ESSENTIAL SAFETY MEASURES FOR ACCIDENT AND INJURY REDUCTION IN THE WORKPLACE

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Abstract of the Dissertation
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One of the problems in organizations, especially in hospitals, is that injury rates are increasing because most safety programs lack the essential safety measures for accident reduction in the workplace.

The study examined the safety measures that played a role in accident and injury reduction in the workplace. Specifically, the old and new safety programs of an anonymous company was investigated to identify the safety measures that distinguished both programs, their impact on injury rates, and whether the variables of safety program and the variables of safety performance are independent. Data were described by a narrative method, displayed by descriptive statistics, and analyzed by chi square test of independence.

The results showed that: (1) The new safety program had twenty-one additional safety measures more than the old safety program; (2) The old safety program increased the recordable injuries by an average of 85%, increased lost workday cases by an average of 14%, and increased incidence rates by an average of 31%; (3) The new safety program decreased the recordable

injuries by 48%, decreased lost workday cases by 3%, decreased incidence rates by 51%, and decreased lost workday rates by 12%; and (4) chi square test of independence showed that the safety performance for the recordable injuries and lost workday cases were different across the old and new safety programs.

X^2 **(1,** N **= 1259) = 29.76, p < 0.001.**

The researcher concluded that: (1) The new management at the company was committed to safety performance improvements; (2) The new safety program performed better than the old safety program; and (3) safety performance variables were dependent of the safety program variables. The researcher recommended that the new management finalize pending policies and also, to perform facility safety inspections semi-annually rather than annually in selected areas so that hazards can be identified more quickly.

Lastly, this study and the results thereof, provided useful information to safety professionals and organizations that plan to develop and implement a successful safety program that will reduce accidents and injuries in the workplace.

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DEDICATION

This dissertation is dedicated to my parents, Mr. Alfred E. Ulinfun and Mrs. Henrietta O. Ulinfun, my brother, Mr. Julius Ulinfun, and my sisters, Mrs. Florence Brown, Mrs. Mary Ilabor, and Mrs. Anthonia Oshilaru in honor of their patience.

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CHAPTER ONE

Introduction

Statement of the Problem

One of the problems in organizations, especially in hospitals, is that lost workday rates are increasing because most safety programs lack the essential safety measures that are components of management commitment & leadership, worksite inspection, hazard control, and safety training for accident reduction in the workplace.

Management commitment is the key to all effective safety programs. Any responsible organization must commit to protect its employees with an effective safety program that identifies and eliminates hazards and subsequently reduces injuries in the workplace. Vincoli (1993) alluded to this point that in the practice of occupational safety in industry today, the primary concern of any responsible organization is to identify and eliminate hazards that threaten the life or health of employees.

Safety programs have now become the focus of many companies with recordable injuries, lost workdays and workers compensation insurance costs rising. These programs, when implemented correctly, have been successful in reducing the number of injuries and in turn reducing the lost workdays and workers compensation costs (Ford, 2000).

Specifically to the healthcare industry, whereby the Bureau of Labor and Statistics (BLS) classified hospitals as "806" under the Standard Industrial Classification SIC, the lost workday rates has been increasing since 1998. In 2000, the lost workday rate was 4.1 per 100 employees. This was a 3% lost workday rate increase from 1999. Table 1 illustrated the lost workday rates for hospitals. Also, see Appendix F.

Table 1

BLS – Lost Workday Rates for Hospitals

Year	Lost Workday Rates Per 100 Employees
1997	4.0
1998	3.8
1999	4.0
2000	4.1

Currently, based on information from numerous sources, the key to a successful safety program is top management buy-in and support. Without the support from top management, the program will not be effective (Ford, 2000).

The Occupational Safety and Health Administration's (OSHA's) Voluntary Safety and Health Program Management document emphasized that top management involvement while implementing the safety program is necessary so that all employees will understand that management's commitment is serious. The document further indicated that management commitment provides the motivating

force and the resources for organizing and controlling activities within an organization.

The OSHA document also stated that in an effective program, management regards workers' safety as a fundamental value of the organization and applies its commitment to safety protection with as much vigor as to other organizational problems.

Some organizations risk the safety of those who work for them by not having a safety program. Ford (2000) indicated that pressure from governments and insurance companies has now forced organizations to provide safer working environments for their employees. Organizations must work with these groups to develop activities to identify hazards, prevent injuries, and inform employees (Ford, 2000). These activities are typically referred to as safety programs and there have been many approaches to the development and implementation of safety programs over the years, some are successful, and many are not successful (Ford, 2000).

In some successful safety programs that have reduced accidents that cause injuries in the workplace, management has taken the approach whereby employees are constantly reminded about their voluntary agreement to perform their job safely. Honkasalo (2000) alluded to this point that voluntary and negotiated agreements are an alternative to the traditional command and control approaches to accident reduction.

Many traditional approaches to injury reduction also focus on group behavior instead of individual behavior. According to Saari (1992), safety programs that attempt to change individual

behavior were unsuccessful, while programs that changed group behavior worked better. Saari (1992) further explained that thirty years ago, 100 leading American safety experts rated "enforcing safe job procedures" as the most effective safety activity and these enforcements involved reprimand and penalties as an essential component.

Additionally, Goetsch (1996) indicated that early successful safety programs were based on the enforcement of safe work practices for the group rather than the individual, but an integrated approach has become the norm today.

Some organizations safety programs only meet the minimum standard. As stated by Rahimi (1995), most organizations that were surveyed are only willing to comply with the minimum regulatory standards and have implemented traditional safety programs, which are modular and somewhat unrelated to the overall organizational mission and objectives. In the traditional approach, support comes from top management concerned only with minimum standards and regulations.

Most successful safety programs have a relationship with transformational leadership. According to Grubbs (1999), transformational leaders are needed to instill safety as a value to the organization.

Transformational leadership refers to leaders who initiate and promote change within organizations. These types of leaders are needed in management to be responsible for safety, which is a

process that includes management tasks such as planning, organizing, controlling, directing, and staffing (Grubbs, 1999).

Leaders must instill safety as a value within the organization no matter the operating conditions. This means that safety must be more important than production (Grubbs, 1999).

Additionally, the transformational leaders must have a vision and be able to communicate the vision to the entire organization, build trust by remaining consistent, persistent and dependable when it comes to safety management (Grubbs, 1999).

Grubb (1999) further stated that Transformational Leaders must also promote growth while accepting organizational and individual weaknesses in order to promote the value of safety at every opportunity.

Petersen (1996) identified a three-step approach that organizations may utilize to control safety activities as:

1. Determining where it is now by understanding what the current system is, what it looks like, and what it consists.

2. Deciding where it wants to be by understanding what the safety system should look like and what it should consist.

3. Providing the difference by determining an action plan to move from approach #1 to approach #2.

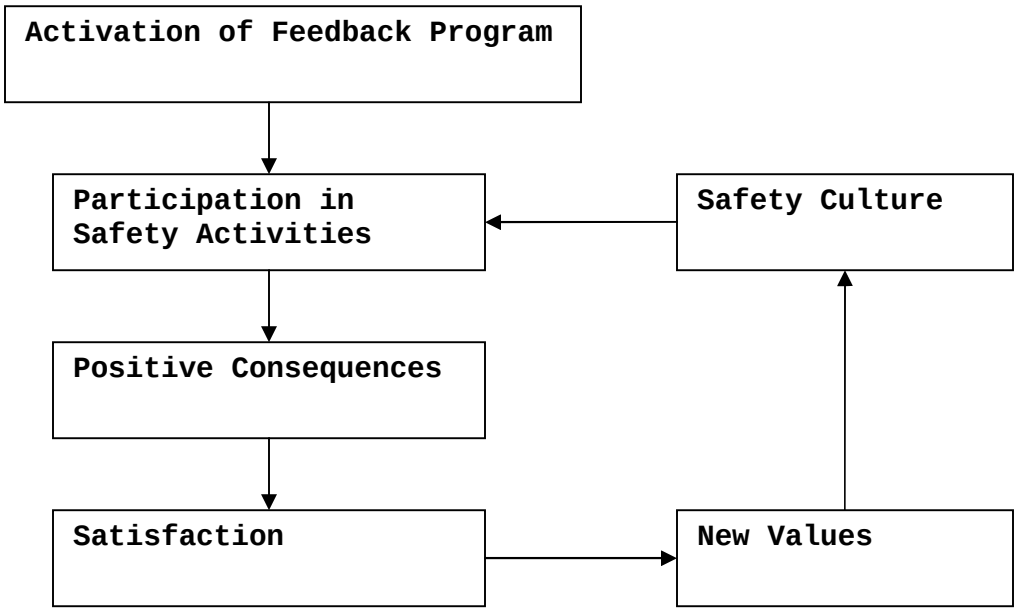
When an organization culture supports the safety process, safety performance that relates to accidents and injury occurrence will decrease. Mansdorf (1999) alluded to this point that an organizational culture that supports safety is essential for the prevention of injury and illnesses. Additionally,

Petersen (1996) explained organizational culture as the key to successful safety programs and managers must use the elements of a safety program as a tool to achieve safety goals. Achieving agreement among employees on how the safety elements will be used is essential to create a true safety culture.

This approach is seen as participative, positive, and flexible by managers and employees and has upper management support (Petersen 1996). Also, according to Saari (1992), successful safety programs are activities that start from management behavior change and gradually create a new culture in the organization. Figure 1 illustrated this point.

Figure 1

Safety Culture Activation



Based on the fact that management commitment is vital to the success of a safety program, Peterson (1996) suggested

twenty-one items for management to determine what needs to be done to control injuries. The twenty-one items can be summarized into the following categories: achieving continuous improvement of the safety process; building a positive safety culture; improving the skills of managers, supervisors and employees; improving employee behavior; and improving physical work conditions (Petersen, 1996).

Additionally, Geller (2000) challenged leaders to inspire their employees to feel personally responsible for the success of the safety process. This can be accomplished by teaching the theory and principles of safety before the procedural process and allowing employees to customize the safety process for their particular work areas (Geller, 2000). Geller (2000) also advised leaders to "watch their language", meaning that the language they use may increase or decrease employee involvement. Figure 2 illustrates this point.

Figure 2

Safety Terms and Phrases

USE		SHOULD NOT USE
"behavioral safety"	instead of	"behavior modification"
"safety belt"	instead of	"occupant restraint"
"safety cushion"	instead of	"air bag"
"value"	instead of	"priority"
"safety leader"	instead of	"safety manager"
"achievement"	instead of	"compliance"
"peer support"	instead of	"peer pressure"
"process"	instead of	"program"
"coaching"	instead of	"training"

Another management tool that can be used to influence accident and injury reduction in the workplace is tying quality

into the organization's safety program. As it relates to total quality and strategic safety management, Rahimi (1995) proposed the integration of Total Quality Management (TQM) into the safety planning process to create the new concept of Strategic Safety Management (SSM) in order to promote long-term safety and quality improvements. TQM concepts can be used to mold system-focused, safety practices into the organizational culture.

Rahimi (1995) quoted Dr. Deming reiterating the need for integration of quality with safety in a systems approach, "Safety, like quality improves when we improve the system and not when we hire more specialists to find defects or remove hazards". The quality of work of life will improve when management view safety as the results of their management system rather than treating accidents as a special occurrence outside their management system (Rahimi, 1995).

Some organizations in Japan are using the TQM approach for safety and have developed self-directed work groups where workers are empowered to identify and correct safety-related problems through a formal or informal structure of safety committees (Rahimi, 1995). The proposal by Rahimi (1995) is to combine a bottom-up approach with the traditional top-down implementation process and create a continuous process of an organization-wide hazard control.

Rahimi (1995) summarized what Smith and Larson concluded in 1991 by stating that highly successful quality and safety management programs share a number of common features that

include employee participation in management decision-making, regular utilization of employees for problem-solving, and involving employees from the outset in the design, development and implementation of new products, processes, and programs.

As part of the Strategic Safety Management approach, the self-directed work can be used to get all employees involved in the safety and quality process in as much as management is involved with the team to assist with planning, organizing, staffing, directing, coordinating, and reporting the safety program, while operations engineering is involved with the team to assist with education; training; and the experience to plan, design, and supervise the safety of the work environment (Rahimi, 1995). This approach promotes safety as a value to the organization by requiring that employees get involved, take ownership, and work together to continuously improve the safety processes that would reduce injuries and hazards in the workplace (Rahimi, 1995).

In organizations with good safety programs, workplaces are inspected for hazards, a process for replacing damaged equipment is in place to control hazards, and training is provided to all employees for safe work performance. OSHA document indicated that an effective safety and health program included four elements such as worksite analysis, hazard prevention and control, safety and health training and management commitment.

In order to prevent accidents and injuries from occurring in the workplace, organizations must protect the safety of their

employees by developing and implementing an effective safety program that has the required elements. While this is true, Hammer (1989), however, explained that the struggle to provide safeguards to eliminate accidents were predicated on the costs of accident prevention and the moral regard for human life and well-being. Nevertheless, Fletcher (2001) indicated that once developed, implemented, and embraced by the entire organization, a preventive safety program could bring significant savings in workers compensation and other costs.

An anonymous company was used in this study. The anonymous company was a large hospital that was located in the northeastern part of the USA. The company had an old safety program in place during a merger from mid 1997 through the early part of 2000. During this period, the recordable injuries, lost workday cases, and incidence rates were increasing. After the merger, the company implemented a new safety program to manage the recordable injuries, incidence rates, and lost workday cases that were increasing.

Research Questions

In view of the new safety program at the anonymous company, this study answered the following specific questions:

1. What are the safety measures that distinguished the new safety program from the old safety program at the anonymous company?

