating surpluses, which so far it appears able to do. After the loan is paid back, the

plan is for the mutual insurance company to pay policyholders from the profits in the form of dividends (Privatized Workers' Comp Succeeding in West Virginia, 2008). Privatization is an extension of the Republican political agenda of the early twenty-first century. The political change marked by the election of President Barack Obama and a Democrat majority in the Congress has been widely expected to reverse the trend toward privatization of government agencies and functions.

RECORDKEEPING

Forms, reports, and recordkeeping make up no small part of the safety and health manager's job. According to the National Safety Council (NSC), "Just one OSHA data sheet takes U.S. safety managers a cumulative 54 million hours a year to complete. And that's just one of dozens of forms (the safety manager) may be responsible for" (National Safety Council, 1995). In addition, the safety manager must keep up with the latest developments, including changes to rules and procedures. The official public notification device of the federal government is the *Federal Register*, which is printed daily by the U.S. Government Printing Office. In this document alone, the government prints approximately 70,000 pages every year (National Safety Council, 1995).

The NSC established the first national system of industrial safety recordkeeping. This system was standardized and designated the Z16.1 system by the American National Standards Institute (ANSI). In the 1970s, the federal agency OSHA set mandatory recordkeeping requirements very similar to the Z16.1 system, which was voluntary. There were some differences, however, that made year-by-year comparisons of safety and health records infeasible when one year was based on traditional Z16.1 records and another on the federal system. This is particularly unfortunate in that it confounds attempts to determine from statistical records whether the federal agency has had any beneficial impact on worker safety and health. Some specific industries and hazard categories, such as trenching and excavation cave-ins in construction, have shown visible improvements since OSHA's inception, but other gains have been obscured by the change in the statistical records system. Other variations in conditions, such as employment levels and recession cycles, have also acted to blur statistical comparisons. Statistical studies on this subject will be examined in Chapter 4 in the section titled "Public Uproar."

The recording of worker fatalities is more consistent than that of injuries and illnesses; thus, fatality statistics can be used to observe trends both before and after federal regulation. Figure 2.1 shows that the long-range trend of industrial fatalities is downward. Note that since the implementation of the OSHA law in the early 1970s there has been very little visible impact on this trend when all industries are considered together.

The NSC continues to publish data on workplace fatalities in its revised-format *Injury Facts*, the successor to its former publication, *Accident Facts*. Although no longer reported in the same format as that shown in Figure 2.1, the trend in workplace fatalities is still downward (*Injury Facts*, 2002). The latest available statistics at the time of printing this book were for the year 2006, in which the total number of workplace fatalities was 4988 for a workforce of approximately 146 million workers. The fatality rate per 100,000 workers was 3.4.

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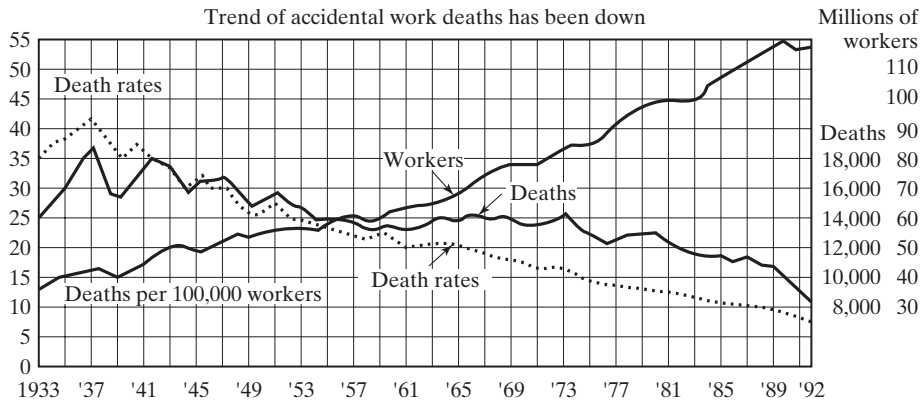


FIGURE 2.1

Trends in workers, deaths, and death rates, 1933–1992. (Source: National Safety Council, *Accident Facts*, 1993 Edition. Chicago: NSC; used with permission.)

Traditional Indexes

Familiar statistical measures are *frequency* and *severity*, which were defined by the old Z16.1 system. Frequency measured the number of cases per standard quantity of work-hours, and severity measured the total impact of these cases in terms of “lost work-days” per standard quantity of workhours.

Some injuries, such as amputations, are quite severe, but might result in few or no lost workdays. To avoid a distortion in severity rates in such cases, standard lost-workday charges were arbitrarily set for permanent injuries, such as amputations or loss of eyesight. The greatest need for arbitrary severity charges was for fatalities, because when you think about it, a fatality is not really a lost-workday case in the literal sense of the term; neither is it a permanent total disability, because the worker never works again.

Another obsolete term is *seriousness*, which is the ratio of severity to frequency. This produced a measure of the relative average importance of injuries and illnesses without regard to the number of hours worked during the study period.

Incidence Rates

The current system of recordkeeping represents an enlargement of the old Z16.1 system. The total injury–illness incidence rate includes all injuries or illnesses that require medical treatment, plus fatalities. Compare this with the traditional *frequency rate*, which included only those cases in which the worker missed at least a day of work.¹ *Medical treatment* does not include simple first aid, preventive medicine (such as tetanus shots), or medical diagnostic procedures with negative results. *First aid* is described as

¹The ANSI Z16.1 system labeled such lost-workday cases as “disabling injuries” whether the disability was temporary or permanent.

“one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care.” First aid is not considered medical treatment even if it is administered by a physician or registered professional personnel. Regardless of treatment, if an injury involves loss of consciousness, restriction of work or motion, or transfer to another job, the injury is required to be recorded. Certainly, regulating agencies, by their recordkeeping criteria, would not want to discourage medical treatment for an injury that should receive attention, so the U.S. Bureau of Labor Statistics (BLS) (Recordkeeping 1978) has listed sample types of medical treatment (see Appendix B). Any injury that receives or should have received one or more of these types of treatment is almost always considered recordable. Appendix C gives examples of first aid given for injuries that are not normally recordable unless they qualify for recording for another reason, such as loss of consciousness or transfer to another job.

To compute the incidence rate, the number of injuries is divided by the number of hours worked during the period covered by the study. The value obtained is then multiplied by a standard factor to make the rate more understandable. Specifically,

$$\text{total injury - illness incidence rate} = \frac{\text{number of injuries and illnesses including fatalities}}{\text{total hours worked by all employees during the period covered}} \times 200,000 \quad (2.1)$$

Without the factor of 200,000, the incidence rate would be a very small fraction indeed, as it should be. One should expect a very small number of recordable injuries and illnesses per single hour worked. The choice of the number 200,000 is not entirely arbitrary. A full-time worker typically works approximately 50 weeks per year at 40 hours per week. Thus, the number of hours worked per year per worker is approximately

$$40 \text{ hours/week} \times 50 \text{ weeks/year} = 2000 \text{ hours/year}$$

So 200,000 hours represents the number of workhours spent by 100 workers in a year:

$$100 \text{ workers} \times 2000 \text{ hours/year/worker} = 200,000 \text{ hours/year}$$

Thus, the total injury–illness incidence rate represents the number of injuries expected by a 100–employee firm in a full year if injuries and illnesses during the year follow the same frequency as observed during the study period. Note from Equation (2.1) that the actual period for gathering the incidence-rate data need not be a year or any other specific time period. A fairly long period is needed, however, to obtain a representative number of cases, especially when the incidence is low. A typical data collection period is 1 year.

Sometimes the safety and health manager will want to relate current total injury–illness incidence rates to the traditional frequency rate. The old frequency rate used a factor of 1,000,000 hours instead of 200,000. Thus, rates were standard as “per million manhours,” as they were called in those days. Note that such a factor related to a standard year for a firm employing 500 employees, not 100 employees. Thus, the old

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frequency rates should be higher than the current total injury–illness incidence rates—but they generally are not because one must remember that the current rate includes all cases involving medical treatment, not just lost-workday cases. Also, days in which the worker was still on the job, but was unable to perform his or her regular job due to an injury or illness, are now taken into account. These days are called *restricted work activity* days and may be lumped together with lost workdays or considered separately, depending on the statistic desired. Unless specifically stated otherwise, today’s interpretation of *lost workdays* includes days in restricted work activity as well as days away from work.

The term *incidence rate* is really a general term and includes the following:

1. Total-Recordable-Cases (TRC). Counts all recordable injury and illness cases, except fatalities.
2. Lost-WorkDay-cases Incidence rate. (LWDI) Counts injury (excludes illness) cases involving “lost workdays,” which includes restricted work activity days. Fatalities are not included.
3. Days Away, Restricted, or Transferred Rate (DART). Counts injury and illness cases involving days away from work, restricted work activity, and transfer to another job. Fatalities are not included.
4. Days Away From Work Injury and Illness Case Rate (DAFWII). Counts injury and illness cases that involve days away from work. Fatalities are not included.
5. Number-of-Lost Workdays rate. Counts number of “lost workdays” including restricted work activity days. Fatalities are not included.
6. Injury incidence rate. Counts total number of injury cases.
7. Illness incidence rate. Counts total number of illness cases.
8. Fatality incidence rate. Counts total number of fatalities.
9. Specific-hazard incidence rate. Counts cases in which only a specific hazard results in injury or illness.

All of the foregoing rates use the standard 200,000 factor. Note the difference between rates 2 and 5 in the foregoing list. Although the descriptions appear similar, rate 2 is counting *cases* involving lost workdays, whereas rate 5 is counting *total days lost*. The reader may see a similarity between the comparison of the old frequency rates (which are analogous to rate 2 above) with the old severity rates (which are analogous to rate 5 above).

In counting the number of lost workdays, the date of the injury or the date of onset of illness should not be counted, even though the employee may leave work for most of that day. Thus, if the employee returns to his or her *regular* job and is able to perform all regular duties full time on the day after the injury or illness, no lost workdays are counted. Count all calendar days lost, not just regular workdays lost. The reader may note that counting calendar days, instead of just workdays, represents a policy change on the part of OSHA. This change was instituted in the 1990s at the same time that the recordkeeping forms were revised. The number-of-lost-workdays rate compares to the old severity rate, except that no arbitrary charges are assessed for permanent partial disabilities and except for the 200,000 factor.

The specific-hazard incidence rate is useful in observing a small part of the total hazards picture. For specific hazards, injury incidence, illness incidence, fatality incidence, and all of the other rates can be computed. Care must be taken in selecting the corresponding total hours worked to be used in the denominator in calculating specific-hazard incidence rates. Since specific hazards are narrower and fewer workers are exposed, data should be collected over several years to achieve meaningful results for specific-hazard incidence rates.

For many years, OSHA relied on the *lost-workday-cases incidence rate*, commonly known as the *LWDI*, as a criterion for selecting high hazard industries for priority inspection. The term *priority* means higher in priority than random general inspections, but still lower in priority than inspections triggered by an employee complaint or a serious accident report, as will be seen in Chapter 4.

A somewhat surprising characteristic of the LWDI is that it considers injuries only—not illnesses. Illnesses are more difficult to track than injuries because there are often time delays in their diagnosis. Also, it is more difficult to prove work-relatedness for chronic exposures, which may have a variety of concurrent causes. The LWDI, because it is based on clear evidence, is considered a more precise and robust measure of the effectiveness of the firm's overall safety and health program. Also, perhaps for the same reasons, the LWDI considers only lost-time injuries, not all injuries. Remember, though, that restricted work activity cases are considered to be lost-time cases. Finally, the LWDI does not include fatalities, whether they be by illness or injury. Fatalities should always be considered a rare occurrence of grave importance and as such should not be averaged among the more common injury statistics on which the LWDI is based.

Newer benchmarks have taken the place of the LWDI as OSHA attempted to refine its inspection priorities. In 2008, the *Days-Away-Restricted-or-Transferred* (DART) rate replaced the LWDI as a criterion for inspection priority. Some states also use the *Days-Away-From-Work-Injury-and-Illness-Case* (DAFWII) rate. OSHA has recognized the importance of including illness statistics as well as injury statistics in setting priorities for inspections. Unlike the LWDI, both the DART and the DAFWII include illness statistics as well as injury statistics in the formula. Like the LWDI, both the DART and DAFWII rates consider *cases* that involve lost workdays, not the *total number of days lost*. It should also be noted that the DAFWII does not include cases in which the worker is transferred to another job, whereas the DART rate does include such cases. Finally, all four major rates calculated by enforcement agencies, the TRC, the LWDI, the DART, and the DAFWII, exclude fatalities in the formula, a reflection of the policy used for the LWDI. For all of these standard incidence rates, OSHA compares various industry's rates with nationwide rates published by the Bureau of Labor Statistics (BLS). The BLS has tracked industries by the Standard Industrial Classification (SIC) number for many years. The SIC number is being replaced by the internationally recognized North American Industry Classification System (NAICS) number, but many OSHA policies and standards still refer to the traditional SIC number. By comparing with national averages for the major injury/illness statistics, OSHA can set priorities for inspections at higher levels than random, general inspections. Whether an individual company actually receives an inspection, however, is subject to several additional factors, such as in which OSHA region and area it is located, the available

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inspection resources in that region or area, how recently the firm has received an inspection, the number of high-priority requests (such as major accident investigations or employee complaints) that arise in that region or area, and the number of resources already committed for named target areas (such as construction). The priorities for OSHA inspections will be examined in more detail in Chapter 4.

Every year, the National Safety Council gathers incidence statistics from surveys of its member companies and publishes them in *Injury Facts* (Injury Facts, 2009). Since the surveys are voluntary, they cannot be relied on to represent all member companies of the National Safety Council or the general population of industries nationwide. However, the NSC reports are frequently used as benchmarks for comparison. Figure 2.2 is a reprint of the NSC's report for 2007 (Injury Facts, 2009).

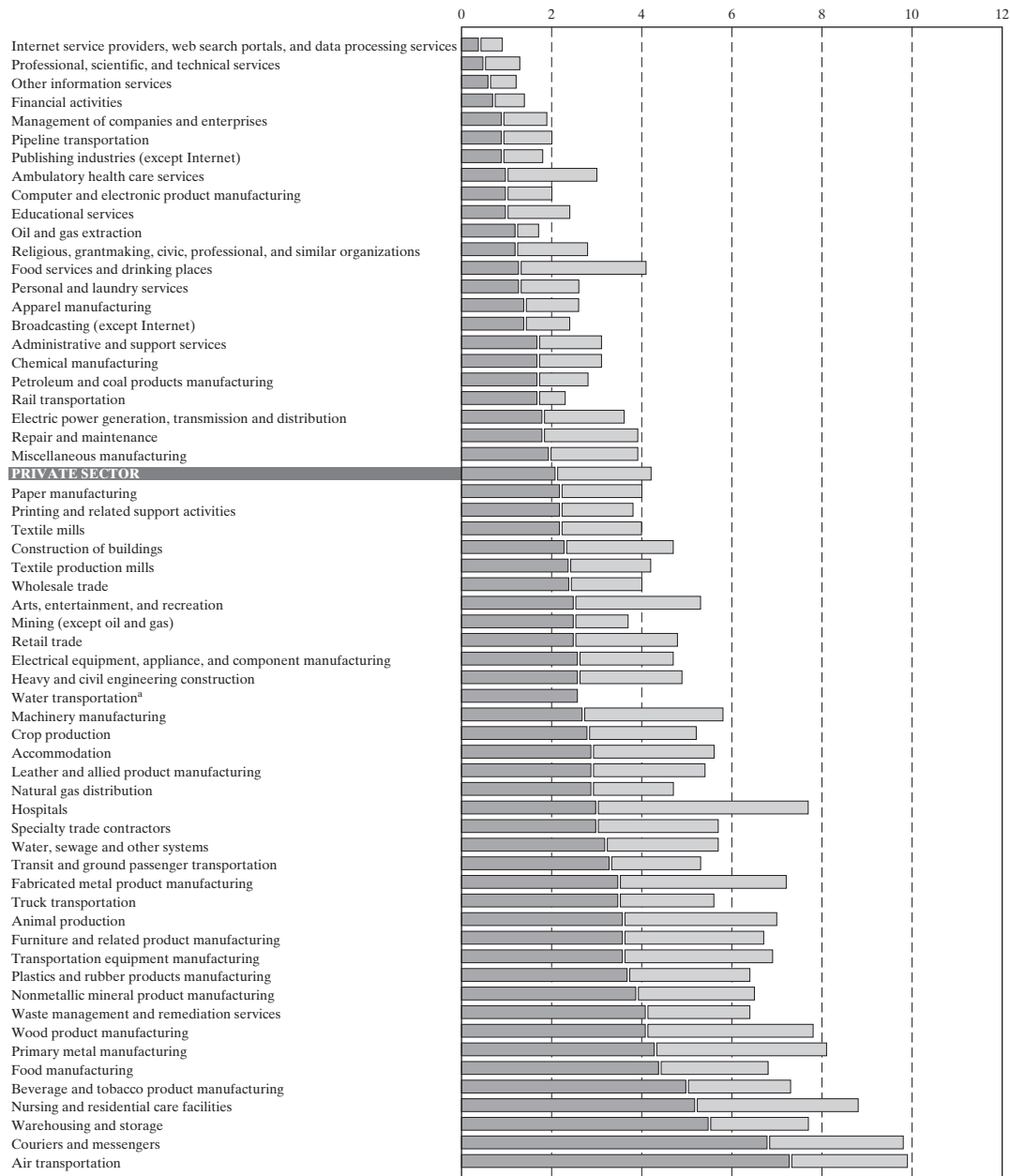
Recordkeeping Forms

The format for keeping injury and illness records has been standardized. The basic form is the *Log of Work-Related Injuries and Illnesses*, as displayed in Figure 2.3. Figure 2.4 shows a summary to post annually, so that employees can see what injuries and illnesses have been recorded for the year. The summary is required to be posted in a prominent place in the workplace on February 1 each year and to remain posted until April 30. It is the employer's responsibility to enter data correctly into the log and summary. General records are required to be saved for a period of at least 5 years.

The person responsible for completing the log and summary may need some guidance in distinguishing between occupational injuries and illnesses. Examples of occupational injuries include lacerations, fractures, sprains, and amputations that are the result of a work accident or an exposure involving a single incident in the work environment. Animal bites, such as insect or snake bites, are considered injuries. Even chemical exposures can be considered injuries if they result from a one-time exposure.

An illness is any abnormal condition or disorder not classified as an injury and caused by exposure to environmental factors associated with employment. Illnesses are usually associated with chronic exposures, but some acute exposures can be considered illnesses if the exposure is the result of more than a single incident or accident. It is important to note that starting January 1, 2003, it is necessary to record all work-related cases of hearing loss. Hearing loss is defined as a *standard threshold shift* and accompanying total hearing level 25 decibels or more above audiometric zero in the same ear. Hearing loss is described in greater detail in Chapter 10. A more detailed classification in the log and summary is required for illnesses than for injuries. Some guidance in classifying illnesses can be found in Appendix D. Some injuries or illnesses can cause unnecessary embarrassment or anguish to the people involved. Examples are injuries to personal or private areas, injuries as a result of sexual assault, mental illness, or others. In order to protect privacy, names can be left out of the OSHA Form 300. If necessary, details of the event, which would identify the person may also be omitted. This information must be kept in a confidential file with reference numbers to the events. Employees may also request that their names be left out of Form 300. Employers should also ensure that any change to an outcome of an injury or illness be noted on the OSHA Form 300. For instance, a drawn-out occupational illness that subsequently results in death would be changed to death on Form 300 (Recordkeeping, 2001).

BLS ESTIMATES OF NONFATAL OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES FOR SELECTED INDUSTRIES, 2007



Note: Industries are shown at the 2-, 3-, or 4-digit NAICS level.
 Total Cases with Days Away from Work, Job Transfer, or Restriction plus Other Recordable Cases equals Total Recordable Cases.
^aData for Total Recordable Cases and other Recordable Cases do not meet publication guidelines.