2. What was the impact of the old safety program and the new safety program on recordable injuries, incidence rates, lost workday cases and lost workday rates at the anonymous company?

3. Are the variables of safety program and the variables of safety performance independent?

Statement of the Purpose

The purpose of this study was to identify the safety measures that played a role in accident and injury prevention or reduction in the workplace. In order words, to provide reasons why some safety programs works and why other safety programs do not work in organizations.

In order to achieve this purpose, the safety measures of a new safety program of an anonymous company was compared with an old safety program of the said company and also, the impact of the new safety program and the old safety program on recordable injuries, incidence rate, lost workday cases, and lost workday rates was identified. Additionally, the significance of the safety measures, recordable injuries, and lost workday regarding the old and new safety programs were determined.

The study results are beneficial to safety professionals in similar workplace that are considering the development and implementation of a successful safety program that will reduce accidents or injuries in their organizations.

Definition of Terms

Accident: An unplanned event that may result in, or suggest, the possibility of personal injury, property damage, production interruption, or diminished health.

ASSE: American Society of Safety Engineers.

BLS: Bureau of Labor and Statistics, US Dept of Labor.

EPA: Environmental Protection Agency.

Hazard: A condition or practice with potential for loss under the right circumstance.

Incidence Rate: The total recordable injuries and illnesses per 100 fulltime employees. It is measured by multiplying the total recordable injuries and illnesses by 200,000 and dividing the outcome by the total man-hours worked in the particular year.

Injury: An impact on the human body as a result of an accident.

Job Safety Analysis: The process of identifying the hazards that are associated with all job tasks and assigning a procedure to perform the job tasks safely.

JCAHO: Joint Commission for the Accreditation of Hospital Organizations.

Lost Workday Cases: The total lost workday cases that occurred.

Lost Workday Rate: The total lost workday cases that involve days away from work or days with restricted activities, or both per 100 full time employees. It is measured by

multiplying the lost workday cases by 200,000 and dividing the outcome by the total man-hours worked for the particular year.

NIOSH: National Institute of Occupational Safety and Health.

NSC: National Safety Council.

NSMA: National Safety Management Association.

OSHA: Occupational Safety and Health Administration.

OSHA Log: This contains information about the total of all injuries, their causes, types, and location within an organization. It also includes the names of the injured employees.

Recordable Injuries: The total number of injuries and illnesses that require medical treatment.

Safety Inspection: The process of identifying, analyzing, correcting, and eliminating potential hazards in the workplace.

Safety Plan: A set of policies and procedures that support accident prevention efforts.

Safety Program: A set of policies and procedures that support accident prevention efforts.

SIC: Standard Industrial Classification.

Unsafe Act: The behavioral factors that may contribute to an accident or injury occurring in the workplace.

Unsafe Conditions: The environmental work factors that may contribute to an accident or injury occurring in the workplace.

Limitations of the Study

The following limitations were made in pursuit of this study:

1. Not all safety journals, texts, articles, and research papers were utilized to complete the literature review.

2. Only the contents of the old safety program and the new safety program at the anonymous company were compared.

3. Only the safety performance at the anonymous company was reviewed to illustrate any impact on accident prevention or reduction.

4. The effect of employee morale as a contributor to injury rate reduction was not considered.

CHAPTER TWO

The Review of Literature on Workplace Safety Programs

Introduction

A good safety program must identify and remove hazards in the workplace. Plunkett (1994) indicated that each workplace has certain hazards that must be identified and removed so that they cause a minimum amount of damage and human suffering.

Safety plans are utilized to prevent accidents and are written to control recognized hazards to attain an acceptable level of risk and address leadership roles in top management. Safety plans clearly define and assign responsibilities for health and safety activities, the methodology of identifying possible accident causes and steps taken to either eliminate or control them (Plunkett, 1994).

A safety plan establishes requirements for appropriate safety and health training, accident recording requirements and addresses medical and first aid systems. A safety plan enumerates on continued activities designed to foster on the job awareness and acceptance of safety and health responsibility by every employee and also, forewarns personnel about and tells them how to cope with the hazards they may face on the job (Plunkett, 1994).

According to Serrette (2001), in order to attain success, the workplace must be made safe. To do this, organizations should have effective procedures in place for reporting, investigating, and preventing accidents, near-misses, or any other incidents. Serrette (2001) also expressed that Health and safety principles are universal, but how much action is needed will depend on the size and physical characteristics of the organization, the hazards presented by its activities, products or services, and the adequacy of its existing arrangements.

Many reasons exist for reducing workplace accidents. There are sound economic reasons as well as ethical and regulatory reasons for reducing work-related accidents (Serrette, 2001). Serrette (2001) indicate that besides reducing costs, effective health and safety management promotes business efficiency.

However, Minter (2002) indicated that too many companies continue to give safety and health short shrifts as a management focus and instead decide to ride out their luck until one day something terrible happens. Everyone wants a safe and healthful workplace, but what each person is willing to do to achieve this worthwhile objective can vary a great deal (Minter, 2002). Asfahl (1984) alluded that the management of each firm must decide at what level, along a broad spectrum, the safety and health effort will be aimed.

Hence, Serrette (2001) indicated that the essentials for planning and organizing safety program features include hazard recognition, evaluation, and control; workplace design and

engineering; safety performance; regulatory compliance management; occupational health; information collection; employee involvement; training and orientation; organizational communications; management and control of external exposures; workplace planning and staffing; and assessments, audits and evaluations.

Once safety programs are established, organizations constitute the vehicle, the systematic procedure by means of which interest is created and maintained and safety activities are correlated and directed (Heinrich, Petersen, and Roos, 1980).

The critical requirement in successful safety programming is that all management and employees understand the logic of their safety activities (Colvin, 1992). Colvin (1992) further states that a sound plan must be developed, agreed to, implemented, and evaluated. Every successful program is individually tailored to an organization and emphasizes the importance of the whole and the interdependence of its parts.

Safety and Health are well-established concepts in the American workplace and have been a concern since the 1800's when coal mining became one of the leading killers of American working people (Ford, 2000).

During this time, common law provided the employer with a defense that gave the injured worker little chance for compensation. The three doctrines of common law that favored employers were:

1. Fellow Servant Rule – Employers were not liable for injury to an employee that resulted from negligence of a fellow employee.

2. Contributory Negligence – Employers were not liable if the employee was injured due to his own negligence.

3. Assumption of Risk – Employers were not liable because the employee took the job with full knowledge of the risks and hazards involved (Hagan, Montgomery, & O'Reilley, 2001).

Since the early 1900's, many organizations have been established that promote and support safety in the workplace. The first official safety organization, the National Safety Council, was formed in 1913 and is still in operation today. Other organizations that have been formed include the American Society of Safety Engineers (ASSE) and the National Safety Management Association (NSMA) (Ford, 2000).

The key federal agency responsible for the regulation of safety and health in the workplace is the Occupational Safety and Health Administration (OSHA).

Mansdorf (1993) indicated that the OSHA purpose is to assure, so far as possible, every working man and woman in the nation safe and healthful working conditions.

The OSHA, as an agency, was established by the Occupational Safety and Health Act of 1970 as part of the Department of Labor and is responsible for establishing and enforcing workplace safety and health standards (Mansdorf, 1993). As an enforcement

agency, OSHA has the authority to levy and collect fines up to $70,000 per violation (Mansdorf, 1993).

There are many publications that emerged during the early 1900's as a result of the increasing number of work-related injuries and fatalities and they were to promote and support safety and health activities in the workplace. Some of these publications are still in existence today and many more have been added that cover work-related issues (Ford, 2000).

Some of the current safety and health professional journals include The American Journal of Industrial Medicine, Applied Occupational and Environmental Hygiene, Journal of Occupational and Environmental Medicine, Safety Science Journal, and Professional Safety Magazine. There are also numerous publications that keep employers and employees informed of safety and health concerns and as a matter of fact, many employers even have their own newsletters, magazines or bulletins that are published in-house on safety and health issues (Ford, 2000).

Occupational Safety and Health Act

Actually, the Federal Occupational Safety and Health Act (OSHAct) of 1970 might best be regarded as a blessing to American workers in terms of protecting employees in the workplace and a burden to American businesses. Accordingly, Smitha (2000) indicated that OSHA has the duty of protecting 100 million people at more than 6.5 million worksites across the country. The

Occupational Safety and Health Act was one of the many new types of regulations introduced in 1970s that regulated the economy on a nationwide basis (Marlow, 1982).

The Occupational Safety and Health Act was a major departure from previous modes of governmental regulation (Smitha, 2000). Congress, in declaring that occupational injuries and illnesses impose a substantial burden upon interstate commerce, passed legislation authorizing a wide-ranging list of research, educational, and regulatory actions to be carried out by various federal agencies or by individual state acting under the supervision of the federal government (Wing, 1995).

Smitha (2001) alluded that central to the legislative actions was the creation of the OSHA within the Department of Labor. OSHA was empowered by the new federal law to establish and enforce health and safety standards for America's workplaces (Wing, 1995). The Occupational Safety and Health Act contains a catch-all provision known as the General Duty Clause that requires employers to furnish employees with a place of employment that is free from recognized hazards that may cause death or serious physical harm (LaDou, 1986).

OSHA has two broad regulatory powers that include the on-going regulatory authority to enact standards reasonably appropriate to provide safe and healthful employment and prescribes the rule-making authority for OSHA in issuing all specific standards regulating toxic or other harmful materials (Wing, 1995).

The Occupational Safety and Health Review Commission serves as an administrative hearing board to which employers may appeal citations and penalties and the decisions made by the review commission may be appealed through the U.S. Court of Appeals (LaDou, 1986). Smitha (2000) expressed that employers are not entitled to advance notice before OSHA inspections occur. The Supreme Court has ruled that OSHA has the legal authority to obtain a search warrant (LaDou, 1986).

For permanent regulations, OSHA must first publish a proposed regulation in the Federal Register and allow anyone to submit comments within sixty days of the request before actually publishing the final regulation another sixty days later (Wing, 1995).

OSHA does not conduct inspection of workplaces except when an employee files a formal complaint with the local area OSHA office, when there is an imminent danger that results in an employee fatality, or when a programmed inspection is targeted to a particular employer group.

According to Conway and Svenson (1998), the intensity of the OSHA field inspections has declined significantly over the last 10 years due to reduced staff because more emphasis has been put on employer compliance assistance than on conducting inspections at employer worksites.

Although it is impossible to ascertain the exact effect that OSHA has played in the improvement of workplace safety and health, it is indisputable that OSHA has had a positive effect

during its 28-year history (Government Executive, 1999). Despite a sometimes-low regulatory profile, some researchers even claim that OSHA has had a very large impact on business compliance behavior on safety and health (Weil, 1996).

The Federal Occupational Safety and Health Act allows for states to set-up and manage their own occupational safety and health programs and in doing so, must enforce as a minimum, all federal standards and may promulgate standards covering hazards not addressed by the federal standards (Smitha, 2000). Smitha (2000) has identified states with OSHA programs, states with final approval, and states under the federal OSHA that are listed on Table 2.

Organizations Need for Safety Programs

Employee injuries and workers compensation insurance premiums continued to rise in the workplace. Nichols (2000) states that accidents and injuries have always maintained a presence in American industry. But, as the industrial revolution grew in the U.S., many employers pressured government and legislators against the passage of any safety laws to protect workers because of the high costs for accident prevention measures (Smitha, 2000).

Table 2

Source – OSHA - States Occupational Safety Programs

States with OSHA programs	States with final federal approval of OSHA program	States under federal OSHA
Alaska	Alaska	Alabama
Arizona	Arizona	Arkansas
California	Hawaii	Colorado
Connecticut	Indiana	Delaware
Hawaii	Iowa	Florida
Indiana	Kentucky	Georgia
Iowa	Maryland	Idaho
Kentucky	Minnesota	Kansas
Maryland	North Carolina	Louisiana
Michigan	South Carolina	Maine
Minnesota	Tennessee	Massachusetts
Nevada	Utah	Mississippi
New Mexico	Virginia	Missouri
New York	Wyoming	Montana
North Carolina		Nebraska
Oregon		New Hampshire
South Carolina		New Jersey
Tennessee		North Dakota
Utah		Ohio
Vermont		Oklahoma
Virginia		Pennsylvania
Washington		Rhode Island
Wyoming		South Dakota
		Texas
		West Virginia
		Wisconsin

According to Smitha (2000), the level of workplace safety in the U.S. is inherently linked to two public policy forces that include state workers compensation insurance and the federal occupational safety and health act. Workers compensation is the longest standing set of programs designed, at least partially, to reduce workplace risk (Smitha, 2000).

One of the objectives of the workers compensation system is to encourage workplace safety. For self-insured employers, their incentive is to reduce workers compensation claim payments, and for third-party insured employers, their incentive is to reduce workers compensation premiums (Smitha, 2000).

Experience rating is one of the most influential cost incentives for insured employers because it assesses an up-front discount or surcharge to employers based on their past workers compensation safety performance (Smitha, 2000).

The creation of the Occupational Safety and Health Administration with the passage of the Occupational Safety and Health Act in 1970, has ultimately served to reduce the frequency of accidents, injuries, and deaths in the workplace through rigorous enforcement of various related legislation. The inherent nature of certain American industries continues to produce large accidents, injuries, and death rates for workers (Nichols, 2000).

Before 1970, workers compensation attracted little attention due to relatively consistent and low costs for employers (Smitha, 2001). Smitha (2001) expressed that by 1992, however, employers concerns over rising workers compensation premium rates was increasing.