■ TOTAL CASES WITH DAYS AWAY FROM WORK, JOB TRANSFER, OR RESTRICTION
 □ OTHER RECORDABLE CASE

FIGURE 2.2

Comparison of incidence rates for various industries by North American Industry Classification System code. (Source: National Safety Council, *Injury Facts*, 2009 Edition, Itasca, IL.)



Year 20 _____

Form approved OMB no. 1218-0176

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for Occupational Safety and Health purposes.

OSHA's Form 300 Log of Work-Related Injuries and Illnesses

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer for more than one day away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician of licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Identify the person		Describe the case				Classify the case				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:				
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from explode torch)	(G) <input type="checkbox"/> Death	(H) <input type="checkbox"/> Days away from work	(I) <input type="checkbox"/> Job transfer or restriction	(J) <input type="checkbox"/> Other recordable cases	(K) <input type="checkbox"/> On job transfer or restriction	(L) <input type="checkbox"/> Away from work	(1) <input type="checkbox"/> Injury	(2) <input type="checkbox"/> Skin disorders	(3) <input type="checkbox"/> Respiratory conditions	(4) <input type="checkbox"/> Allergic reactions	(5) <input type="checkbox"/> All other illnesses
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Page totals ▶ Be sure to transfer these totals to the Summary page (Form 300A) below your postcard.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search existing data sources, gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspect of this data collection, contact the US Department of Labor, OSHA Office of Statistics, Room 3-5941, 200 Constitution Avenue, NE, Washington, DC 20210. Do not send the completed form to this office.

FIGURE 2.3
OSHA Form 300: Log of Work-Related Injuries and Illnesses. (This form is available in larger format on the Companion Website.)



OSHA's Form 300A Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary. Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0". Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35. In OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
(G) _____	(H) _____	(I) _____	(J) _____

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
(K) _____	(L) _____

Injury and Illness Types

Total number of ...	(4) Poisonings	(5) All other illnesses
(M) _____	(N) _____	(O) _____
(1) Injuries	(2) Skin disorders	(3) Respiratory conditions
(P) _____	(Q) _____	(R) _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time for reviewing the instructions, searching existing data sources, gathering the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspect of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____ City _____ State _____ ZIP _____

Industry description (e.g., *Maintenance of motor (truck) trailers*) _____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715) _____

Employment information (If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive _____ Title _____
 Phone _____ / /
 Date _____

FIGURE 2.4
OSHA Form 300A: Summary of Work-Related Injuries and Illnesses. (This form is available in larger format on the Companion Website.)

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Besides the log and summary, there is the *Injury and Illness Report* (see Figure 2.5). Each page of the report corresponds to a single-line entry in the log.

To illustrate the calculation of the various incidence rates and to demonstrate the use of the standard forms, Case Study 2.1 will now be analyzed.

CASE STUDY 2.1

A metal products fabrication and assembly plant employs 250 workers and has the following injury–illness experience for the year (workers are employed on a regular 40-hr-workweek basis):

File 1 January 31: Press-blanking operator lacerates hand on strip stock scrap from punch press; first aid received, no medical treatment; worker remains on the job.

File 2 February 19: Maintenance worker, not wearing eye protection, operating grinding machine in tool room, incurs eye injury from flying chip; medical treatment required; injury occurs on Tuesday, employee returns to regular job at regular time on Thursday.

File 3 February 27: Assembly worker becomes “ill” owing to noxious odors from remodeling operation in the assembly area; receives permission from supervisor to take the rest of the day off; does not go to a doctor or clinic; reports to regular work on time the next day.

File 4 March 2: Sewing machine operator’s right ring finger pulled into unguarded drive belt pulley on sewing machine; small fracture revealed by X ray; splint applied; worker returns to regular work at regular time the next day.

File 5 March 19: Dockworker sprains ankle on loading dock; moved to office job for two workweeks.

File 6 May 2: Maintenance worker entangles finger in rope as winch is released; taken to clinic for X ray; no fractures found; no treatment; worker returns to regular work the next day.

File 7 June 7: Yard worker exposed to poison ivy while clearing weeds in tank-farm area behind plant; rash develops; treated with prednisone adrenocortical steroid drug by prescription; no time lost.

File 8 July 6: Assembly worker loses two workdays recuperating from severe allergic reaction to wasp stings incurred while cleaning out his attic at home; medical treatment with prescription drugs.

File 9 August 4: Maintenance worker using ungrounded portable electric drill to repair equipment in assembly area is electrocuted. Date of death: August 4.

File 10 August 7: Loaded pallet in loading dock area falls from forklift on dockworker’s left foot; worker was not wearing steel-toed shoes; worker examined in hospital emergency room and X ray revealed no fractures or other injuries; worker receives whirlpool therapy and goes home; worker reports back to his regular job on time the next day and wears his company-issued safety shoes.

File 11 August 9: Maintenance worker in the tool room incurs injury from foreign object in the eye; irrigation method used to remove foreign object, which was not embedded in the eye; worker returns to regular job.



OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
 Occupational Safety and Health Administration
 Form approved OMB no. 1218-0176

Information about the employee

- 1) Full name _____
- 2) Street _____
 City _____ State _____ ZIP _____
- 3) Date of birth ____/____/____
- 4) Date hired ____/____/____
- 5) Male Female

Information about the physician or other health care professional

- 6) Name of physician or other health care professional _____

- 7) If treatment was given away from the worksite, where was it given?
 Facility _____
 Street _____
 City _____ State _____ ZIP _____

- 8) Was employee treated in an emergency room?
 Yes No

- 9) Was employee hospitalized overnight as an in-patient?
 Yes No

Completed by _____ Date ____/____/____

Title _____

Phone (____) _____

Information about the case

- 10) Case number from the Log _____ (Transfer the case number from the Log after you read the case.)
- 11) Date of injury or illness ____/____/____ AM / PM
- 12) Time employee began work ____:____ AM / PM Check if time cannot be determined
- 13) Time of event ____:____ AM / PM
- 14) What was the employee doing just before the incident occurred? Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing material"; "spraying chlorine from hand sprayer"; "daily computer key-stroke."

- 15) What happened? Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasker broke during replacement"; "Worker developed sores on his wrist over time."

- 16) What was the injury or illness? Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

- 17) What object or substance directly harmed the employee? *Examples:* "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

- 18) If the employee died, when did death occur? Date of death ____/____/____

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspect of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA, Office of Statistics, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20510. Do not send the completed forms to this office.

FIGURE 2.5
 OSHA Form 301: Injury and Illness Report. (This form is available in larger format on the Companion Website.)

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File 12 September 11: Worker in final assembly diagnosed with carpal tunnel syndrome (CTS) from repetitive work; surgery prescribed; worker misses 3 weeks of work before returning to regular job with engineering improvements to the workstation.

ANALYSIS

The first step is to complete the OSHA 300 Log of Occupational Injuries and Illnesses, generating one line on the log for each incident file. Figure 2.6 displays the completed log, and the rationale for each entry is as follows:

- File 1 The key word is “first aid.” This case is not recordable.
- File 2 This is a lost-workdays injury case. Do not count the date of injury (Tuesday). Do not count Thursday either because the worker returned to work at the regular time. Only one day was lost. Mark columns H, L, and M(1).
- File 3 This case is not recordable. The worker felt “ill,” but there was no medical treatment, and although the worker left work one afternoon, the date of the onset is not counted. The worker returned to work on time the next day, so no lost time is counted.
- File 4 This is a recordable injury, as the X ray was positive, revealing a fracture, which is always recordable. However, the worker returned to regular work at the regular time the next day; therefore, no time was lost. Mark columns J and M(1).
- File 5 This is a lost-time injury. Even though the worker returned to work, he was assigned to a different job; therefore, OSHA’s position is that the days at the restricted work activity count as lost workdays. Record in columns I, K, and M(1).
- File 6 Unlike File 4, the X ray in this case was negative. Since there was no fracture and no medical treatment and the worker returned to the same job the next day on time, this case is not recordable.
- File 7 Poison ivy from on-the-job exposure is classified as an occupational illness and is identified in column M(2) as “Skin Disorder” (see Appendix D). No time was lost, so a check also goes in column J.
- File 8 Incidents occurring off the job are not recordable.
- File 9 This is an injury-type fatality and should be recorded in columns G and M(1).
- File 10 The negative X ray and whirlpool therapy during the first visit to medical personnel are both considered first aid, not medical treatment (see Appendix C). This case is not recordable.
- File 11 Since the irrigation method was used and the object was not embedded in the eye, this eye injury is considered a first-aid case and is thus not recordable (see Appendix C).
- File 12 Because CTS is due to “repeated motion,” it is classified as a column M(5) illness (see Appendix D). This is a recordable lost-time illness. The lost time is in the days-away-from-work category, so it is recorded in columns H and L.



Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

OSHA's Form 300 Log of Work-Related Injuries and Illnesses

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0174
U.S. Department of Labor
Occupational Safety and Health Administration

Identify the person			Describe the case			Classify the case				Enter the number of days lost or job transfer from work or other restriction on worker's work					Check the "injury" column or choose one type of illness				
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock, north end)	(F) Describe injury or illness, parts of body affected, and objective substance that directly injured or made person ill (e.g., Struck by pipe from an eight foot tower from acetone splash)	(G) Death	(H) Days away from work	(I) Job transfer or restriction	(J) Other restriction on worker's work	(K) Days lost or job transfer from work	(L) Work restriction	(M) Injury	(1) Skin disorder	(2) Respiratory condition	(3) Reproductive condition	(4) Poisoning	(5) All other		
1	worker # 2	maint.	2/19	tool room	NOT RECORDABLE														
2	worker # 4	seamst	3/2	sewing room	finger fracture - belt pulley														
3	worker # 5	dock wkr	3/19	loading dock	spained ankle														
4	worker # 7	yard wkr	4/7	tank farm	skin rash (acm) - poisoning														
5	worker # 9	maint	8/4	assembly	electrocution - portable drill														
6	worker # 12	assy	9/11	final assy	CTS - repetitive motion														
Page totals							14	2	2	14	22								

FIGURE 2.6
OSHA 300 Log for Case Study 2.1. (This form is available in larger format on the Companion Website.)