Recent reforms in many states' workers compensation programs mandate the implementation of employer safety and health programs and as a matter of fact, twenty-three sates now have

mandatory workplace safety requirements in either their workers compensation law or as part of their state's OSHA program (Smitha, 2001).

Some of the states with the mandatory requirements include Arkansas, California, and Texas and the mandatory requirements of these states encompass a variety of approaches, ranging from safety committee requirements to written safety and health program rules (Smitha, 2001).

According to Harshbarger (2001), workplace injuries are never an intended outcome of a company's commitment to safety. They carry a cost, in the form of consequences to employees, as well as to the organization and these costs are obvious in terms of human suffering and expense. It is a fact that safety comes with a price that organizations would not dispute and even if it is espoused as a value of the company or as program of the company, safety is a priority acknowledged by corporate executives as essential to the success of an organization.

The CAL-OSHA recently stated that safety organizations, states, small business owners and major corporations alike now realize that the actual cost of a lost workday injury is substantial. The CAL-OSHA expressed that for every dollar that is spent on direct costs of a worker's injury or illness, many more dollars would be spent to cover the indirect and hidden costs.

Accident costs will adversely affect an organization's bottom line and as a matter of fact, in 1990, work accidents cost

industries and the nation almost $64 billion. This included insurance administration costs of $10 billion, wage losses of $10.2 billion, and medical costs of $8.7 billion and the remaining $35 billion were for uninsured costs including the cost of lost time, fire losses, and vehicle accident losses. This clearly indicates that accidents are expensive for both business and the nation and thus, justifies the need for continuous safety performance improvement in the workplace (Mansdorf, 1993).

The impact of accidents on profit, as expressed by Colvin (1992) is shown on Table 3.

Table 3

Source – Colvin (1992) - Impact of Accidents on Profits

Cost of Accidents	Sales needed to recoup accident costs ($) at various levels of gross profit (% GP)			
	1% GP	3% GP	5% GP	10% GP
$5,000	$500,000	$167,000	$100,000	$50,000
$50,000	$5,000,000	$1,167,000	$1,000,000	$500,000
$100,000	$10,000,000	$3,333,000	$2,000,000	$1,000,000
$250,000	$25,000,000	$8,335,000	$5,000,000	$2,500,000

In other words, it would be necessary for a company to sell an additional $1,000,000 of products (if they worked on 5% GP) to earn back the expense of a $50,000 accident (Colvin, 1992).

There are two areas that an organization may invest its safety dollars. This includes the costs associated with preventing accidents by developing and implementing an effective

safety program and in the costs of accidents after they occur (Mansdorf, 1993).

When accidents are not prevented in a workplace, an organization will incur the more readily observed direct costs as well as indirect costs and the indirect costs can exceed the direct costs by as much as four times (Mansdorf, 1993).

Mansdorf (1993) articulates that the direct costs that are associated with accidents in the workplace include the followings:

1. **Damage to machinery, tools, and materials.**
2. **Wage losses.**
3. **Insurance Premiums.**
4. **Medical payments.**
5. **Workers Compensation.**

The Indirect costs that are associated with accidents in the workplace include the followings:

1. **Fines from regulatory agencies, e.g., OSHA.**
2. **Profit loss due to overhead without production and time lost due to damaged equipment and failure to fill orders.**
3. **Post-accident time for supervisory, production, clerical, and management staff (i.e., investigations, paperwork).**
4. **Overtime work.**
5. **Re-training expenses.**
6. **Fringe benefits, which are administered even though the employee is not working.**

7. Intangible costs, i.e., good will, business reputation, employee relations, and public & community relations.

8. Efficiency costs due to the loss of experienced workers.

9. Suffering and expenses incurred by the worker, his family, and society.

In general, indirect costs are uninsured costs and direct costs or insured costs represent payments under special labor agreements, workers' compensation laws and other costs usually covered by insurance or special funds (Mansdorf, 1993).

Mansdorf (1993) also indicated that the amount the organization pays for insurance depends on how much its accidents cost the insurance company because insurance rates are based on three factors namely:

1. Average industrial accident rates.

2. Organizations past accident rates.

3. Organizations current accident rates.

The bottom line is that organizations that develop a safety program in an effort to prevent accidents in the workplace will pay less for insurance and also, see improvement in employee morale.

According to the National Safety Council (1994), organizations have also realized that like quality, safety does not cost, it pays. The National Safety Council (1994) says that safety pays in two ways namely:

First, eliminating preventable causes of injuries and illnesses can result in fewer disabling injuries, lower workers compensation costs, and lower replacement costs.

Secondly, by eliminating or controlling exposure to hazards through an aggressive safety and health program, senior managers would spend less time managing safety and health "crises" and can focus on all parts of operations, including quality, productivity, and competitiveness.

Also, faced with increased healthcare and workers compensation costs, high employee turnover rates, and a reduction in marketplace share and profits, more employers are being forced to re-evaluate the benefits and needs for effective workplace safety programs (Anonymous, 2002).

General Elements of a Safety Program

The recently proposed draft safety and health program by the Occupational Safety and Health Administration (OSHA) identifies the core elements of a safety program as follows:

1. **Management Leadership and Employee Involvement**
2. **Worksite Analysis**
3. **Hazard Prevention and Control**
4. **Safety and Health Training**

The first element of a safety program is Management Leadership and Employee Involvement. According to OSHA, management is required to establish program responsibilities for

managers, supervisors, and employees for safety and health in the workplace and hold them accountable for carrying out those responsibilities. OSHA indicated this to be very true because when the chief executive officer of an organization is committed to safety and he conveys it to all levels of the company, safety can have a positive impact on other areas of the business, such as productivity (Gasper, 2002).

Additionally, the American Society for Safety Engineers (ASSE) supports the OSHA proposed safety and health rule and states that effective and efficient safety and health programs are important ingredient in a well-managed business program. The ASSE also recommended that to be effective and efficient, the safety and health program must be individually tailored to each business and its own specific safety and health priorities.

The CAL-OSHA indicated that when organizations are committed to safety and health, that would show in every decision they make and on every action they take that would enable employees to respond to the perceived commitment.

The CAL-OSHA also alluded that the individual with the authority and responsibility for the organization's safety and health program must be identified and given management's full support.

Accordingly, the CAL-OSHA also stated that the commitment must be backed by strong organizational policies, procedures, incentives, and disciplinary actions as necessary to ensure

employee compliance with safe and healthful work practices. These actions include:

1. Establishment of workplace objectives for accident and illness prevention such as “Reduce injury by 10% next year”.

2. Emphasize responsibilities and accountability to employees and supervisors.

3. A means of encouraging employees to report unsafe conditions with assurance that management will take action.

4. Allocation of company financial, material, and personnel resources for identifying and controlling hazards, installing engineering controls, purchasing personal protective equipment, promoting, and training employees in safety and health.

5. Setting a good example for all employees on all safety and health issues.

Adams (2001) indicated that a good safety program starts with top management. Smith (1978) indicated that organizations with low accident rates usually enjoy a high level of commitment and leadership from top management.

According to Kapp (2001), the National Institute for Occupational Safety and Health (NIOSH) conducted a study to investigate factors that differentiate organizations with successful occupational safety programs with low accident rates from organizations with less successful occupational safety programs with high accident rates.

In one phase of the NIOSH study, five plants were studied from a list of eight that was provided by the National Safety Council as having the most outstanding and less outstanding safety performance in the United States were investigated. The five plants completed the questionnaires and follow-up site visits involving employee interviews and observation of the production operations were conducted. The five organizations were quite diverse in their size, and standard industrial classifications including manufacturing textiles, photoflash components, silicon crystals, and components for the nuclear power industry. The results could not be analyzed statistically due to the small sample size, but the importance of management commitment to safety, a proactive stance on safety, employee involvement in safety, and the integration of safety into overall operations were noted Kapp (2001).

Kapp (2001) further explained that it is clear from the NIOSH study that the safety performance of an organization is dependent on more than the presence of safety policies, programs, and procedures.

According to Kapp (2001), the results show that the difference in safety performance cannot be accounted for by the presence of conventional safety practices such as the existence of safety committees, establishment of safety rules, the methods and adequacy of hazard control, formalized accident investigation procedures, and safety promotion campaigns. Instead, the study indicated that factors like "management commitment to safety"

and “making safety a real priority” did differentiate high and low accident rate organizations. It became evident from the NIOSH study that management commitment to safety is important as a real priority in corporate policy and action (Kapp, 2001).

Cohen (1975) concluded that regarding management commitment, employees do realize the causes of accidents such as environmental hazards, unsafe behaviors, inadequate knowledge, insufficient skills, and improper attitude and habits only because the information came from management because of their commitment to safety in the organization.

Some of the approaches in organizations that show management commitment and leadership include establishing a safety policy statement, the establishment of a safety and health committee, the establishment of a Safety Department, and the utilization of safety by objectives strategy (Petersen, 1978).

A safety policy statement (Appendix A) is the foundation of a safety program and it is imperative that the safety policy statement be approved and issued over the signature of the top official in the organization (Mansdorf, 1993).

The safety policy statement should identify those responsible for safety matters and the steps employees should take if they have questions and/or concerns on any environmental or safety matter (Hagan, Montgomery, & O’Reilly, 2001).

Once it is completed, the safety policy statement must be effectively communicated to all the employees throughout the organization (Colvin, 1992).

A safety and health committee is a group that aids and advises both management and employees on matters of safety and health pertaining to plant or company operations (Hagan, Montgomery, & O'Reilly, 2001). In addition, a safety and health committee performs essential monitoring, educational, investigative, and evaluative tasks that include keeping minutes (Hagan, Montgomery, & O'Reilly, 2001).

A safety and health committee may represent various constituencies or levels within an organization or may be management or workplace committees (Hagan, Montgomery, & O'Reilly, 2001).

Top management must be involved in a safety committee, either by regularly attending and participating in meetings or by regularly reviewing the minutes and activities (Hagan, Montgomery, & O'Reilly, 2001). This initial and continuing visual support becomes the positive message, which shows that top management cares about the organization's safety program (Colvin, 1992) and would encourage employees to participate in all the organization's safety and health activities (Zimmerman, 2001).

The composition of a joint safety and health committee is such that all organizational levels that include management, supervision, employees, labor unions, and the safety professional are represented so that all components of the organization can participate in the safety and health activities of the organization (National Safety Council, 1994). Safety committee members need to be trained. A well-trained safety committee is a

very valuable tool to help management provide a safe workplace for employees and improve the bottom line of any company, large or small (Vanderhoof, 2002).

Petersen (1978) has long advocated assigning safety and health responsibilities to every level of the organization. Accordingly, the National Safety Council (1994) indicated that organizations must assign responsibilities and accountability for the safety and health professionals, managers, supervisors, and employees. The safety and health professionals should be required to provide program direction, interpretation, technical assistance, develop workplace safety and health policies and procedures, maintain program performance, and coordinate the overall safety efforts (National Safety Council, 1994).

Williams (2002) also indicated that safety professionals should be charged with reducing employee injuries and promoting a strong safety culture within their organizations.

As part of program responsibilities and accountability that management must assign to all levels of the organization, the National Safety Council (1994) states that managers shall be assigned the responsibility of incorporating the organization's safety program into all physical worksite tasks and processes. Also, supervisors shall be assigned to implement or enforce the organization's safety and health program. Additionally, employees shall be assigned the responsibility to participate by complying with the organization's safety and health program (National Safety Council, 1994).

The establishment of a safety department by top management that is assigned with the responsibility, authority, and funding to manage the safety program, shows a clear and visible commitment (Mansdorf, 1993). A safety program cannot be effective if a safety department does not manage it and the safety department must be integrated into the organizational structure for accountability (Mansdorf, 1993). A safety professional is usually assigned the responsibility (Appendix B) of ensuring the operation of all safety programs (Worick, 1975).

Top management must incorporate a safety department within its organization structure in order to demand for:

1. Identification and investigation of safety and health risks.

2. Evaluation of risks.

3. Assurance from the safety department that tolerable risks are controlled to prevent severe accidents.

4. Correction of uncontrollable risks.

5. Follow-up of all injuries and accident reports.

6. Periodic reports on safety programs.

7. Information regarding the acceptance of safety rules for job performance by employees (Schenkelbach, 1975).

Petersen (1978) explained that another approach that indicates top management's commitment to safety is a new dimension called Safety by Objective (SBO). Petersen (1978) states that SBO allows line and staff personnel to perform effectively on safety issues of the organization and:

1. Provides agreement on objectives by management and supervisors.

2. Gives the supervisor an opportunity to perform.

3. Gives input as to how objectives are achieved.

4. Train supervisors on safety issues.

5. Reward supervisors on attainment of safety objective.

In reality, SBO works best for companies that are regarded as lively companies because these lively companies teach their employees how to identify safety goals as designed by the top management (Petersen, 1978).

The second element of a safety program is Worksite Analysis. According to OSHA, the employer is required to systematically identify and assess hazards to which employees are exposed. Additionally, OSHA states that this program elements should include workplace safety inspection, job safety analysis, comprehensive safety surveys, investigation of accidents and near misses, and a mechanism for employees to notify management of potential or perceived safety and health problems i.e., the formation of joint labor and management safety and health committee (Mansdorf, 1993).

Safety inspection (Appendix C) is usually designed to uncover, document, and correct existing or potential hazards in the workplace that have the capacity to cause accidents or illness (Mansdorf, 1993). According to CAL-OSHA, periodic safety inspections and procedures for correction and control provide a method of identifying existing or potential hazards in the

workplace, and eliminating or controlling them. To accomplish this outcome, frequent, extensive safety inspection must be conducted to identify and correct unsafe equipment, conditions, processes, and work practices (Colvin, 1992).