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Calculation of Incidence Rates

$$\text{TRC} = \frac{5 \times 200,000}{250 \times 2000} = 2.0$$

$$\text{DART} = \frac{2 \times 200,000}{250 \times 2000} = 1.2$$

$$\text{DAFWII} = \frac{2 \times 200,000}{250 \times 2000} = 0.8$$

$$\text{LWDI (injuries only)} = \frac{2 \times 200,000}{250 \times 2000} = 0.8$$

$$\text{Injury incidence rate} = \frac{3 \times 200,000}{250 \times 2000} = 1.2$$

$$\text{Illness incidence rate} = \frac{2 \times 200,000}{250 \times 2000} = 0.8$$

$$\text{Fatality incidence rate} = \frac{1 \times 200,000}{250 \times 2000} = 0.4$$

$$\text{Number-of-lost-workdays rate} = \frac{36 \times 200,000}{250 \times 2000} = 14.4$$

$$\text{Specific-hazard incidence rate (eye injuries)} = \frac{1 \times 200,000}{250 \times 2000} = 0.4$$

Some explanation for the calculations in Case Study 2.1 may be helpful. The TRC rate totals Columns H, I, and J from the OSHA 300 log. The DART rate totals Columns H and I from the OSHA 300 log. The DAFWII rate uses only Column H from the OSHA 300 log. The LWDI rate at 0.8 is numerically equal to the DAFWII rate, but the calculations to arrive at these answers are different. The DAFWII rate counted cases 2 and 12, whereas the LWDI rate counted cases 2 and 5. The DAFWII rate excludes “job transfer or restriction” cases (Column I), and the LWDI excludes illness cases (case 12). Also, remember that all rates, except for the fatality incidence rate, exclude fatalities from the calculation. Also, remember that only the “number-of-lost-workdays” rate counts the total number of days of lost work, including job transfer and restricted work activity days. All of the other rates count the *cases*, not the *total days lost*.

In the specific-hazard incidence rate calculation, only one eye injury (File 2) was included in the calculation. The File 11 eye injury satisfied the Appendix C definition of first aid and thus, as a nonrecordable injury, was excluded from the calculation.

The 250-employee firm in Case Study 2.1 provides ample data to show meaningful calculations for the various incidence rates. But many firms are much smaller. For very small

firms, the calculations are obviously inappropriate. It is not uncommon for small businesses to operate for several years without a single injury or illness. Recognizing that the general injury illness recordkeeping system was designed for larger firms, Congress exempted small firms with 10 or fewer employees from general recordkeeping requirements.

However, Congress granted only a partial exemption. The federal Bureau of Labor Statistics (BLS) conducts annual surveys of occupational injuries and illnesses based on a random, stratified sample of industries. If a firm is to be included in a sample, it will be notified by the BLS. To keep the statistics representative of all industries, small firms are *not* excluded. Therefore, if a firm receives notice that it has been selected for participation in the survey for a given year, the firm must respond to the BLS. Thus, selected sample firms must keep the OSHA log and injury–illness statistics even though they normally would be exempt owing to their small size.

The current general recordkeeping system is based on federal standards and has remained relatively static since the early 1970s. As was stated earlier in this chapter, the required retention period for these general records is 5 years. However, in the early 1980s, special recordkeeping requirements were established for toxic chemicals in the movement that became known as *right to know*. It will be seen in Chapter 5 that the recordkeeping requirements for toxic chemicals are much more comprehensive and have led to the development of computer information systems for safety and health. The required retention period for hazardous chemical exposure records and medical records under the “right-to-know” standards is 30 years.

ACCIDENT CAUSE ANALYSIS

So far, this chapter has discussed the more visible, busy functions of the safety and health manager, many of which are required by state or federal agencies. However, even more important to the health and safety of workers are some of the jobs that the safety and health manager is not required to, but should, do. One of these voluntary, but important, tasks is a thorough analysis of the potential causes of injuries and illnesses that have already occurred in the plant. Even accidents or incidents that may not actually have caused injuries or illnesses, but which could have, should be studied to prevent their recurrence. Any occurrence of an unplanned, unwanted event is a data point to consider in the prevention of future illnesses and injuries. Accident cause analysis and subsequent dissemination of this information to personnel who will be exposed to the hazards in the future is believed to be the most effective way of preventing injuries and illnesses. The literature of injury case histories is filled with accounts of cases in which workers are killed by conditions that had previously caused accidents or injuries to others. Case Study 2.2 will be used to illustrate this point.

Sometimes, the accident analysis leads to a design change in a product or process. In other cases, work procedures are changed to prevent future occurrences, or at least to minimize the adverse effects of these occurrences. Even when nothing can be changed to prevent a future occurrence, at least workers can be informed of what happened, what caused the accident, under what conditions the accident might occur again, and how to protect themselves in such an event. Informing workers of the facts and causes of accidents that have already happened to their coworkers is a very effective method of training workers to avoid injury and illness. Thus, accident cause analysis is the foundation on

34 Chapter 2 Development of the Safety and Health Function**CASE STUDY 2.2**

A worker was struck on the head and killed by the sudden movement of a large wrench used for releasing gates on the bottom of railroad hopper cars. The worker used a powerful, 3- to 4-ft-long wrench to trip a mechanical latch on the bottom gate of the car. The wrench was supposed to be of a ratchet type, so that when the gate was tripped, the tremendous weight of the bulk material in the hopper car would not suddenly force the wrench back on the worker. However, for some reason the ratchet wrench was not available, and workers had been using an ordinary rigid wrench to release the latch. Only a week before the fatality occurred, another worker had narrowly escaped the same injury when he lost control of the same wrench in the same operation.

which safety and health engineering, capital investment planning, training, motivation, and other functions are based. There are other types of accident analysis; statistical frequency analysis was discussed earlier, and cost analysis will be discussed later in this chapter. Yet, an important first step is the determination of causes of accidents that have already occurred and might occur again.

Accident cause analysis, as essential as it is, does have some disadvantages. The main disadvantage is the obvious one: it is after the fact, that is, it is too late to prevent any injury or loss that occurred as a result of the accident under analysis. Another disadvantage is that the focus of the analysis can easily degenerate into an exercise in assigning blame or allocating legal liability. Recognizing these disadvantages, the analyst should strive to stay focused on the objective of identifying processes, procedures, or management practices that need to be changed to prevent future occurrences of the same or similar accidents.

ORGANIZATION OF COMMITTEES

The value of using safety and health committees has long been recognized. Committees are appointed from the ranks of the operating personnel of the regular line organization. The appointments are temporary, so that workers throughout the organization rotate on and off a committee periodically. The committees then conduct facility inspections, evaluate safety and health suggestions, analyze accident causes, and make recommendations.

Several natural advantages of the committee approach make it a winning strategy. In general, operating personnel know a lot more about their processes and machines than does the safety and health manager. Many valuable and practical ideas can come from operating personnel if staff persons will listen. Also, operating personnel may accept more readily new policies and procedures if these procedures arise from other operating personnel like themselves. Then there is the advantage of exposure. Sooner or later, nearly everyone has his or her turn on a safety committee, which means that the direct activity of the safety and health program is a product of

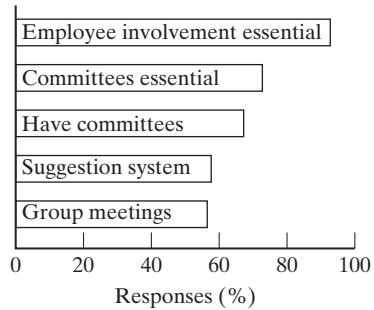


FIGURE 2.7

Employee involvement in safety and health [Source: 1993 National Safety Council study (OSHA, 1993)].

plantwide participation. Some workers have no appreciation for or sensitivity to safety and health hazards until they take their turn on the committee. Indirectly, then, the committee becomes a vehicle for safety and health training.

The early 1990s was the stage for general public debate on the issue of whether companies should have employer–employee committees for safety and health. At the congressional level, a key element of reform legislation was a provision for mandatory safety and health programs with employer–employee committees. The idea was particularly attractive to labor unions. To test the popularity of the idea nationwide, the NSC conducted a study in late 1993, obtaining 249 responses from a sampling of 2500 non-agricultural companies. If those responses can be assumed to be representative, the study suggests that a general consensus favors employee involvement and safety and health committees, as Figure 2.7 seems to bear out (OSHA, 1993).

Despite its advantages, there are pitfalls to the committee approach. The safety and health manager should provide resources and guidance to the committee so that it will have the necessary tools and knowledge to function effectively. Otherwise, the committee may make ridiculous suggestions and be disappointed when management does not approve them or does not follow through with capital support. Also, committees must be conditioned not to expect miracles. Some orientation or training is necessary so that committee members will comprehend the goal of targeting recognized hazards, but not all hazards. Finally, committees should not be allowed to degenerate into spy parties with the objective of discrediting the processes or procedures of other departments.

SAFETY AND HEALTH ECONOMICS

Safety and health managers are sometimes dismayed to discover that top management bases safety and health decisions on dollars and cents. However, the cold reality is that a business exists to make profits, and everything a business does is either directly or indirectly related to economics. Safety and health managers who are naïve enough to think that the humanitarian objective of worker safety and health transcends the more crude issues of profit and loss should ask themselves the question: How *much* safety and health staff activity is justified by the humanitarian objective?

The prevention of employee injuries and illnesses can be formulated as an economic objective; such a formulation is more meaningful to management than vague

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humanitarian aspirations. Accidents, injuries, and illnesses have undeniable costs that contribute nothing to the value of products manufactured or services performed by the firm. Occupational injuries alone have been estimated to total over \$164 billion annually (Injury Facts, 2002). The annual cost of injuries and illnesses in many industries dwarfs the total profits picture. This is a reality that almost any top manager will want to consider. Although it is true that many of these costs are subtle and difficult to estimate, the existence of these costs is in no way diminished by this fact.

One obvious and direct category of costs from injuries and illnesses is the payment of workers' compensation insurance premiums, which are based on a firm's injury and illness experience. Self-insured firms have the actual claims data on which to calculate these direct costs. In addition to these claims are medical costs that may be covered by insurance. Since these costs are directly identified with injuries and illnesses in accounting records, they are sometimes called *direct costs* of injuries and illnesses. Workers' compensation premiums have recently been increasing sharply. Historically, premiums have been in the range of 1–2% of a total payroll. In recent years, however, rates have been much higher, as Table 2.2 attests.

Despite the significantly higher premium rates for workers' compensation insurance, these "direct costs" of injuries and illnesses have been referred to by some analysts as the *tip of the iceberg* (see Figure 2.8). The intangible costs of accidents, although hidden, appear to be much greater than the so-called "direct costs." It is the job of the safety and health manager to attempt to estimate these costs and to keep management apprised so that rational investment decisions can be made.

The National Safety Council, in its *Accident Prevention Manual for Industrial Operations*,² lists the following categories of hidden costs of accidents:

1. Cost of wages paid for time lost by workers who were not injured. These are employees who stopped work to watch or assist after the accident or to talk about it, or who lost time because they needed equipment damaged in the accident or because they needed the output or the aid of the injured worker.

TABLE 2.2 Sample Workers' Compensation Insurance Premium Rates

SIC code	Description	WC rate (% of payroll)
8039	Department stores	2.91
2003	Bakeries	4.40
2883	Cabinet manufacturing	6.92
8829	Nursing homes	4.25
5022	Bricklayers	10.14
5645	Carpentry (light residential)	18.86
5551	Roofers	29.53

WC, workers' compensation.

Source: Arkansas Assigned Risk Rates for 2002.

²*Accident Prevention Manual for Industrial Operations: Administration and Programs Volume*, 8th ed. Chicago: National Safety Council, 1981, pp. 214–215 (used with permission).

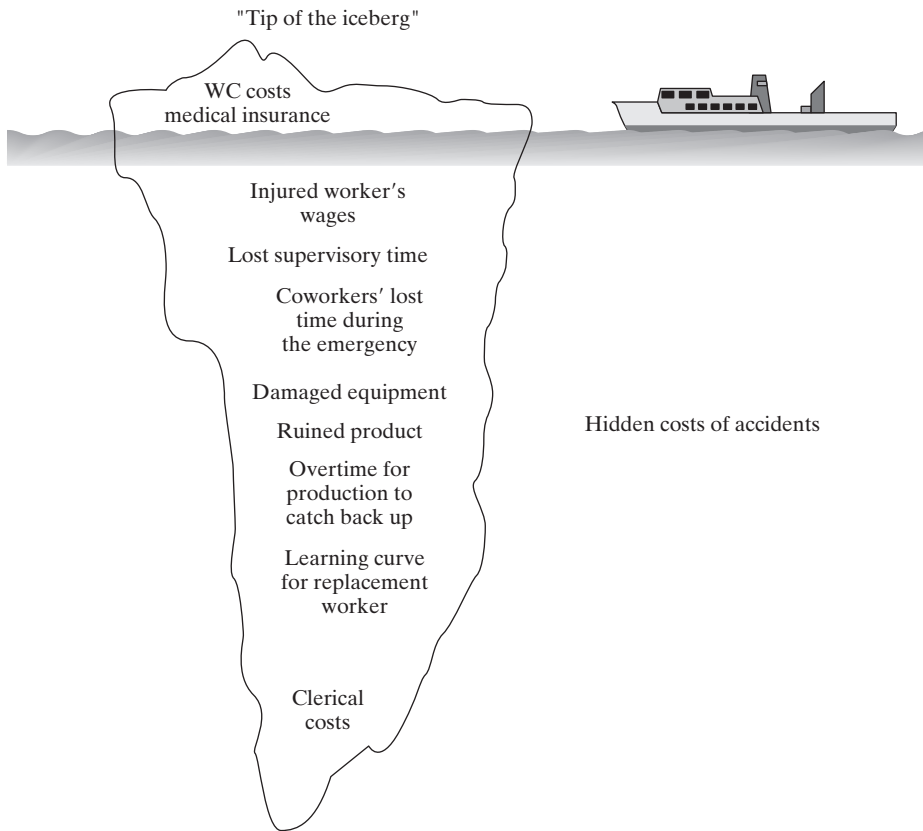


FIGURE 2.8

Direct costs of accidents (workers' compensation premiums and medical insurance) represent only the "tip of the iceberg."

2. Cost of damage to material or equipment. The validity of property damage as a cost can scarcely be questioned. Occasionally, there is no property damage, but a substantial cost is incurred in putting back in order material or equipment that has been thrown into a state of disorder. The charge should, however, be confined to the net cost of repairing or putting in order material or equipment that has been damaged or displaced, or to the current worth of the equipment less salvage value if it is damaged beyond repair.

An estimate of property damage should have the approval of the cost accountant, particularly if the current worth of the damaged property used in the cost estimate differs from the depreciated value established by the accounting department.

3. Cost of wages paid for time lost by the injured worker, other than worker's compensation payments. Payments made under workers' compensation laws for time lost after the waiting period are not included in this element of cost.

4. Extra cost of overtime work necessitated by the accident. The charge against an accident for overtime work necessitated by the accident is the difference between

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normal wages and overtime wages for the time needed to make up lost production, and the cost of extra supervision, heat, light, cleaning, and other extra services.

5. Cost of wages paid supervisors for time required for activities necessitated by the accident. The most satisfactory way of estimating this cost is to charge the wages paid to the foreman for the time spent away from normal activities as a result of the accident.

6. Wage cost caused by decreased output of injured worker after return to work. If the injured worker's previous wage payments are continued despite a 40% reduction in his output, the accident should be charged with 40% of his wages during the period of such low output.

7. Cost of learning period of new worker. If a replacement worker produces only half as much in his first two weeks as the injured worker would have produced for the same pay, then half of the new worker's wages for the two-week period should be considered part of the cost of the accident that made it necessary to hire him. A wage cost for time spent by supervisors or others in training the new worker also should be attributed to the accident.

8. Uninsured medical cost borne by the company. This cost is usually that of medical services provided at the plant dispensary. There is no great difficulty in estimating an average cost per visit for this medical attention. The question may be raised, however, whether this expense may properly be considered a variable cost. That is, would a reduction in accidents result in lower expenses for operating the dispensary?

9. Cost of time spent by higher supervision and clerical workers on investigations or in the processing of compensation application forms. Time spent by supervision (other than the foreman or supervisor covered in Item 5) and by clerical employees in investigating an accident, or settling claims arising from it, is chargeable to the accident.

10. Miscellaneous usual costs. This category includes the less typical costs, the validity of which must be clearly shown by the investigator on individual accident reports. Among such possible costs are public liability claims, cost of renting equipment, loss of profit on contracts canceled or orders lost if the accident causes a net long-run reduction in total sales, loss of bonuses by the company, cost of hiring new employees if the additional hiring expense is significant, cost of *excess* spoilage (above normal) by new employees, and demurrage. These cost factors and any others not suggested here would need to be well substantiated.

Every firm is different, and if time and staff resources permit, the best way to estimate hidden costs of accidents is to survey and analyze the individual company's recent accident data. When performing such an analysis, it must be remembered that noninjury accidents can also be costly and are generally caused by the same types of conditions and practices that result in injury accidents. Therefore, noninjury accidents should also be included when one attempts to assess the total cost of accidents.

Most firms cannot afford the luxury of a comprehensive, statistically reliable, in-house study of hidden accident costs. An alternative is to turn to national studies of average costs of various accident categories, and apply these survey averages as estimates of in-house costs. Two well-known studies of uninsured costs of accidents were reported by Grimaldi and Simonds (Grimaldi and Simonds, 1975) and Imre (Imre, 1974). Although the data were gathered over a span of several years, when the dollar figures were

adjusted for inflation to a common representative year, the results of the two studies were shown to corroborate each other, recognizing that rough approximations are all that can be hoped for in such studies.

Though the Grimaldi and Simonds and Imre studies are classics in the field of estimating the costs of accidents, many safety professionals consider them too old and too conservative to be relevant to today's costs. Even when adjusted by the Consumer Price Index (CPI), the classic estimates are often seen as too low to be realistic. Another difficulty with the classic studies is that the classification of accidents is not clear. The four general classifications are "lost time," "first aid," "doctors' cases," and "no-injury cases." These four general classes seem to overlap for some accidents. Furthermore, the classification of fatalities does not seem to be adequately addressed.

Revisions to cost estimating procedures were made in 2005 to 2006 (Injury Facts). As per the 2009 edition of Injury Facts, the NSC estimate of the average total cost per worker fatality is \$1,270,000. For worker injuries, the corresponding figure is \$43,000. These figures are much higher than would be derived using the classical methods employed by Grimaldi, Simonds, and Imre. Even so, the NSC estimates do not include any estimate of property damage costs.

The U.S. Air Force has compiled estimates of accident cost categories for use in their investigations of aircraft accidents and other loss incidents (AFI 91-204, 1995). Despite the difficulty associated with estimating human loss, the Air Force has even attempted to place some kind of cost figure on the loss of life. For a rated³ officer fatality, the estimated cost to the Air Force is \$1,100,000 as per the publication of AFI 91-204 (1995).

For permanent total disability, the estimated cost is slightly higher (\$1,300,000, including lost-workday and hospitalization-day costs). The average estimated cost for permanent partial disability is \$210,000. For temporary disabilities, the lost-workday cost estimate is \$425/day, or \$466/day during hospitalization. For an injury that does not result in lost workdays, the estimated average cost is \$120. The corresponding costs for civilian employees are generally less, probably because the government investment in training these individuals is low. Civilian fatalities are estimated at \$460,000 each, permanent total disabilities at \$385,000 each, permanent partial disabilities at \$250,000 each, and lost workdays at \$350 per day. Hospitalization-day costs are \$466 per day, and the no-lost-time cases (at \$120 each) are estimated to be the same as for the military-rated officer.

Turning to the nonmilitary environment, the U.S. Department of Energy (DoE) places a similar dollar value on human life (\$1 million per fatality) and reportable injuries (\$2000 per case) in cost studies and annual reports. In addition, for cases involving lost workdays, DoE estimates \$1000 loss per workday lost (Briscoe, 1982; Crites, 1995). Another estimate (Barciela, 1994) places the hidden costs of accidents anywhere from \$5 to \$50 per dollar of workers' compensation claims.