The CAL-OSHA indicated that a safety inspection should produce knowledge of hazards that exist in the workplace and should be conducted by personnel who, through experience or training, are able to identify actual and potential hazards and understand safe work practices. The CAL-OSHA also stated that written inspection reports be reviewed by management and/or the safety committee in order to review trends, prioritize actions, and verify completion of previous corrective actions.

Job Hazard Analysis (JHA) or sometimes, called Job Safety Analysis (JSA), is another tool that can be used as part of worksite analysis. The National Safety Council (1994) defined JSA as a systematic method of hazard recognition and evaluation where each task is considered as a series of steps and each step having its own hazards. According to Sutcliffe (2000), JHA focuses on identifying the hazards or tasks in the workplace through hazard assessments, establishing the behaviors that employees would engage to complete the tasks safely, and training the employees on how to complete the tasks as designed.

Job Hazard Analysis is a procedure which examines each step of a job, identifies existing or potential hazards, and determines the best way to perform the job to reduce or eliminate the hazards (Pennsylvania Chamber of Business, 1997).

When accidents occurs, they are usually the result of one or more failures in a system or process, or the result of contact with a source of energy above the stress threshold of a particular body or structure (Vincoli, 1994). Accident investigation is a key to the prevention of future accidents (Ferry, 1978). The other two reasons for investigating all accidents is to ensure that all injured personnel receive their workers compensation benefits that they are entitled to when injured on the job and to protect the organization from false claims (Sorrell, 1998).

Management's dedication to the safety program can be easily measured by the company's efforts to investigate the causes of incidents that cause injury, property damage, production interruptions, diminished health, or environmental damage (Colvin, 1992).

According to Colvin (1992), once a policy is established for reportable accidents or incidents, supervisors and managers should be trained in reporting and investigation procedures. The Tennessee Division of Health and Safety (1987) explained that the purpose of accident investigation (Appendix D) is to prevent re-occurrence and also to evaluate the causal factors of the accident.

When accident investigation is incorporated into the safety program, it helps to safeguard employees from unnecessary danger (Tennessee Division of Health and Safety, 1987). In the process of investigating accidents, only relevant data that relates to

the occurrence of the accident needs to be collected, analyzed, and corrected (Tennessee Division of Health and Safety, 1987).

A team that includes management, safety and health professionals, a safety committee member, and labor union member, except prohibited by the labor agreement should conduct accident investigation (National Safety Council, 1994). The National Safety Council (1994) advised that written conclusions and recommendations about the investigation should be reported to senior management.

The third element of a safety program is Hazard Prevention and Control. According to the National Safety Council (1994), a safe and efficient work environment is achieved as a result of an on-going process that includes design and various stages of evaluation and modification that takes the following issues into account:

1. **The relationship between the worker and the job.**
2. **Relevant safety and health regulations and standards.**
3. **Facility, workstation, and machine design.**
4. **Material selection.**
5. **Proper material handling.**
6. **Life safety and fire protection.**
7. **The safety and health aspects of automated processes.**

Mansdorf (1993) stated that this consists of the use of engineering techniques to reduce or eliminate hazards in the design stage. For hazards that cannot be eliminated in the design stage, it is necessary to establish work practices such as

administrative procedures, or personal protective equipment controls to reduce the hazards (Mansdorf, 1993).

Additionally, OSHA required that maintenance of workplace equipment is documented, written plans are maintained for emergency situations, hazard correction tracking is maintained, and a consistent disciplinary system is applied to all employees, including supervisors and managers, who disregard basic safety rules.

The fourth element of a safety program is Safety and Health Training. According to CAL-OSHA, training is one of the most important elements of an injury and illness prevention program because it allows employees to learn their job properly, bring new ideas into the workplace, reinforces existing ideas and practices, and puts the organization's safety program into action. Safety and health education/training is part of a direct assault on the causes and frequency of injury and illnesses (Kinn, 2000). Safety and health education is the process of instructing an individual on how to recognize safety and health hazards in the workplace and safety and health training is the process of instructing an individual on how to perform a specific task while avoiding the safety and health hazards for that task (Kinn, 2000).

Rekus (1999) explained safety education as a process through which learners gain new understanding, acquire new skills, or change their attitudes or behaviors and described

safety training as a specialized form of education that focuses on developing or improving skills.

Training is the key to success. The type and amount of safety and health training should depend on the type, size, and complexity of the organization. Also, training should be based on the nature of hazards, risks, or the potential exposures (Tweedy, 1997).

The Pennsylvania Chamber of Business (1997) also identified steps that included:

1. Determine if voluntary or mandatory training is needed.

1. Identify training needs.

2. Identify goals and objectives.

3. Develop learning activities.

4. Conduct training.

5. Evaluate program effectiveness.

6. Improve the program.

Patterson (1999) stated that effective safety programs have leaders that are personally committed to safety. These leaders use smart training, which uses stories with real people and real injuries to illustrate the relationship between training and safety. Employees must understand the importance of training in order to understand how they can prevent injuries. These real stories motivate employees and capture their attention. Smart training is specific and addresses using the correct techniques for a task. Patterson further states that smart training is

measurable, rewarding, responsive, timely, and does not underestimate the power of positive reinforcement.

According to Ford (2000), smart training was applied in General Electric's Bangor, Maine plant to experience zero accidents in more than two years, saving G.E. $200,000 annually. It was also used at Solutia Inc., a chemical plant in Pensacola, Florida, to reduce recordable injuries from 6.8 in 1996 to 0.7 in 1997.

Ford (2000) further explained that these companies have safety programs that have meetings where employees actively and willingly participate in developing safety policies and procedures. They are able to track and measure their results by utilizing the job hazard analysis form, near misses and ergonomic near-misses forms. The incidents that are reported on these forms are investigated and the information gathered is used to modify and make improvements to the work areas. Audit teams are also active in the safety programs.

At General Electric (G.E.), the audit team members rotate so that every employee has a chance to participate in the auditing process. Employees are required to be rewarded and recognized when safety goals and accomplishments are made and when employee suggestions are implemented hence, G.E. employees receive $25 for an adopted suggestion (Ford, 2000).

An effective safety and health training should begin with a written policy that expresses management approval, defines training and re-training requirements and instructor competency,

and defines an auditing procedure (Colvin, 1992). Additionally, the proposed OSHA guideline requires that employers provide initial, on-going, and specific safety and health training to employees.

As a matter of fact, there are more than 100 OSHA Standards that contain mandatory training requirements (Pennsylvania Chamber of Business, 1997). These mandatory training requirements include but not limited to Hazard Communication, Lock-Out and Tag-Out, Use of Personal Protection Equipment, Machine Guarding, and Fire Extinguisher (Pennsylvania Chamber of Business, 1997).

The OSHA guidelines also require that all safety and health training be documented (Appendix E).

Causes of Accidents in the Workplace

When employees have insufficient knowledge, bad attitude, and are handicapped in some way, accidents may happen in the workplace. Colvin (1992) alluded to this point that the four factors that contribute to the cause of accidents in the workplace are:

1. Employee lack of knowledge due to failure to understand instructions or has not received adequate instructions.

2. Employee bad attitude regarding the willful disregard of instructions.

3. Employee physical or mental deficiencies regarding vision, hearing and locomotion.

4. Employee perception of safe work to be awkward, difficult, or impossible because emergency prevents safe practice or operation.

According to Worick (1975), in most organizations, accidents usually occur because of:

1. Unsafe working conditions.

2. Unsafe employee conduct.

3. Unsafe equipment usage.

Focusing on factors that inhibit production can eliminate unsafe working conditions and these factors include but are not limited to, extreme temperature control, exposure to chemical fumes, inadequate ventilation, and lack of space. Vincoli (1994) indicated that unsafe conditions in the workplace also included:

1. Inadequate guards or protection.

2. Defective tools, equipment, substances.

3. Congested work areas.

4. Inadequate warning system.

5. Fire or explosion hazard.

6. Substandard housekeeping.

7. Hazardous atmospheric conditions.

8. Excessive noise and Radiation exposures.

9. Inadequate illumination.

Ferry (1978) indicated that an unsafe act refers to that personal action which directly caused or permitted the accident.

It can be something the person did not do, did improperly, or should not have done.

According to the Tennessee Division of Health and Safety (1987), Unsafe Employee Act is usually related to lack of education regarding how tasks are to be performed. Education serves as a tool to influence effective task performance. Grimaldi & Simond (1989) indicated that education includes all implicit and explicit actions that modify knowledge, viewpoint, and behavior. Additionally, unsafe acts are caused by lack of understanding by the worker and through lack of management control (Mansdorf, 1993).

Vincoli (1994) explained that the most common example of unsafe acts by employees included:

1. **Operating without authority.**
2. **Failure to warn or secure.**
3. **Operating at improper speed and/or use of drugs.**
4. **Using defective equipment.**
5. **Using equipment improperly.**
6. **Failure to use protective equipment.**
7. **Improper loading, lifting, or placement.**
8. **Servicing equipment in motion.**
9. **Horseplay.**

Also, Ra Velle (1980) indicated that accidents and injuries on the job just don’t happen, they are frequently caused by unsafe acts rather than unsafe conditions. Ra Velle (1980) added that roughly four accidents on the job are caused by unsafe acts

for every one caused by unsafe conditions as evidenced by the breakdown of the causes of accident below:

Mechanical failure (unsafe conditions)	**20%**
Human failure (unsafe acts)	**78%**
Acts of nature (floods, storm)	**2%**

Unsafe equipment usually results from malfunction of equipment and machinery that provides a potential hazard to the user, but to reverse the equipment problems, it is necessary to redesign the equipment with new technology (Petersen, 1978).

Procedures for Workplace Accident Prevention

Organizations must respond to prevent the initial accident that occurred, but did not cause any injury. Colvin (1992) identified a rule of thumb, accident ratio which is explained as 300-30-1 = 331 that says for every 331 times a safety rule is violated, 300 times nothing will happen, 30 times a close call or minor incident will occur, and 1 time an accident or injury will occur.

The implications of the rule of thumb, according to Colvin (1992), is that management must take seriously and react to correct or abate identified hazards because most of the time an employee will get away without an accident or injury occurring, some of the time, an employee will have a close call or a minor accident or injury, and eventually, the employee will have a serious accident or injury.

Once the hazard analysis has been completed, appropriate controls should be implemented. The selection of the controls would be dictated by the nature of the hazard and the feasibility of control options in a given work setting (Hagan, Montgomery, & O'Reilly, 2001).

According to Tweedy (1997), identifying and understanding accident causal factors including unsafe human behaviors can be beneficial when evaluating accidents and implementing preventive measures. Management should consider the following principles when considering the approaches for accident prevention:

1. Accident programs must be organized, planned, and directed to achieve the desired results.

2. Accident prevention programs must place strong emphasis on identifying, evaluating, and correcting hazards and hazardous conditions.

3. Accident prevention must also address human behavior, which is the most unpredictable aspect of the accident prevention program.

4. Identifying the causal factors responsible for the accident is important in accident prevention.

5. Preventing accidents and controlling hazards include some type of process innovation, machine safeguarding, personal protective equipment, training, and administrative procedures.

6. Monitoring systems can also assess the effectiveness of hazard-reducing controls and the accident prevention program.

Grimaldi & Simond (1989) clearly stated that education,

engineering, and enforcement are other tools used in managing accident prevention. Education included all implicit and explicit actions that management will establish to deliberately or coincidentally modify knowledge, viewpoints, or behavior.

Also, Engineering controls are basically related to all management actions that are needed to correct a physical hazard while enforcement usually implied the procedures that are in place such as disciplinary actions and it included any management step intended to increase the likelihood that employees will comply with safety requirements (Grimaldi & Simond, 1989).

CHAPTER THREE

Methodology

The purpose of this study was to identify the safety measures that played a role in accident and injury prevention or reduction in the workplace.

Specifically, an anonymous company was used in the study. The company was a large hospital that was located in the northeastern part of the USA. The company's old safety program that was in place during a merger, was compared with a new safety program that was implemented after merger to show their differences, and how both safety programs impacted recordable injuries, incidence rates, lost workday cases, and lost workday rates. The old and new safety programs are the independent variables. The recordable injuries, incidence rates, lost workday cases and lost workday rates are the dependent variables.

Research Question #1

What are the safety measures that distinguished the new safety program from the old safety program at the anonymous company?

Research #1 was addressed through the use of a narrative method for the comparative safety program study that identified

the safety measures that distinguished the company's new safety program from the old safety program. The researcher reviewed the old and new safety programs. After the review of the old and new safety programs, the researcher indicated "yes" or "no" for the safety measures that were not included in the old safety program but were included in the new safety program.

The basis for the narrative method used in this research was to provide meaning and understanding for the changes that occurred at the anonymous company. Many articles have been written that supported the use of narrative methods in researches. For example, O'Connor (2000) stated that narrative is a useful construct for attending to and shedding light on organizational change initiatives.

Also, Daft (1983) expresses that qualitative research is concerned with the meaning of organizational phenomena. This is because organizations are enormously complex social systems that cannot be studied effectively with the same techniques that are used to study physical or biological sciences. Hence, understanding the changes in organizations require the direct involvement and use of human senses to interpret organizational phenomena that are necessary for discovering new knowledge.

Research Question #2

What was the impact of the old safety program and the new safety program on recordable injuries, incidence rates, lost

workday cases and lost workday rates at the anonymous company?