At the beginning of this section, it was stated that the direct cost of worker injuries and illnesses, workers' compensation insurance costs, represented the "tip of the iceberg" compared to the total costs incurred. Recent National Safety Council and U.S. Air Force estimates seem to bear out this theory.

³The term *rated* means that the officer is in flight-duty status, which means that the officer has been trained for and receives extra compensation for flight duties.

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TRAINING

Training or training support may be the most important staff function to be performed by the safety and health manager. Despite a recent trend toward concentration on unsafe conditions, experts still attribute most worker injuries and illnesses to unsafe acts. Unsafe work habits are deeply rooted, even in new, young workers. Our society and its standards of status, as influenced by the media (especially television), places a premium on high-risk activity. From an early age, children learn that heroes are people who are daring, lucky, and risk their lives, especially in their lifework. In some jobs, such as space exploration, the military, law enforcement, and firefighting, it is occasionally both necessary and rational to take big risks. And those who take these risks indeed deserve to be called *heroes*. Unfortunately, though, the desire for recognition, status, and the esteem of their peers causes people to take unnecessary risks in activities that do not warrant such risk. A good example of this phenomenon is exhibited in the automobile driving habits of people of all ages. Deep-rooted, unsafe habits and lack of knowledge about specific job hazards are major barriers to worker safety and health. It is on these two problems that the training program should be focused, and training is perhaps the most challenging and important function of the safety and health manager.

One of the biggest mistakes safety and health managers can make is to assume that they are the principal trainers in safety and health. The principal trainers in safety or health or in any other aspect of the job are the first-line supervisors. Their direct contact with the workers will determine how the job will be done. A corollary to this principle is that most training in safety and health is informal and is conducted on the job. In fact, training by example is a very important delivery mode, and new workers are more influenced by what the supervisor and experienced workers *do* than by what they *say*.

Recognizing that most training takes place between supervisor and worker, there is still a need for classroom training in safety and health principles, standards, and hazards recognition, especially for supervisors. The safety and health manager can provide this training directly or can act as a facilitator in bringing useful information and training aids into the plant. Commercially available videos are especially helpful in addressing basic principles applicable to all workplaces. An example principle addresses the inherent hazard in workers' tendencies to save time by taking shortcuts for comfort or convenience. The video titled "It's About Time," produced by Envision, Inc., addresses this general hazard principle.

Responsibility for the effective use of time in safety training meetings falls upon the safety and health manager. A high priority should be to begin the meeting on time. Latecomers show their lack of respect for the importance of the meeting and waste the time of the other attendees. Likewise, interrupting the agenda to bring latecomers up to date on what has happened in the meeting before they got there wastes the time of the attendees who arrived on time (ref Leading).

Safety and health managers should not "try to reinvent the wheel" in their development of training materials. Audiovisual packages and outlines are available, and when the safety and health manager's time, including overhead, is considered, it is usually much more reasonable to purchase or rent training materials than to attempt to create original material in-house. Chapter 1 enumerated some sources to assist safety and health managers in developing this aspect of their job. Chapter 3 also will address the subject of training and how it becomes a part of the overall objective of hazard avoidance.

Drug and Alcohol Abuse

Safety and health managers are taking a more assertive posture to control the effects of drug and alcohol abuse in the workplace. Drug and alcohol abuse has been shown to be a greater problem than was once thought. Consider the experience of the Aluminum Company of America's (ALCOA) plant in Vancouver, Washington (Houston Chronicle, 1984). Following the lead of a sister ALCOA plant in Davenport, Iowa, the company decided to try a preemployment drug screening test for all applicants. To the surprise of management, in 3 months of testing, half of the 750 applicants failed the test. The test was a urinalysis designed to indicate whether drugs had been used in the preceding 2 or 3 days and was conducted by a hospital laboratory service. The test results indicated that the use of marijuana was the most prevalent problem. ALCOA hired 130 of its applicants who passed the test and, according to the personnel manager, found the people hired to be better workers than those that the company had had before the drug screening program was added to the hiring process.

It is not difficult to justify a carefully planned and executed drug and alcohol abuse plan for any company, and the safety and health manager should take the lead in establishing one. Indeed, there is no choice in certain sectors of the transportation industry subject to mandatory testing for marijuana, cocaine, opiates, amphetamines, and phencyclidine (PCP), under rules issued by the U.S. Department of Transportation. The program prescribes random, preemployment, periodic, reasonable cause, and postaccident testing (Drug Testing Monitor, 1989). Drug and alcohol testing may make even more sense in other industries. And when a treatment program, whether it is for drug abuse or alcohol abuse, becomes necessary, few parties have as much influence over an employee's decision to enter treatment as does his or her employer.

A key question to ask management is whether they can imagine a situation in which the firm might some day need to terminate an employee because excessive drug or alcohol abuse has affected his or her job. If the answer is yes, the firm is exposed to litigation risks if a policy on drug and alcohol abuse is not in place. If your company has a rule against drug abuse, employees should be informed, and new employees should be required to consent in writing that they are working under the company's drug abuse policy as a condition of employment (Wilkinson, 1987). By making preemployment drug screening a requisite for employment, safety and health hazards can be prevented, but to be consistent, the company should apply the same rules against drug abuse to existing employees. Otherwise, the firm may face a discrimination charge from an applicant who has been refused employment.

Besides screening programs to detect a problem, both in the cases of new applicants and existing employees, many employers are instituting *employee-assistance programs* to deal with the difficulties of employees who have a recognized drug or alcohol abuse problem. The rationale is that some well-trained and competent employees are too valuable to lose because of a drug or alcohol problem. Therefore, instead of viewing the problem as a matter of discipline, the condition is viewed as a sickness requiring treatment and therapy to restore the worker to full usefulness. Such programs have the intangible benefit of conveying to workers in general that the company cares about the well-being of its employees and would rather see them cured than terminated.

As pervasive as the drug and alcohol abuse problem is, there is no doubt that safety and health managers will continue to encounter increased responsibilities to establish and maintain programs to control the hazards these problems present.

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JOB PLACEMENT TESTING

The success with laboratory tests for drug and alcohol abuse suggests that perhaps other tests can be used to screen applicants so that safer and more dependable employees can be recruited. Such tests have been used, with quantifiable results that have been extensively validated. One such test, developed by Behavioral Science Technology, Inc., is the Job Candidate Profile (JCP) (Kamp, 1991). Dramatic reductions in workers' compensation claims have been demonstrated after the implementation of the JCP testing system.

A program of placement testing should not be entered into lightly, as it is possible to run afoul of Title VII of the Civil Rights Act of 1964. Preemployment screening tests must not be discriminatory against women or racial minorities. Of course, it is possible that more individuals representing racial minorities or more women will happen to fail a given test than male Caucasians do. The Equal Employment Opportunity Commission (EEOC) has published guidelines that prescribe limits for failure rates for any selection test or procedure. If the failure rate for racial minorities or women is less than 80% of the failure rate for white men, the test is considered to have an adverse impact on those racial minorities or women.

Another concern is the Americans with Disabilities Act (ADA) of 1990, which protects disabled persons from job discrimination. However, Congress did not intend for the ADA to prohibit job screening for alcohol or drug abuse. Therefore, despite the fact that alcohol and drug abuse can sometimes be considered "diseases" or "handicaps," alcohol or illegal-drug users cannot use this as a defense to force an employer to consider them for employment without regard to their existing alcohol or drug problem. Chapter 4 will explore the ADA in more detail. As can be seen, the preemployment screening problem can be legally complicated, but if these problems can be overcome, the policy of using preemployment tests of proven reliability and validity can be a sound and effective method of reducing workplace injuries.

THE SMOKE-FREE WORKPLACE

Public opinion has shifted in the direction of sober respect for the serious hazards of tobacco smoke. In the past, the general health concern was the deleterious effects of smoking on the smokers themselves. More recently, the concern has shifted to the *nonsmoker*, who is the victim of what has become known as *passive smoking*. Wells estimates (Wells, 1989) that some 46,000 nonsmoking Americans die each year from exposure to tobacco smoke. Glantz (Glantz, 1991) cites cigarette smoke as a source of more than 4000 chemical air contaminants, including 43 known carcinogens. OSHA, in its Advanced Notice of Proposed Rulemaking, notes the presence of chemicals such as acrylonitrile, arsenic, benzene, lead, cadmium, formaldehyde, and vinyl chloride in tobacco smoke. For all of these chemicals, there is "sufficient evidence" of carcinogenicity in humans or animals. The concentrations of these dangerous substances may be tiny in tobacco smoke, but it should be noted that each of these chemicals is the subject of a separate OSHA air contaminant standard. These and other air contaminants will be addressed in Chapter 9. It is evident that the increasing concerns of nonsmoking American workers about passive exposure to

tobacco smoke cannot be ignored by the safety and health manager, Congress, or federal agencies. OSHA has already taken steps to deal with smoking in the workplace in advance of any workplace standards that deal specifically with this problem. OSHA officials have testified before congressional subcommittees studying this problem. (Douglass, 1992; Scannell, 1991.)

In 1994, OSHA published a “Proposed Rule on Indoor Air Quality” in the *Federal Register*. Although other indoor air contaminants are addressed, it is clear that tobacco smoke is the primary target of this proposed standard. In the case of tobacco smoke, employers would be required either to prohibit smoking in the entire building or to establish designated smoking areas. The proposed standard requires direct exhaust ventilation for the designated smoking area and maintenance of continuous negative pressure in the area so that tobacco smoke will be contained within that area. If the exhaust system breaks down, smoking must be prohibited even in the designated smoking area until repairs are made. Even cleaning and maintenance activities in the smoking area are restricted to those times in which personnel are not smoking in the area.

It should not be difficult to understand that OSHA would have problems with promulgating a sweeping new standard as pervasive as the Proposed Rule on Indoor Air Quality. Therefore, it came as no surprise that on December 17, 2001, OSHA published a notice in the *Federal Register* that it was withdrawing its proposed standard on indoor air quality. OSHA cited state, local government, and private industry actions to control smoking, the principal issue in the standard. As for other indoor air contaminants, OSHA stated that “the portion of the proposal not related to Environmental Tobacco Smoke (ETS) received little attention during the rulemaking proceedings.” OSHA concluded that there was insufficient evidence to support a new rule on indoor air quality. Political pressure continues to exist on both sides of the issue, however. A national antismoking organization named *ASH* (Action on Smoking and Health) has been pressing OSHA for the past 30 years to promulgate a rule to regulate smoking in the workplace (*Workplace Smoking Rule Moves Too Slowly for ASH*, 1997). *ASH* has sought court action to force OSHA to act on conclusions reached by several federal agencies that tobacco smoke is a “Group A carcinogen.” OSHA, by its own rules, gives priority to promulgating standards that respond to carcinogen hazards. *ASH* insists that OSHA adhere to these priorities with respect to tobacco smoke, now that tobacco smoke has been found to be a carcinogen. Despite OSHA’s inaction on the issue of indoor air quality, the first decade of the twenty-first century has seen dramatic reduction in public tolerance of tobacco, not only inside public buildings, but outside within whole campuses or complexes as well.

A milestone in the mounting sentiment against public smoking occurred on June 20, 1997, when legislation was introduced in Congress to delineate a comprehensive settlement between the tobacco industry and suits brought by attorneys general of 40 of the 50 states. The settlement contained sweeping features, including a confirmation of the authority of the federal Food and Drug Administration (FDA) to regulate tobacco products, a monetary settlement to be paid by the tobacco industry having a 25-year face value of \$358.5 billion, and comprehensive bans on outdoor advertising that is believed to be focused on youthful smokers (*The Tobacco Settlement, Statements & Information*, 1997).

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BLOODBORNE PATHOGENS

In the words of Warner Green in *Scientific American* (Greene, 1993), "AIDS is the defining immunologic problem of our time. The HIV pathogen stands out as the pre-eminent threat to human health and therefore is the most intensely studied virus in history." According to the Global AIDS Policy Coalition, the estimated number of people infected by human immunodeficiency virus (HIV) as at the end of 1992 was 19.5 million (Felsenthal, 1994). By 2002, that figure may have doubled. The alarming AIDS crisis has captured the attention of not only the medical profession, but also the military, elected officials, and the general public. Although workplace exposures are rare, some occupational exposures have resulted in bloodborne disease incidence and subsequent death. Workers in some industries have become sensitized to the threat, and it is not surprising that OSHA responded with the promulgation of a standard for bloodborne pathogens, made effective March 6, 1992.

The HIV virus has the spotlight because of the alarming growth of the epidemic, the lack of any cure, the lack of any preventive immunization, and because it eventually leads to AIDS and certain death. However, despite these sinister aspects of AIDS, in the occupational arena the hepatitis B virus (HBV) actually kills more victims than does HIV.

It is well known that the health professions are the primary at-risk occupations for bloodborne pathogens, and these jobs are the primary focus of the OSHA standard. Indeed, hospitals have long known of and dealt with the risk of hepatitis B outbreaks among their staff. Although the medical professions are the primary focus, the OSHA standard is not limited to these workplaces. The question to be asked is whether the worker will be exposed to blood or other potentially infectious materials, which include some wastes and tissues of infected animals. The precautions to be taken to defend against HIV infection are basically the same as for HBV, so the OSHA standard addresses them together.

For workplaces that have one or more employees who may encounter occupational exposures, OSHA expects the employer to have a written exposure control plan. This plan must be accessible to employees and is subject to update at least annually. The employer must identify and list those jobs that are subject to exposure.

As with other health hazards, OSHA looks first to elimination of HBV and HIV hazards by engineering and work-practice control measures. A large percentage of the occupational incidence of HIV infection is from accidental contact with "sharps," such as needles and broken glass vessels for human blood. In fact, OSHA mandates that employers record all injuries from needlesticks and sharps that involve contamination from blood or other infectious materials on the OSHA Form 300 log. A simple and reasonable system for disposal of sharps is a practical first step toward control of the hazard and compliance with the OSHA standard.

An orderly and effective system of housekeeping, laundry, and waste disposal is another significant step in controlling the hazard and complying with the standard. Washing, cleaning, and disinfecting exposed surfaces are particularly effective in destroying HIV and HBV. Provision for consumption and storage of food must consider the need for separation from potential exposures. Applying cosmetics or lip balm and handling contact lenses are prohibited in work areas with a reasonable likelihood of occupational exposure. The eyes are suspected to be a somewhat vulnerable path for contracting HIV or HBV.

Besides engineering and work-practice controls, there still is a need for personal protective equipment. The employer's duty is to supply the necessary equipment and, further, to require employees to use it, unless, under unusual circumstances, the employee elects, for professional reasons, to refuse to use the equipment. One can picture an emergency medical scenario in which a medical professional might elect to forgo personal protective equipment in order to immediately render lifesaving aid to the victim of a medical crisis.

Bloodborne pathogens, especially AIDS, are more a concern of society and the medical profession in general than to the typical workplace. This vital topic, though, is too important to ignore and will continue to receive attention from OSHA and those safety and health managers whose workers are potentially exposed. OSHA has published guides, fact sheets, and even a *Sample Bloodborne Pathogens Exposure Control Plan* booklet (Bloodborne Pathogens Final Standard: Summary of Key Provisions, 1992; Most Frequently Asked Questions Concerning the Bloodborne Pathogens Standard, 1993; Sample Bloodborne Pathogens Exposure Control Plan, 1992).

WORKPLACE VIOLENCE

Ask the average person what the leading cause of workplace fatalities is and you will probably hear "falls," "electrocutions," or perhaps "asphyxiation." But, according to recent statistics (DeGroff, 1996), *workplace violence* is the leading cause of occupational fatalities for working women and the second leading cause for working men. Prevention of workplace violence is usually considered someone else's responsibility, but, increasingly, the safety and health manager is taking the initiative to control this significant hazard. The federal agency OSHA, too, is taking a look at this problem, and though no standards had been set as of this writing, guidelines have been issued by OSHA for comment. The first-draft guideline was issued in April 1996.

Not surprisingly, the most hazardous exposure to workplace violence is the check-out clerk in a night retail establishment, that is, the convenience store clerk. OSHA guidelines address six risk factors usually present in such environments (DeGroff, 1996):

1. Exchange of money with the public
2. Working alone or in small numbers
3. Working late at night or during early morning hours
4. Working in high-crime areas
5. Guarding valuable property or possessions
6. Working in community settings

Some of the preceding risk factors are unavoidable in night retail store operations. However, the OSHA guidelines recommend measures that are intended to control or reduce the severity of the hazards. The following elements are included:

1. Management commitment and employee involvement
2. Worksite analysis
3. Hazard prevention and control
4. Training and education

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The OSHA recommendations are necessarily general and are obviously intended to cause employers and employees to think about this hazard category and to concentrate on methods to reduce its impact. At the same time, technology is advancing the means of detection and apprehension of criminals who attempt violent crimes in the workplace.

It is understandable why night retail establishments are susceptible to violent acts. Somewhat more difficult to understand are acts of violence in schools and college campuses. The deadliest school shooting of all time occurred in the campus of Virginia Polytechnic Institute and State University on April 16, 2007, in which a single student killed 27 other students and 5 professors before killing himself. This and other school tragedies have resulted in new security measures that will be covered later in Chapter 6.

The night retail establishment, colleges, and schools are considered workplaces too, but even in manufacturing, processing, and construction industries, workplace violence is on the increase. In fact, according to Moore (Moore, 1997), homicide in the workplace is the fastest-growing violent crime in the United States. Unlike homicide off the job, it is not appropriate to blame alcohol or drugs in workplace homicides. Workplace homicide is often related to despair over downsizing or a termination notice for some other reason. There is evidence that homicide in the workplace is committed in a methodical and selective way (Psychological Tests and Workplace Violence, 1994).

The safety and health manager needs to be alert to this hazard and take necessary steps to keep it under control. Managers need plans and procedures for dealing with incidents when they do occur and for trying to prevent violence before it happens. A logical first step is to train supervisors in conflict management and in the importance of basic fairness in dealing with their subordinates. Managers also need to be ready with ideas for investment to start making a difference if it becomes apparent that workplace-violence hazards are present. Some possibilities include cellular phones for workers in dangerous zones, more intensive maintenance and replacement of motor vehicles so as to prevent breakdown exposure, assignment of tasks to pairs of workers instead of to single workers, and closer supervision of schedule with interim reporting at scheduled intervals.

SUMMARY

Safety and health on the job, like production quality or any other desirable factory characteristic, is achieved by the workers themselves. Thus, the actual achievement of safety and health is a line function. The safety and health manager, then, has a staff function in facilitating the line organization, especially first-line supervisors, in achieving the goal of safety and health.

It cannot be assumed that safety and health is really a “goal” of line management. More or less everyone wants safety and health in the workplace, but the degree of management’s commitment to this goal must be assessed and documented by the safety and health manager.

Once management’s commitment to the goal of safety and health is ascertained, the safety and health manager can get to the important functions of dealing with workers’

compensation, collecting and analyzing statistical records, economic analysis, safety and health training, and dealing with both hazards and violations of safety and health standards.

In the 1990s, safety and health managers were saddled with responsibility for managing new programs dealing with changes in our society, government, and the environment. Drug and alcohol abuse are problems to both society and the workplace. The safety and health manager must administer programs that protect workers and their companies, while sidestepping discrimination pitfalls. The discrimination issue also is the focus of the Americans with Disabilities Act and touches on the social issue of the smoke-free workplace. Finally, the AIDS crisis and other diseases attributed to blood-borne pathogens are headline concerns addressed by OSHA and by the modern safety and health manager as well.