Research Question #2 was addressed through the use of a narrative method that described and identified (1) the recordable injuries from the company's OSHA Log that are affiliated with the old & new safety programs; (2) the lost workday cases from the company's OSHA Log that are affiliated with the old & new safety programs; (3) the incidence rates affiliated with the old and new safety programs by using the required BLS equation; (4) the lost workday rates affiliated with the old and new safety programs by using the required BLS equation; (5) the national BLS incidence and lost workday rates for hospital with Standard Industrial classification (SIC) Code #806; and (6) compared the company's incidence rates & lost workday rates for the old & new safety programs with national BLS rates.

The OSHA Act requires employers to maintain logs on workplace injuries and illnesses. The OSHA Act also requires the BLS to provide statistics on incidence and lost workday rates for all industries. The BLS require organizations to use the following equation to calculate incidence and lost workday rates:

$$\frac{N \times 200{,}000}{PH}$$

Where N indicates the number of recordable injuries or lost workday cases; 200,000 hours represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year; and PH indicates the number of hours all employees actually worked.

The use of the BLS rates have it's own problems. The BLS identified sampling errors as a problem that affect the gathering and interpretation of the rates for all industries due to the

inability to obtain information about all cases in the sample and data recording mistakes. However, the BLS has implemented rigorous training for state coders and mechanical edit system that identify questionable entries that are used in calculating reliable incidence and lost workday rates for all industries.

The BLS indicated that the incidence and lost workday rates are more meaningful to an employer when the injury and illness of the firm is compared with other employers doing similar work with workforces of similar size. Also, these rates help organizations to determine problem areas and the progress made in preventing work-related injuries and illnesses. Also, descriptive statistics were reported in table form to reflect the recordable injuries, payroll hours, lost work cases, incidence rates and lost workday rates for the anonymous company and the BLS.

Research Question #3

Are the variables of safety program and the variables of safety performance independent?

Research Question #3 was addressed through the use of Chi-Square Test of Independence to show whether the variables of safety program and the variables of safety performance were independent. The old and new safety programs (independent variables) were arranged in two rows and the recordable injuries and lost workday cases (dependent variables) were arranged in two columns. The use of Chi Square are based on the assumptions that

scores have been independently sampled, the samples size are large, scores are representative of the population, each participants contribute to only one cell, and few or no expected frequencies < 5 (Harris, 1998). Hence, the incidence rates and lost workday rates were excluded from the analysis because their observed frequencies were < 5 and their expected frequencies were < zero. However, their impacts were analyzed qualitatively.

A Chi Square test looks at scores on one or more nominal level variables and at the frequencies with which these scores occur (Harris, 1998). Chi Square is popular for test in causal comparative studies and is used to analyze data expressed as frequencies rather than measurements (Leedy, 1989). The following equation was used to calculate Chi Square *(X^2):*

$$X^2 = \sum \frac{(O - E)^2}{E}$$

Where: O is the observed frequency

E is the expected frequency

∑ is the "sum of"

***X^2* is Chi Square**

The expected frequency is calculated by multiplying the row total by the column total and divides the result by the grand total. The degrees of freedom is obtained from the formula: (rows - 1) x (columns – 1). The level of significance is 0.05. Hence, when chi square value is greater than the p-value of 0.05, this indicated that there was a significant difference between the applicable variables or vice versa.

CHAPTER FOUR

Results

Identification of Variables

The identification of the variables that were used in this research are the independent variables that included the old safety program and new safety program and the dependent variables that included the recordable injuries, lost workday cases, incidence rates and lost workday rates.

Research Question #1

What are the safety measures that distinguished the old safety program from the new safety program at the anonymous company?

Answer to Research Question #1

The comparative safety program showed on Table 4 revealed the safety measures that distinguished the new safety program from the old safety program as follows:

1. The institutional safety policy clearly identified the

names, titles, and signatures of top management to show their commitment that ensured a safe workplace for the employees.

2. Top management identified the Director of Safety as the authority to manage, through design and implementation of the applicable safety program for the company. Top management effectively supported the Department of Safety with a budget to manage the clearly described functions of the department.

3. The safety policy statement clearly identified top management's expectations for employees, managers, and medical residents in terms of complying with the safety policies and procedures as contained in the Safety Program Manual.

4. Safety updates through a question and answer format are provided to employees at the quarterly employee meetings.

5. A representative of top management participated in the environmental rounds which provided visibility to employees that top management is concerned about the well being of the employees and the physical status of the facilities.

6. Top management designated an administrator to co-chair the safety committee and directly received the quarterly safety committee minutes that ensured employees that top management cared about their concerns.

7. Managers were required to inform the Department of Safety when a new departmental safety officer was assigned for the department. The role of the departmental safety officers was to support the Department of Safety accident prevention program for the company.

8. Top management supported the introduction of the new incentive that rewarded the departmental safety officers prizes for their efforts in departmental accident prevention programs.

9. A new ladder safety policy was developed and training was provided to the affected employees.

10. A new personal protective equipment policy was developed that reduced the risk of employee injuries.

11. A new accident prevention signs/tags policy was developed that aided the company's accident prevention efforts.

12. The anonymous company purchased new disposal kits that supported the proper disposal of infectious needles to prevent employee injuries.

13. A new individualized computer assisted training program was procured that supported the education and orientation of affected employees related to shipping of infectious waste.

14. A new gluturaldehyde policy for sterilizing equipment was developed and affected employees were trained in order to reduce their exposures to inhalation related injuries.

15. A new wall and cable penetration policy was developed that required the openings around ducts or cable wires that penetrate fire-rated walls to be caulked in order to prevent the passage of smoke, fire or fumes from one compartment to another.

16. A new reporting system "Suggestion Form" was developed for employees to report any unsafe act or conditions at the company that resulted in the abatement of additional safety deficiencies identified by the employees.

17. As an enhancement to staff knowledge, two quarterly safety newsletters were developed that educated staff on general safety issues and laboratory safety issues.

18. As part of the company's accident prevention efforts, a targeted approach that reduced injury exposures at targeted departments was established. The approach identified the department with the highest particular injury type and frequency, compared data with previous years, communicated with the departmental manager, explained the injury trend with the manager, engaged with the departmental employees with the injury trend, included the employees in the task analysis, trained the employees on the new approach to perform the task, evaluated the outcome, provided feedback to the departmental manager, employees, and the safety committee, and recognized the affected department for a good job for injury reduction.

19. The staff of the Department of Safety maintained membership in the safety committee and all the affiliated safety subcommittees that aided the immediate response to and the resolution of safety concerns from the committees.

20. The fire drill policy was revised that targeted the active fire/smoke zone that was monitored that ensured 100% staff participation in scheduled fire drills.

21. The new employee safety orientation was expanded to include new medical and graduate students. Additionally, a new online safety training was developed that supported and fulfilled the annual safety training requirements for all employees about

the Seven Areas of the JCAHO Environment of Care; Infectious Control; Glutaraldehyde; and Hearing Conservation. Table 4 summarized the comparison of the new safety program from the old safety program of the anonymous company.

Table 4

Summary of Safety Programs Comparison

Institutional Safety Measures (Policies/Procedures)	Old Safety Program	New Safety Program
1. Institutional safety policy Statement	Yes	Yes
a. Identified leaders and signatures	Yes, excluded the Controller's signature	Yes, included the Controller's signature
b. Identified a Safety Director to manage the safety efforts	None	Yes
c. Participate in facility rounds	None	Yes
d. Leaders talk about safety at facility-wide employee meetings	None	Yes
e. Identified staff roles	Yes	Yes
f. Identified manager's role	Yes	Yes
g. Identified resident's role	None	Yes
h. Included clinics	Yes, implied	Yes, included
2. Safety Management Plan (See the specific and various safety management polices shown from item 2a through 2ab)	Yes, Managed by the Department of Safety	Yes, Managed by the Department of Safety
2a. Safety Committee	Yes, designated an administrator to committee meetings	Yes, designated an administrator to co-chair meetings

"Table 4 Continues"

Table 4 - Summary of Safety Programs Comparison

2b. Functions of Departmental Safety Officers	**Yes, but managers seldom notify Department of Safety when new departmental safety officers are selected. Also, no incentives for departmental safety officers**	**Yes, managers are required to notify Department of Safety when new departmental safety officer is selected. Also, incentives in place to recognize departmental safety officers**
2c. Functions of the Department of Safety	**None**	**Yes**
2d. Orientation and Education of new and existing employees and students on general safety **➢ Departmental specific training**	**Yes, excluded new medical and graduate students** **Yes, never audited**	**Yes, included new medical and graduate students** **Yes**
2e. Confined Space	**Yes**	**Yes**
2f. Cellular Phones	**Yes**	**Yes**
2g. Compliance Audits by Outside Regulatory Agencies	**Yes**	**Yes**
2h. Defensive Driving	**None**	**Partial**
2i. Extension Cords/Power	**Yes**	**Yes**
2j. Electrical Appliances	**Yes**	**Yes**
2k. Patient-owned Personal Appliances	**Yes**	**Yes**
2l. Fall Protection	**Yes**	**Yes**
2m. Hearing Conservation	**Yes**	**Yes**
2n. Powered Trucks	**Yes**	**Yes**
2o. Lock Out/Tag Out	**Yes**	**Yes**
2p. Report of work Related injuries	**Yes, but there was no procedure for notifying workers compensation manager of serious injuries and lost time injuries. Safety is informed late of employee injuries for follow-up**	**Yes, new procedure included notification to workers compensation and Safety of serious and lost time injuries. Departmental heads perform initial injury investigation**

"Table 4 Continues"

Table 4 - Summary of Safety Programs Comparison

2q. Ladder Safety	None	Yes
2r. Access Control and ID Badges	Yes	None, transferred to Security Manual
2s. Asbestos program	See Hazardous Waste	See Hazardous Waste
2t. Personal Protective Equipment	None	Yes
2u. Safety Inspection	Yes, semi-annually in all buildings	Yes, annually in non-patient care areas
2v. Accident Prevention Signs and Tags	None	Yes
2w. Ergonomics	Yes	Yes, included Dept. evaluation of workstations by Safety as requested
2x. Performance Indicators	Yes	Yes
2y. Assessment of Safety Training	Yes	None, See Safety Management Plan
2z. Job Safety Analysis	None	Partial, on-going
2aa. Annual evaluation of the Environment of Care Management Plans	Yes	Yes
2ab. Annual review of safety policies	Yes, every three years	Yes annually or as revised
3. Security Management Plan	Yes, Managed by the Security Department	Yes, Managed by the Security Department
4. Hazardous Materials and Waste Plan (See the specific hazardous materials management polices shown from item 4a through 4p)	Yes, Managed by Safety Department	Yes, Managed by Safety Department
4a. Asbestos Program	Yes, see Safety Management Plan	Yes, see Safety Management Plan
4b. Chemical Hygiene ➢ Maintenance of Eye Wash Stations	Yes Partial	Yes Partial
4c. Right To Know	Yes	Yes
4d. Compressed Gases	Yes	Yes
4e. Employee Exposure Control	Yes	Yes

"Table 4 Continues"

Table 4 – Summary of Safety Programs Comparison

4f. Flammables	Yes	Yes
4g. Hazardous Chemical Spill ➢ Staff training ➢ Investigation	Yes Yes Yes	Yes Yes Yes
4h. Waste Disposal	Yes	Yes
4i. Infectious Waste	Yes	Yes
4j. Sharps Disposal ➢ Hazard Control ➢ Incident Notification ➢ Injury Investigation ➢ Initial Training ➢ On-going Training ➢ Re-training	Partial None Yes Partial Yes Yes None	Yes Yes, Disposal kits Yes Yes Yes Yes Yes
4k. Mercury Spill ➢ Response ➢ Staff Training	Yes Yes Yes, included all responders	Yes Yes Yes, included all responders
4l. Respiratory Protection ➢ Training ➢ Medical Evaluation ➢ Fit Testing	Yes Partial Yes Partial	Yes Yes Yes Partial
4m. Lead Abatement	None	Partial
4n. Shipping of Infectious Waste ➢ Training	Yes None	Yes Yes
4o. Transportation of Infectious Waste ➢ Training ➢ Manifest	Yes Yes Yes	Yes Yes Yes
4p. Glutaraldehyde ➢ Training ➢ Ventilation	Yes None None	Yes Yes Yes
5. Disaster Management Plan	Yes, Managed by Pre-Hospital Department	Yes, Managed by Pre-Hospital Department
6. Fire Prevention Management Plan (See the specific hazardous materials management polices shown from item 6a through 6p)	Yes, Managed by Safety Department	Yes, Managed by Safety Department

“Table 4 Continues”

Table 4 – Summary of Safety Programs Comparison

6a. Fire Drill ➢ **Training** ➢ **Participation** ➢ **Participation Rate**	**Yes** **Yes** **Yes, included active zone, adjacent, above and below zones, and 20% of remaining smoke zone** **80% average of required smoke zones**	**Yes** **Yes** **Yes, included only active smoke zone** **100% of all active zones**
6b. Fire Alarm/Drill Monitoring	**Yes**	**Yes**
6c. Hot Work Permit	**Yes**	**Yes**
6d. Evacuation Plan	**Yes**	**Yes**
6e. Construction Safety ➢ **Contractor's Training** ➢ **Review of Contractor's Safety Policy** ➢ **Site Inspection**	**Yes** **Yes** **Random**	**Yes** **Yes** **Random**
6f. Fire Plan ➢ **Hospital Buildings** ➢ **Clinics** ➢ **College** ➢ **Other Buildings** ➢ **Bi-Annual Departmental Policy Review** ➢ **Fire/Fire Investigation**	**Yes** **Yes** **Yes** **Yes** **Yes** **Partial** **Yes**	**Yes** **Yes** **Yes** **Yes** **Yes** **Yes** **Yes**
6g. Furnishings, Decorations, and Interior Finishes	**Yes**	**Yes**
6h. Interim Life Safety Measures	**Yes**	**Yes**
6i. Interim Life Safety Program Inspection ➢ **Projects** ➢ **Training** ➢ **Security**	**Yes** **Yes** **Yes** **Yes**	**Yes** **Yes** **Yes** **Yes**

"Table 4 Continues"

Table 4 – Summary of Safety Programs Comparison

6j. Wall/Cable Penetration Program ➢ **Inspection** ➢ **Abatement** ➢ **Staff Training** ➢ **Contractor's Training**	**None, designated as a Taskforce** **Yes** **Yes** **Yes** **Yes**	**Yes** **Yes** **Yes** **Yes** **Yes**
6k. Corridor/Egress	**Yes**	**Yes**
6l. Testing, Inspection, and Maintenance of Fire Protection Systems ➢ **Staff Training**	**Yes,** **Yes**	**Yes** **Yes**
6m. Safety Alert	**Yes**	**Yes**
7. Medical Equipment Management Plan	**Yes, Managed by Clinical Engineering**	**Yes, Managed by Clinical Engineering**
8. Utility Management Plan	**Yes, Managed by Facilities**	**Yes, Managed by Facilities**
9. Other Safety Tools	**Yes**	**Yes**
9a. Safety Suggestion Form	**None**	**Yes**
9b. General Safety Newsletter	**None**	**Yes**
9b. Laboratory Safety Newsletter	**None**	**Yes**
Safety Incentives	**None**	**Yes, Dept. Safety Officer's Program**
9c. Targeted Dept. Injury Investigation	**None**	**Yes**
9d. Targeted Dept. Safety Training	**None**	**Yes**
9e. Recognition of Departments with High/Low Injuries	**None**	**Yes**

Research Question #2

What was the impact of the old safety program and the new safety program on recordable injuries, incidence rates, lost workday cases, and lost workday rates at the anonymous company?

Answer to Research Question #2

The review of the anonymous company's OSHA Log and other completed calculations revealed the impact of the old and new safety programs on recordable injuries, incidence rates, lost workday cases and lost workday rates as follows:

Impact of The Old Safety Program on Recordable Injuries

With the old safety program, the recordable injuries at the anonymous company increased by 127% between 1997 and 1998, and also increased by 47% between 1998 and 1999 as identified on Table 5. Additionally, the total payroll hours for the anonymous company affiliated with the old safety program increased annually between 1997 and 1999 as identified on Table 5.

Table 5

Recordable Injuries & Payroll Hours for the Old Safety Program

Period	Recordable injuries	% Changes	Payroll Hours
1997	98		5,982,515
1998	222	+127%	11,903,368
1999	327	+47%	11,701,653

Impact of The New Safety Program on Recordable Injuries

With the new safety program, the recordable injuries at the anonymous company decreased by 48% between 2000 and 2001 as identified on Table 6. Additionally, the total payroll hours for

the anonymous company affiliated with the new safety program increased yearly between 2000 and 2001 as identified on Table 6.

Table 6

Recordable Injuries (RI) and Payroll Hours for New Safety Program

Period	RI	% Changes	Payroll Hours
2000	201		8,383,925
2001	105	-48%	8,813,650

Calculation of Incidence Rates for Old Safety Program

The incidence rates for the old safety program for the anonymous company were calculated as showed below:

1997 incidence rate: $\frac{98 \times 200{,}000}{5{,}982{,}515}$ **= 3.2 injuries per 100 employees**

1998 incidence rate: $\frac{222 \times 200{,}000}{11{,}903{,}368}$ **= 3.7 injuries per 100 employees**

1999 incidence rate: $\frac{327 \times 200{,}000}{11{,}701{,}653}$ **= 5.5 injuries per 100 employees**

Impact of the Old Safety Program on Incidence Rates

With the old safety program, the incidence rates for the anonymous company increased by 15% between 1997 and 1998. It also increased by 48% between 1998 and 1999 and was identified on Table 7.

Table 7

Summary of Incidence Rates for Old Safety Program

Period	Incidence Rates Per 100 Employees	% Changes
1997	3.2	
1998	3.7	+15%
1999	5.5	+48%

Calculation of Incidence Rates for New Safety Program

The incidence rates for new safety program for the anonymous company were calculated as showed below:

2000 incidence rate: $\frac{201 \times 200{,}000}{8{,}383{,}925}$ = 4.7 injuries per 100 employees

2001 incidence rate: $\frac{105 \times 200{,}000}{8{,}813{,}650}$ = 2.3 injuries per 100 employees

Impact of the New Safety Program on Incidence Rates

With the new safety program, the incidence rates for the anonymous company decreased by 51% between 2000 and 2001 and was identified on Table 8.

Table 8

Summary of Incidence Rates for New Safety Program

Period	Incidence Rates Per 100 Employees	% Changes
2000	4.7	
2001	2.3	-51%

Impact of The Old Safety Program on Lost Workday Cases

With the old safety program, the lost workday cases at the anonymous company increased by 64% between 1997 and 1998 and, decreased by 36% between 1998 and 1999 and were identified on Table 9. Additionally, the total payroll hours for the anonymous company affiliated with the old safety program increased annually between 1997 and 1999 and were also identified on Table 9.

Table 9

Lost Workday Cases and Payroll Hours for Old Safety Program

Period	Lost Workday Cases	% Changes	Payroll Hours
1997	42		5,982,515
1998	69	+64%	11,903,368
1999	44	-36%	11,701,653

Impact of the New Safety Program on Lost Workday Cases

With the new safety program, the lost workday (LW) cases at the anonymous company increased by 9% between 2000 and 2001 and were identified on Table 10. Additionally, the total payroll hours for the anonymous company affiliated with the new safety program increased annually between 2000 and 2001 and were also identified on Table 10.

Table 10

Lost Workday Cases (LWC) and Payroll Hours for New Safety Program

Period	LWC	% Changes	Payroll Hours
2000	72		8,383,925
2001	79	+9%	8,813,650

Calculation of Incidence Rates for Old Safety Program

The lost workday rates affiliated with the old safety program for the anonymous company was calculated as showed below:

1997 lost workday rate: $\frac{42 \times 200{,}000}{5{,}982{,}515}$ **= 1.4 lost workdays per 100 employees**

1998 lost workday rate: $\frac{69 \times 200{,}000}{11{,}903{,}368}$ **= 1.1 lost workdays per 100 employees**

1999 lost workday rate: $\frac{44 \times 200{,}000}{11{,}701{,}653}$ **= 0.7 lost workdays per 100 employees**

Impact of the Old Safety Program on Lost Workday Rates

With the old safety program, the lost workday rates at the anonymous company decreased by 21% between 1997 and 1998, and also decreased by 36% between 1998 and 1999 as per Table 11.

Table 11

Summary of Lost Workday Rates for Old Safety Program

Period	Lost Workday Rates Per 100 Employees	% Changes
1997	1.4	
1998	1.1	-21%
1999	0.7	-36%

Calculation of Lost Workday Rates for New Safety Program

The lost workday rates for the new safety program for the anonymous company was calculated as showed below:

2000 lost workday rate: $\frac{72 \times 200{,}000}{8{,}383{,}925} = 1.7$ **lost workdays per 100 employees**

2001 lost workday rate: $\frac{79 \times 200{,}000}{11{,}903{,}368} = 1.7$ **lost workdays per 100 employees**

Impact of the New Safety Program on Lost Workday Rates

With the new safety program, there were no changes in the lost workday rates at the anonymous company between 2000 and 2001 per Table 12.

Table 12

Summary of Lost Workday Rates for New Safety Program

Period	Lost Workday Rates Per 100 Employees	% Changes
2000	1.7	
2001	1.7	No Change

Identification of National Incidence Rates and Lost Workday Rates

The Bureau of Labor Statistics (BLS) classified hospitals under the Standard Industrial Classification code 806. The BLS (national) incidence rates and lost workday rates published for hospitals for 1997, 1998, 1999, and 2000 were showed on Table 13 and Appendix F. The 2001 data are unpublished. Hence, the data was not identified on Table 13.

Table 13

BLS – Incidence Rates and Lost Workday Rates for Hospitals

Year	All Hospitals Incidence Rates Per 100 Employees	All Hospitals Lost Workday Rates Per 100 Employees
1997	10.0	4.0
1998	9.2	3.8
1999	9.2	4.0
2000	9.1	4.1
2001	N/A	N/A

Comparison of Company Incidence Rates Versus BLS (National) Rates for Old Safety Program

With the old safety program, the incidence rates for the anonymous company increased annually while the BLS incidence rates for hospitals decreased annually. Overall, the incidence rates for the anonymous company were better than the BLS incidence rates for hospitals in each year. Table 14 showed the incidence rates comparison between the anonymous company and BLS.

Table 14

Company and BLS Incidence Rates for Old Safety Program

Year	Anonymous Company Incidence Rates Per 100 Employees	Status	Hospitals BLS Incidence Rates Per 100 Emp.
1997	3.2	Better	10.0
1998	3.7	Better	9.2
1999	5.5	Better	9.2

Comparison of Company Incidence Rates Versus BLS (National) Rates for New Safety Program

With the new safety program, the incidence rates for the anonymous company decreased annually while the BLS incidence rates for hospitals also decreased annually. Overall, the incidence rates for the anonymous company were better than the BLS incidence rates for hospitals in each year. Table 15 showed the incidence rates comparison between the company and the BLS.

Table 15

Company and BLS Incidence Rates for New Safety Program

Year	Anonymous Company Incidence Rates Per 100 Employees	Status	Hospitals BLS Incidence Rates Per 100 Emp.
2000	4.7	Better	9.1
2001	2.3	Unknown	Not Available

Comparison of Company Lost Workday Rates Versus BLS (National) Rates for Old Safety Program

With the old safety program, the lost workday rates for the anonymous company decreased annually while the BLS lost workday rates for hospitals also decreased annually. Overall, the lost workday rates for the anonymous company were better than the BLS lost workday rates for hospitals in each year. Table 16 showed the incidence rates comparison between the anonymous company and the BLS.

Table 16

Company & BLS Lost Workday Rates for Old Safety Program

Year	Anonymous Company Lost Workday Rates Per 100 Employees	Status	Hospitals BLS Lost Workday Rates Per 100 Employee
1997	1.4	Better	4.0
1998	1.1	Better	3.8
1999	0.7	Better	4.0

Comparison of Company Lost Workday Rates Versus BLS (National) Rates After Merger

The lost workday rates for the anonymous company remained flat while the BLS (national) lost workday rates for hospitals increased after merger. Overall, the lost workday rates for the anonymous company were better than the BLS lost workday rates for hospitals in each year after merger. Table 17 showed the lost workday rates comparison between the anonymous company and BLS.

Table 17

Company & BLS Lost Workday Rates for New Safety Program

Year	Anonymous Company Lost Workday Rate Per 100 Employees	Status	Hospitals BLS Lost Workday Rate Per 100 Employee
2000	1.7	Better	4.1
2001	1.7	Unknown	Not Available

Research Question #3

Are the variables of safety program and the variables of safety performance independent?

Answer to Research Question #3

Chi square test of independence was used to analyze the applicable data for variable relationships.

The following equation was used to calculate Chi Square (X^2):

$$X^2 = \sum \frac{(O - E)^2}{E}$$

Where: O is the observed frequency

E is the expected frequency

∑ is the "sum of" the values

X^2 is Chi Square

The expected frequency is calculated by multiplying the row total by the column total and divides the result by the grand total. The degrees of freedom is calculated by using the formula below: (rows - 1) x (columns – 1). There are two rows and two columns. Hence, the degrees of freedom (df): (2-1) x (2-1) equal is 1. A 0.05 level of significance was used for this study.