EXERCISES AND STUDY QUESTIONS

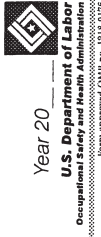
- 2.1 Is worker safety a line or a staff function?
- 2.2 What is the safety and health manager's relationship to the line organization?
- 2.3 Why is it often difficult for safety and health managers to win the respect and approval of top management?
- 2.4 What principle is embodied in the statement "Safety is everybody's business"?
- 2.5 What should the safety and health manager do if top management does not "practice what it preaches" in safety and health policies?
- 2.6 Is the workers' compensation system a federal or a state program? How long has it been in existence?
- 2.7 What are the ostensible and ulterior purposes of the workers' compensation system?
- 2.8 Should employers bear the entire risk of injury to their workers?
- 2.9 Who pays the workers' compensation claims of injured workers?
- 2.10 Define the term "loss-control representative."
- 2.11 What is the Z16.1 system?
- 2.12 Why is it difficult to prove by statistics whether OSHA has been of any benefit?
- 2.13 What is the disadvantage of using lost workdays as a measure of the severity of injury or illness?
- 2.14 What constitutes a recordable injury or illness?
- 2.15 A firm employing 300 workers has 25 recordable injuries or illnesses in a year. What is its total injury-illness incidence rate?
- 2.16 How does the injury-illness incidence rate compare with the traditional frequency rate?
- 2.17 Compare the terms *frequency*, *severity*, and *seriousness*.
- 2.18 What is important about February 1 in the life of a safety and health manager?
- 2.19 How long are files of records required to be kept?
- 2.20 Are there advantages and pitfalls to the use of safety and health committees?
- 2.21 Compare the importance of direct and hidden costs of accidents.
- 2.22 Name some categories of hidden costs of accidents.
- 2.23 How can records of noninjury accidents be important to the safety and health manager?
- 2.24 Who are the principal trainers in safety and health in industry?

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- 2.25** During a 6-month period, a firm employing 50 employees has 18 injuries and illnesses requiring medical treatment; in four of these cases the employee lost at least 1 day from work.
- Calculate the general injury–illness incidence rate.
 - Calculate the traditional frequency rate.
 - Is this a very dangerous industry?
- 2.26** For the year 2001, a firm with 25 employees has two medical-treatment injuries, plus one injury in which the worker lost 3 days of work. Calculate the injury incidence rate and the LWDI.
- 2.27** A firm has 62 employees. During the year, there are seven first-aid cases, three medical-treatment injuries, an accident in which an injured employee was required to work 1 week in restricted work activity, a work-related illness in which the employee lost 1 week of work, a work-related illness in which the employee lost 6 weeks of work, and a fatality resulting from an electrocution. Calculate the total incidence rate, the number-of-lost-workdays rate, and the LWDI.
- 2.28** Top management has set a safety and health objective for the year for a plant employing 135 employees. The objective is to reduce the LWDI of the firm to a level lower than the national average: 3.6. By May 1, the safety and health manager has logged 12 first-aid cases, 3 lost-time injuries, and 2 illnesses, both of which resulted in hospitalization. Based on these preliminary results, does it appear that the firm will meet top management's objective for the year? Show calculations to justify your conclusion.
- 2.29** A chemical plant employing 900 employees (employees work a regular 40-hour work week) has the following safety and health record for the year 2003:
- File 1* Forklift truck drops pallet load of packaged raw material; no injuries; some material wasted; pallet destroyed; extensive cleanup required.
- File 2* Worker suffers heat cramps (illness) from continuous exposure to hot process; admitted to hospital for treatment; 2 weeks off.
- File 3* Worker burns hand on steam pipe; first aid received and worker returns to workstation.
- File 4* Worker suffers dermatitis from repeated contact with solvent; 1 week of work lost; another 4 weeks of work restricted to an assembly job.
- File 5* Worker fractures finger in packaging machine; worker sent to hospital for treatment; back on the job the next day.
- File* Maintenance worker lacerates hand when screwdriver slips; five sutures given; worker back on the job the next day.
- File 7* Pressure vessel explodes; extensive damage to processing area; miraculously, no one is injured.
- File 8* Worker gets poison ivy from exposure a week earlier while removing weeds around the plant perimeter fence; worker receives doctor's treatment, but no workdays are lost.
- File 9* Worker becomes ill from continuous exposure to hydrogen sulfide leaks from furnace area; misses 2 weeks' work; leaks are repaired.
- File 10* Worker gets severe poison ivy from weekend outing with Boy Scout troop; misses 2 days of work.
- File 11* Maintenance worker falls from fractionating tower and is killed.
- File 12* Worker fractures an arm in transmission system that powers pulverizer mill; loses 3 days of work and an additional 6 weeks of work is in the production scheduling office before returning to regular job.

- (a) Calculate the following incidence rates:
1. LWDI
 2. Total injury incidence rate
 3. Total illness incidence rate
 4. Fatality incidence rate
 5. Number-of-lost-workdays rate (injuries and illnesses)
 6. Specific-hazard incidence rate (fractures)
- (b) How does the safety and health record of this firm compare with that of other manufacturing companies and with industries in general?
- 2.30** On February 1, a 50-employee firm posts its annual OSHA log for the previous year, as shown in Figure 2.9. Complete the table and calculate the following:
- (a) Total injury incidence rate
 - (b) Total illness incidence rate
 - (c) Number-of-lost-workdays rate
 - (d) LWDI
- 2.31** A certain large firm with 1400 employees in 1998 pays an annual workers' compensation insurance premium of \$120,000. The experience modifier for this firm for 1998 was 1.05. By the year 2001, the firm has shown a dramatic improvement in worker safety and health, and accordingly, the insurance rating bureau revises the experience modifier for this firm to 0.80. What is the actual and percent savings in workers' compensation premium for this firm in 2001 compared with the premium in 1998?
- 2.32** The National Safety Council provides annual reports of incidence statistics from surveys gathered from member companies (Accident Facts, 1993). Identify which combinations of column totals on the OSHA 300 log correspond to each of the NSC reporting categories named as follows:
- (a) Lost-workday cases
 - (b) Cases involving days away from work and deaths
 - (c) Nonfatal cases without lost workdays⁴
 - (d) Total cases
 - (e) Lost workdays
 - (f) Days away from work
- 2.33** Complete the column totals in the OSHA 300 log in Figure 2.9 for a firm that has 165 employees. In your school library, check current annual National Safety Council summaries (Injury Facts) to compare the incidence statistics of this firm with corresponding reports to the National Safety Council for the most recent year available. If your library does not have *Injury Facts*, published by the National Safety Council, compare Figure 2.9 statistics with 2000 rates shown in Figure 2.2.

⁴The NSC now uses the OSHA definition of "lost workday" to include days away from work, plus days of restricted work activity.



Year 20

U.S. Department of Labor
Occupational Safety and Health Administration
Form approved OSHA no. 1218-0176

Establishment name B & D Castings
City Buffalo State TX

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

OSHA's Form 300

Log of Work-Related Injuries and Illnesses

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Identify the person			Describe the case				Classify the case				Enter the number of days the injured or ill worker was					Check the "injury" column or choose one type of illness:					
Case no.	(A) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Strain/dig or burn on right forearm from acetylene torch)	Death	Days away from work	Job transfer or restriction	Restricted work or other cases	(G)	(H)	(I)	(J)	(K) On job transfer or restriction	(L) Away from work	(M) Total days	(1) Injury	(2) Skin disease	(3) Respiratory disease	(4) Poisoning	(5) All other illnesses
1	Empl A	Maint.	Monday	Warehouse C	Ankle sprain	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8		8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Empl B	Assy.	Monday	Final Assy	CTS - wrist discomfort	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	56		56	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Empl C	Plating	Monday	Dip tank area	Nauseous from vapors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Empl D	Maint.	Monday	Receiving	Fatality - fall from ladder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Empl E	Press Oper	Monday	Fabrication	Hand laceration - skip stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Empl F	Yard Worker	Monday	Bank form	Poison ivy - arms & face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Empl G	Grinder	Monday	Fabrication	Grinding dust - pneumoconiosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Empl H	Plating	Monday	Dip tank area	Skin rash on hands - solvent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Empl I	Operator	Monday	Foundry	Burned hand - hot casting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspect of this data collection, contact: US Department of Labor, OSHA, Office of Statistics, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Page totals: Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

FIGURE 2.9

OSHA Form 300 for Exercises 2.30 and 2.33. (This form is available in larger format on the Companion Website.)

- 2.34 In cost analysis studies, what dollar cost does the U.S. Air Force associate with a human fatality? How does the cost vary between military-rated officers and civilian personnel? Why is there a difference?
- 2.35 What is the National Safety Council estimate of the cost of a human fatality? How much is the corresponding estimate for a worker injury?
- 2.36 What is the Air Force's estimate of the cost of an injury that does not result in one or more lost workdays?
- 2.37 What is the organization called *ASH*, and for the promulgation of what OSHA standard is it attempting to apply political pressure?
- 2.38 What is the leading cause of occupational fatalities among working women?
- 2.39 Discuss the findings of the ALCOA Company with regard to drug testing.
- 2.40 What litigation risks should a firm consider if it terminates employees because of alcohol or drug use? Explain how this risk is affected by a drug and alcohol abuse policy within the company.
- 2.41 Is alcohol and drug abuse a significant factor in workplace homicides? Why or why not?
- 2.42 How has preemployment testing become a controversial issue?
- 2.43 What basic plant procedures are considered particularly effective in controlling blood-borne pathogens such as HIV and HBV?
- 2.44 What part of the body is considered a particularly vulnerable path of entry for HIV or HBV in occupational scenarios?
- 2.45 How are workers' compensation tables of compensation made independent of inflation rates?
- 2.46 Use two different bases to justify why loss-control representatives should maintain a close relationship with injured employees.
- 2.47 Why is the number-of-lost-workdays rate always higher than, or at least as high as, the LWDI?

RESEARCH EXERCISES

- 2.48 Examine significant citations disclosed in the news media to find an outstanding example of large OSHA fines for recordkeeping violations.
- 2.49 This chapter has stated that workplace violence is an increasing cause of workplace fatalities. Examine current research to determine whether this trend is continuing.
- 2.50 Besides homicide, what other acts of violence occur in the workplace? Obtain annual estimates in each category if available.
- 2.51 Examine current developments in the comprehensive settlement between the tobacco industry and the states. What monetary damages has the tobacco industry been required to pay?
- 2.52 Find recent reports on the cumulative death toll from the AIDS epidemic. If possible, determine what percentage of the victims can be attributed to workplace exposure.
- 2.53 Use the Internet to examine the development of privatization among state workers' compensation programs. Which state was the first to embrace privatization for such programs? Have other states followed suit?