Table 18

Observed Frequencies for Safety Program Variables and Performance Variables

	Safety Performance		
Safety Program	Recordable Injuries (C1)	Lost Workday Cases (C2)	Row Total
Old (R1)	647	155	802
New (R2)	306	151	457
Column Total	953	306	1259 (N)

Table 19

Observed Frequencies, Expected Frequencies, and $(O-E)^2/E$ for Safety Program Variables and Performance Variables

	Safety Performance						
	Recordable Injuries (C1)			Lost Workday Cases (C2)			(RT)
Safety Program	OBSERVED	EXPECTED	$(O-E)^2/E$	OBSERVED	EXPECTED	$(O-E)^2/E$	
Old (R1)	647	607.07	2.63	155	194.93	8.18	802
New (R2)	306	345.93	4.61	151	111.07	14.34	457
(CT)	953			306			1259 (N)

Chi Square (X^2): 2.63 + 8.18 + 4.61 + 14.34 = 29.76

Finding Expected Frequencies and Chi Square ($(O-E)^2/E$)

Calculation for R1, C1

Observed value (O) = 647

Expected value (E) = (row total x column total) / grand total

E = (802 x 953) / 1259 = 607.07

Chi-square = (O - E) squared / E

Chi-square = ((647 – 607.07) **2) / 607.07

Chi-square = 2.63

Calculation for R1, C2

Observed value (O) = 155

Expected value (E) = (row total x column total) / grand total

E = (802 x 306) / 1259 = 194.93

Chi-square = (O - E) squared / E

Chi-square = ((155 – 194.93) **2) / 194.93

Chi-square = 8.81

Calculation for R2, C1

Observed value (O) = 306

Expected value (E) = (row total x column total) / grand total

E = (457 x 953) / 1259 = 345.93

Chi-square = (O - E) squared / E

Chi-square = ((306 – 345.93) **2) / 345.93

Chi-square = 4.61

Calculation for R2, C2

Observed value (O) = 151

Expected value (E) = (row total x column total) / grand total

E = (457 x 306) / 1259 = 111.07

Chi-square = (O - E) squared / E

Chi-square = ((151 – 111.07) **2) / 111.07

Chi-square = 14.34

Table 20

Chi Square (X^2) Probability of Exceeding the Critical Value

df	0.10	0.05	0.025	0.01	0.001
1	2.706	3.841	5.024	6.635	10.828
2	4.605	5.991	7.378	9.210	13.816
3	6.251	7.815	9.348	11.345	16.266
4	7.779	9.488	11.143	13.277	18.467
5	9.236	11.070	12.833	15.086	20.515
6	10.645	12.592	14.449	16.812	22.458
7	12.017	14.067	16.013	18.475	24.322
8	13.362	15.507	17.535	20.090	26.125
9	14.684	16.919	19.023	21.666	27.877
10	15.987	18.307	20.483	23.209	29.588
11	17.275	19.675	21.920	24.725	31.264
12	18.549	21.026	23.337	26.217	32.910
13	19.812	22.362	24.736	27.688	34.528
14	21.064	23.685	26.119	29.141	36.123
15	22.307	24.996	27.488	30.578	37.697
16	23.542	26.296	28.845	32.000	39.252
17	24.769	27.587	30.191	33.409	40.790
18	25.989	28.869	31.526	34.805	42.312
19	27.204	30.144	32.852	36.191	43.820
20	28.412	31.410	34.170	37.566	45.315
21	29.615	32.671	35.479	38.932	46.797
22	30.813	33.924	36.781	40.289	48.268
23	32.007	35.172	38.076	41.638	49.728
24	33.196	36.415	39.364	42.980	51.179
25	34.382	37.652	40.646	44.314	52.620
26	35.563	38.885	41.923	45.642	54.052
27	36.741	40.113	43.195	46.963	55.476

Source: http://www.itl.nist.gov/div898/handbook/index.htm

Based on the above Chi Square (X^2) tables, with 1 degrees of freedom:

At significant level 0.05: X^2 value of 29.76 > 3.841

At significant level 0.025: X^2 value of 29.76 > 5.024

At significant level 0.01: X^2 value of 29.76 > 6.635

At significant level 0.001: X^2 value of 29.76 > 10.828

Since Chi Square (X^2) value of 29.76 > 10.828 at $p < 0.001$, the distribution was significant.

The chi square test of independence showed that safety performance variables were dependent on the safety program variables.

CHAPTER FIVE

Conclusions and Recommendations

Conclusions

The Occupational Safety and Health Administration (OSHA) Standard required employers to provide employees a workplace that is free of hazards. Hence, organizations must develop an effective safety program that reduces or prevents accidents or injuries in the workplace.

Research Question #1

What are the safety measures that distinguished the new safety program from the old safety program at the anonymous company?

There were twenty-one safety measures that distinguished the new safety program from the old safety program. The indication was that the new management at the anonymous company was committed to safety because of the set of new safety measures (policies and procedures) that were developed and implemented as part of the new safety program. Regarding worksite analysis, the company inspected the facility as scheduled, and established a new, targeted incident investigation process that supported

injury reduction. Regarding hazard control, the company introduced a needle-less devices and procured disposal kits that supported injury reduction related to needle-sticks or sharps. Regarding training, the company expanded safety training to new medical and graduate students and also, launched a web-based, online safety training that supported the education and orientation of employees. Hence it was concluded that the new management at the anonymous company committed to a new safety program that performed better than the old safety program.

Research Question #2

What was the impact of the old safety program and the new safety program on recordable injuries, incidence rates, lost workday cases and lost workday rates at the anonymous company?

The overall impact of the old and new safety programs are:

1. The old safety program increased recordable injuries by an average of 85%, lost workday cases increased by an average of 14%, and incidence rates increased by an average of 31%.

2. The new safety program decreased the recordable injuries by 48%, lost workday cases decreased by 3%, incidence rates decreased by 51%, and lost workday rates decreased by 12%.

Hence, it was concluded that the new safety program performed better than the old safety program even though both of their incidence rates and lost workday rates were better than national rates.

Research Question #3

Are the variables of safety program and the variables of safety performance independent?

Chi square test of independence showed that the safety performance for the recordable injuries and lost workday cases are different across the old and new safety programs. Hence, it was concluded that safety performance variables were dependent on the safety program variables.

Overall, it must be noted that there is no custom designed, one size fit all workplace safety program. Every workplace is unique and hence, it is practically impossible for anyone to design a generic workplace safety program for all organizational environments. The information and data presented in this study are some essential safety measures of a successful safety program that was developed and implemented by an anonymous company that reduced recordable injuries, incidence rates, lost workday cases, and lost workday rates.

Realizing that no organization lives in isolation, but rather operates within the framework of social, governmental, and legal institutions, therefore, safety professionals or corporations that attempt to adopt some or all of the information and data in this study must be sensitive to the particular environment of operation.

Finally, this study and the results thereof, provided useful information to safety professionals and organizations that

plan to develop and implement a successful safety program that will reduce accidents and injuries in the workplace.

Recommendations

In order to maintain continuity in safety program excellence, it was recommended that the anonymous company:

1. Finalize the defensive driving policy that minimized accidents for all employees who drive company vehicles. Also, the affected employees shall be trained regarding defensive driving training techniques. While the OSHA does not have a specific driver safety standard, employers can be cited for lack of this particular program under the OSHA general duty clause that required employers to provide a safe work environment for employees.

2. Provide safety training for affected employees when the new eye wash stations are procured in order to comply with the OSHA Standards on Chemical Hygiene and Blood-Borne Pathogens.

3. Finalize the procedure that outlined the requirements for employees with facial hairs to be fit tested as part of the Respiratory Protection Policy.

4. Finalize the Lead Abatement Policy and provide safety training for the affected employees engaged in paint jobs, in-house asbestos remediation, and other related job tasks in order to comply with the OSHA Lead Standard.

5. Perform facility safety inspection of non-clinical areas semi-annually rather than annually so that hazards can be identified more quickly.

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APPENDICES

APPENDIX A

SAMPLE SAFETY POLICY FORM

SAMPLE SAFETY POLICY

It is a company safety policy for all employees to carry out all activities in a safe manner. This means that every reasonable measure will be taken to protect the safety and health of faculty, staff, students, and visitors, to protect the environment, and to minimize risk to the company facility and assets. All activities at this facility will be conducted in accordance with the following guidelines:

- **Each person who manages a project or activity is responsible for assuring the safety of such activity or project. This responsibility cannot be delegated to others.**
- **An activity or project is not considered safe unless it is in compliance with applicable safety, health, and environmental regulations and company safety policies.**
- **Each Department Director/Manager is required to designate a Departmental Safety Officer whose role is to be a liaison to the Department of Safety for implementation of safety programs.**
- **Persons who manage an activity and those responsible for approving the budget for the activity are responsible for ensuring that budget requests include adequate funding to meet safety requirements.**
- **Each individual is expected to follow all safety requirements and no person is expected to carry out any activity that does not meet safety requirements. If there is any doubt, it is the individual's responsibility to bring it to the attention of his/her supervisor, and if necessary, consult with the Department of Safety so that safety requirements can be met.**
- **The Department of Safety will advise the company community on safety, health, and environmental requirements and will provide technical safety support to implement safety policies.**
- **Accident prevention is considered of primary importance. We must constantly be aware that accidents involve the safety and well being of not only our staff, but our visitors and patients as well.**

Specific questions regarding the Safety Program may be referred to the Department of Safety.

_____ _____

President and Chief Executive Officer **Date**

APPENDIX B

SAMPLE SCOPE AND FUNCTIONS OF A PROFESSIONAL SAFETY POSITION

Sample Scope and Functions of A Professional Safety Position

A. Anticipate, identify and evaluate hazardous conditions and practices.

This function involves:

1. **Developing methods for:**
   - **Anticipating and predicting hazards from experience, historical data and other information sources.**
   - **Identifying and recognizing hazards in existing or future systems, equipment, products, software, facilities, processes, operations and procedures during their expected life.**
   - **Evaluating and assessing the probability and severity of loss events and accidents which may result from actual or potential hazards.**
2. **Applying these methods and conducting hazard analyses and interpreting results.**
3. **Reviewing, with the assistance of specialists where needed, entire systems, processes, and operations for failure modes, causes and effects of the entire system, process or operation and any subsystem or components due to:**
   - **System, subsystem, or component failures.**
   - **Human error.**
   - **Incomplete or faulty decision making, judgments or administrative actions.**
   - **Weaknesses in proposed or existing policies, directives, objectives or practices.**
4. **Reviewing, compiling, analyzing and interpreting data from accident and loss event reports and other sources regarding injuries, illnesses, property damage, environmental effects or public impacts to:**
   - **Identify causes, trends and relationships.**
   - **Ensure completeness, accuracy and validity of required information.**
   - **Evaluate the effectiveness of classification schemes and data collection methods.**
   - **Initiate investigations.**
5. **Providing advice and counsel about compliance with safety, health and environmental laws, codes, regulations and standards.**
6. **Conducting research studies of existing or potential safety and health problems and issues.**
7. **Determining the need for surveys and appraisals that help identify conditions or practices affecting safety and health, including those which require the services of specialists, such as physicians, health physicists, industrial hygienists, fire protection engineers, design and process engineers,**

ergonomists, risk managers, environmental professionals, psychologists and others.

8. **Assessing environments, tasks and other elements to ensure that physiological and psychological capabilities, capacities and limits of humans are not exceeded.**

B. Develop hazard control methods, procedures and programs.

This function involves:

1. **Formulating and prescribing engineering or administrative controls, preferably before exposures, accidents, and loss events occur, to :**
   - **eliminate hazards and causes of exposures, accidents and loss events.**
   - **reduce the probability or severity of injuries, illnesses, losses or environmental damage from potential exposures, accidents, and loss events when hazards cannot be eliminated.**
2. **Developing methods which integrate safety performance into the goals, operations and productivity of organizations and their management and into systems, processes, operations or their components.**
3. **Developing safety, health and environmental policies, procedures, codes and standards for integration into operational policies of organizations, unit operations, purchasing and contracting.**
4. **Consulting with and advising individual and participating on teams**
   - **engaged in planning, design, development and installation or implementation of systems or programs involving hazard controls.**
   - **engaged in planning, design, development, fabrication, testing, packaging and distribution of products or services regarding safety requirements and application of safety principles which will maximize product safety.**
5. **Advising and assisting human resources specialists when applying hazard analysis results or dealing with the capabilities and limitations of personnel.**
6. **Staying current with technological developments, laws, regulations, standards, codes, products, methods and practices related to hazard controls.**

C. Implement, administer and advise others on hazard controls and hazard control programs. This function involves:

1. **Preparing reports which communicate valid and comprehensive for hazard controls which are based on analysis and interpretation of accident exposure, loss event and other data.**
2. **Using written and graphic materials, presentations and other communication media to recommend hazard controls and hazard control policies, procedures and programs to decision making personnel.**
3. **Directing or assisting in planning and developing educational and training materials or courses. Conducting or assisting with courses related to designs, policies, procedures and programs involving hazard recognition and control.**
4. **Advising others about hazards, hazard controls, relative risk and related safety matters when they are communicating with the media, community and public.**
5. **Managing and implementing hazard controls and hazard control programs which are within the duties of the individual's professional safety position.**

D. Measure, audit and evaluate the effectiveness of hazard controls and hazard control programs.

This function involves:

1. **Establishing and implementing techniques, which involve risk analysis, cost, cost-benefit analysis, work sampling, loss rate and similar methodologies, for periodic and systematic evaluation of hazard control and hazard control program effectiveness.**
2. **Developing methods to evaluate the costs and effectiveness of hazard controls and programs and measure the contribution of components of systems, organizations, processes and operations toward the overall effectiveness.**
3. **Providing results of evaluation assessments, including recommended adjustments and changes to hazard controls or hazard control programs, to individuals or organizations responsible for their management and implementation.**
4. **Directing, developing, or helping to develop management accountability and audit programs which assess safety performance.**

Source: American Society of Safety Engineers. WWW.ASSE.ORG

APPENDIX C

OSHA – SAMPLE EMPLOYER SELF-INSPECTION CHECKLIS

SAMPLE EMPLOYER SELF-INSPECTION CHECKLIST
SAFETY AND HEALTH PROGRAM

Do you have an active safety and health program in operation that deals with general safety and health program elements as well as management of hazards specific to your worksite?

Is one person clearly responsible for the overall activities of the safety and health program?

Do you have a safety committee or group made up of management and labor representatives that meets regularly and reports in writing on its activities?

Do you have a working procedure for handling in-house employee complaints regarding safety and health?

Are you keeping your employees advised of the successful effort and accomplishments you and/or your safety committee have made in assuring they will have a workplace that is safe and healthful?

Have you considered incentives for employees or workgroups who have excelled in reducing workplace injuries/illnesses?

PERSONAL PROTECTIVE EQUIPMENT

Are employers assessing the workplace to determine if hazards that require the use of personal protective equipment (for example, head, eye, face, hand, or foot protection) are present or are likely to be present?

If hazards or the likelihood of hazards are found, are employers selecting and having affected employees use properly fitted personal protective equipment suitable for protection from these hazards?
Has the employee been trained on ppe procedures, that is, what ppe is necessary for a job task, when they need it, and how to properly adjust it?

Are protective goggles or face shields provided and worn where there is any danger of flying particles or corrosive materials?

Are approved safety glasses required to be worn at all times in areas where there is a risk of eye injuries such as punctures, abrasions, contusions or burns?

Are employees who need corrective lenses (glasses or contacts) in working environments having harmful exposures, required to wear

only approved safety glasses, protective goggles, or use other medically approved precautionary procedures?

Are protective gloves, aprons, shields, or other means provided and required where employees could be cut or where there is reasonably anticipated exposure to corrosive liquids, chemicals, blood, or other potentially infectious materials? See 29 CFR 1910.1030(b) for the definition of "other potentially infectious materials."?

Are hard hats provided and worn where danger of falling objects exists?

Are hard hats inspected periodically for damage to the shell and suspension system?

Is appropriate foot protection required where there is the risk of foot injuries from hot, corrosive, or poisonous substances, falling objects, crushing or penetrating actions?

Are approved respirators provided for regular or emergency use where needed?

Is all-protective equipment maintained in a sanitary condition and ready for use?

Do you have eyewash facilities and a quick drench shower within the work area where employees are exposed to injurious corrosive materials?

Where special equipment is needed for electrical workers, is it available?

Where food or beverages are consumed on the premises, are they consumed in areas where there is no exposure to toxic material, blood, or other potentially infectious materials?

Is protection against the effects of occupational noise exposure provided when sound levels exceed those of the OSHA noise standard?

Are adequate work procedures, protective clothing and equipment provided and used when cleaning up spilled toxic or otherwise hazardous materials or liquids?

Are there appropriate procedures in place for disposing of or decontaminating personal protective equipment contaminated with, or reasonably anticipated to be contaminated with, blood or other potentially infectious materials?

FLAMMABLE AND COMBUSTIBLE MATERIALS

Are combustible scrap, debris, and waste materials oily rags, etc.)? stored in covered metal receptacles and removed from the worksite promptly?

Is proper storage practiced to minimize the risk of fire including spontaneous combustion?

Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?

Are all connections on drums and combustible liquid piping, vapor and liquid tight?

Are all flammable liquids kept in closed containers when not in use (for example, parts cleaning tanks, pans, etc.)?

Are bulk drums of flammable liquids grounded and bonded to containers during dispensing?

Do storage rooms for flammable and combustible liquids have explosion-proof lights?
Do storage rooms for flammable and combustible liquids have mechanical or gravity ventilation?

Is liquefied petroleum gas stored, handled, and used in accordance with safe practices and standards?

Are "NO SMOKING" signs posted on liquefied petroleum gas tank?

Are liquefied petroleum storage tanks guarded to prevent damage from vehicles?

Are all solvent wastes and flammable liquids kept in fire-resistant, covered containers until they are removed from the worksite?

Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?
Are firm separators placed between containers of combustibles or flammables, when stacked one upon another, to assure their support and stability?

Are fuel gas cylinders and oxygen cylinders separated by distance, and fire-resistant barriers, while in storage?

Are fire extinguishers selected and provided for the types of materials in areas where they are to be used?

Class A Ordinary combustible material fires.

Class B Flammable liquid, gas or grease fires.

Class C Energized-electrical equipment fires.

Are appropriate fire extinguishers mounted within 75 feet of outside areas containing flammable liquids, and within 10 feet of any inside storage area for such materials?

Are extinguishers free from obstructions or blockage?

Are all extinguishers serviced, maintained and tagged at intervals not to exceed 1 year?

Are all extinguishers fully charged and in their designated places?
Where sprinkler systems are permanently installed, are the nozzle heads so directed or arranged that water will not be sprayed into operating electrical switch boards and equipment?

Are "NO SMOKING" signs posted where appropriate in areas where flammable or combustible materials are used or stored?

Are safety cans used for dispensing flammable or combustible liquids at a point of use?

Are all spills of flammable or combustible liquids cleaned up promptly?

Are storage tanks adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmosphere temperature changes?

Are storage tanks equipped with emergency venting that will relieve excessive internal pressure caused by fire exposure?

Are "NO SMOKING" rules enforced in areas involving storage and use of hazardous materials?

HAND AND PORTABLE POWERED TOOLS

Hand Tools and Equipment

Are all tools and equipment (both company and employee owned) used by employees at their workplace in good condition?

Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?

Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?

Are worn or bent wrenches replaced regularly?

Are appropriate handles used on files and similar tools?
Are employees made aware of the hazards caused by faulty or improperly used hand tools?

Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment, which might produce flying materials, or be subject to breakage?

Are jacks checked periodically to ensure they are in good operating condition?

Are tool handles wedged tightly in the head of all tools?

Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?

Are tools stored in dry, secure locations where they won't be tampered with?

Is eye and face protection used when driving hardened or tempered spuds or nails?

Portable (Power Operated) Tools and Equipment

Are grinders, saws and similar equipment provided with appropriate safety guards?

Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?

Are portable circular saws equipped with guards above and below the base shoe? Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded? Are rotating or moving parts of equipment guarded to prevent physical contact?

Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?
Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?

Are portable fans provided with full guards or screens having openings ½ inch or less?

Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?

Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?

Are pneumatic and hydraulic hoses on power-operated tools checked regularly for deterioration or damage?

Powder-Actuated Tools Are employees who operate powder-actuated tools trained in their use and carry a valid operator's card?

Is each powder-actuated tool stored in its own locked container when not being used?

Is a sign at least 7 inches by 10 inches with bold face type reading "POWDER-ACTUATED TOOL IN USE" conspicuously posted when the tool is being used?

Are powder-actuated tools left unloaded until they are actually ready to be used?
Are powder-actuated tools inspected for obstructions or defects each day before use?

Do powder-actuated tool operators have and use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors?

LOCKOUT/TAGOUT PROCEDURES

Is all machinery or equipment capable of movement, required to be de-energized or disengaged and locked-out during cleaning, servicing, adjusting or setting up operations, whenever required?
Where the power disconnecting means for equipment does not also disconnect the electrical control circuit:
Are the appropriate electrical enclosures identified?
Is means provided to assure the control circuit can also be disconnected and locked-out?

Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?

Are all equipment control valve handles provided with a means for locking-out?
Does the lock-out procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is locked-out for repairs?

Are appropriate employees provided with individually keyed personal safety locks?

Are employees required to keep personal control of their key(s) while they have safety locks in use?

Is it required that only the employee exposed to the hazard, place or remove the safety lock?

Is it required that employees check the safety of the lock-out by attempting a startup after making sure no one is exposed?

Are employees instructed to always push the control circuit stop button immediately after checking the safety of the lock-out?

Is there a means provided to identify any or all employees who are working on locked-out equipment by their locks or accompanying tags?

Are a sufficient number of accident preventive signs or tags and safety padlocks provided for any reasonably foreseeable repair emergency?

When machine operations, configuration or size requires the operator to leave his or her control station to install tools or perform other operations, and that part of the machine could move if accidentally activated, is such element required to be separately locked or blocked out?
In the event that equipment or lines cannot be shut down, locked-out and tagged, is a safe job procedure established and rigidly followed?

CONFINED SPACES

Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?

Are all lines to a confined space, containing inert, toxic, flammable, or corrosive materials valved off and blanked or disconnected and separated before entry?

Are all impellers, agitators, or other moving parts and equipment inside confined spaces locked-out if they present a hazard?

Is either natural or mechanical ventilation provided prior to confined space entry?
Are appropriate atmospheric tests performed to check for oxygen deficiency, toxic substances and explosive concentrations in the confined space before entry?

Is adequate illumination provided for the work to be performed in the confined space?

Is the atmosphere inside the confined space frequently tested or continuously monitored during conduct of work?

Is there an assigned safety standby employee outside of the confined space. when required, whose sole responsibility is to watch the work in progress, sound an alarm if necessary, and render assistance?

Is the standby employee appropriately trained and equipped to handle an emergency?

Is the standby employee or other employees prohibited from entering the confined space without lifelines and respiratory equipment if there is any question as to the cause of an emergency?

Is approved respiratory equipment required if the atmosphere inside the confined space cannot be made acceptable?

Is all portable electrical equipment used inside confined spaces either grounded and insulated, or equipped with ground fault protection?

Before gas welding or burning is started in a confined space, are hoses checked for leaks, compressed gas bottles forbidden inside of the confined space, torches lighted only outside of the confined area and the confined area tested for an explosive atmosphere each time before a lighted torch is to be taken into the confined space?

If employees will be using oxygen-consuming equipment-such as salamanders, torches, and furnaces, in a confined space-is sufficient air provided to assure combustion without reducing the oxygen concentration of the atmosphere below 19.5 percent by volume?

Whenever combustion-type equipment is used in a confined space, are provisions made to ensure the exhaust gases are vented outside of the enclosure?

Is each confined space checked for decaying vegetation or animal matter which may produce methane?

Is the confined space checked for possible industrial waste, which could contain toxic properties?

If the confined space is below the ground and near areas where motor vehicles will be operating, is it possible for vehicle exhaust or carbon monoxide to enter the space?

ELECTRICAL

Do you specify compliance with OSHA for all contract electrical work?

Are all employees required to report as soon as practicable any obvious hazard to life or property observed in connection with electrical equipment or lines?

Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?

When electrical equipment or lines are to be serviced, maintained or adjusted, are necessary switches opened, locked-out and tagged whenever possible?

Are portable electrical tools and equipment grounded or of the double insulated type?

Are electrical appliances such as vacuum cleaners, polishers, and vending machines grounded?

Do extension cords being used have a grounding conductor?

Are multiple plug adaptors prohibited?

Are ground-fault circuit interrupters installed on each temporary 15 or 20 ampere, 120 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed?

Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?

Do you have electrical installations in hazardous dust or vapor areas? If so, do they meet the National Electrical Code (NEC) for hazardous locations?

Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?
Are flexible cords and cables free of splices or taps?

Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, etc., and is the cord jacket securely held in place? Are all cord, cable and raceway onnections intact and secure?

In wet or damp locations, are electrical tools and equipment appropriate for the use or location or otherwise protected?

Is the location of electrical power lines and cables (overhead, underground, underfloor, other side of walls) determined before digging, drilling or similar work is begun?

Are metal measuring tapes, ropes, handlines or similar devices with metallic thread woven into the fabric prohibited where they could come in contact with energized parts of equipment or circuit conductors?

Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures or circuit conductors?

Are all disconnecting switches and circuit breakers labeled to indicate their use or equipment served?

Are disconnecting means always opened before fuses are replaced?

Do all interior wiring systems include provisions for grounding metal parts of electrical raceways, equipment and enclosures?

Are all electrical raceways and enclosures securely fastened in place?

Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?

Is sufficient access and working space provided and maintained about all electrical equipment to permit ready and safe operations and maintenance?

Are all unused openings (including conduit knockouts) in electrical enclosures and fittings closed with appropriate covers, plugs or plates?
Are electrical enclosures such as switches, receptacles, and junction boxes, provided with tightfitting covers or plates?

Are disconnecting switches for electrical motors in excess of two horsepower, capable of opening the circuit when the motor is in a stalled condition, without exploding? (Switches must be horsepower rated equal to or in excess of the motor hp rating.)
Is low voltage protection provided in the control device of motors driving machines or equipment which could cause probable injury from inadvertent starting?

Is each motor disconnecting switch or circuit breaker located within sight of the motor control device?

Is each motor located within sight of its controller or the

controller disconnecting means capable of being locked in the open position or is a separate disconnecting means installed in the circuit within sight of the motor?

Is the controller for each motor in excess of two horsepower, rated in horsepower equal to or in excess of the rating of the motor it serves?

Are employees who regularly work on or around energized electrical equipment or lines instructed in the cardiopulmonary resuscitation (CPR) methods?

Are employees prohibited from working alone on energized lines or equipment over 600 volts?

WALKING-WORKING SURFACES

General Work Environment

Is a documented, functioning housekeeping program in place?

Are all worksites clean, sanitary, and orderly?

Are work surfaces kept dry or are appropriate means taken to assure the surfaces are slip-resistant?

Are all spilled hazardous materials or liquids, including blood and other potentially infectious materials, cleaned up immediately and according to proper procedures?

Is combustible scrap, debris and waste stored safely and removed from the worksite properly?

Is all regulated waste, as defined in the OSHA bloodborne pathogens standard (1910.1030), discarded according to federal, state, and local regulations?

Are accumulations of combustible dust routinely removed from elevated surfaces including the overhead structure of buildings, etc.?

Is combustible dust cleaned up with a vacuum system to prevent the dust from going into suspension?
Is metallic or conductive dust prevented from entering or accumulating on or around electrical enclosures or equipment?

Are covered metal waste cans used for oily and paint-soaked waste?

Walkways

Are aisles and passageways kept clear?

Are aisles and walkways marked as appropriate?

Are wet surfaces covered with non-slip materials?

Are holes in the floor, sidewalk or other walking surface repaired properly, covered or otherwise made safe?

Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?

Are materials or equipment stored in such a way that sharp projectives will not interfere with the walkway?

Are spilled materials cleaned up immediately?

Are changes of direction or elevation readily identifiable?

Are aisles or walkways that pass near moving or operating machinery, welding operations or similar operations arranged so employees will not be subjected to potential hazards?

Is adequate headroom provided for the entire length of any aisle or walkway?
Are standard guardrails provided wherever aisle or walkway surfaces are elevated more than 30 inches above any adjacent floor or the ground?

Are bridges provided over conveyors and similar hazards?
Floor and Wall Openings Are floor openings guarded by a cover, a guardrail, or equivalent on all sides (except at entrance to stairways or ladders)?

Are toeboards installed around the edges of permanent floor openings (where persons may pass below the opening)?

Are skylight screens of such construction and mounting that they will withstand a load of at least 200 pounds?

Is the glass in the windows, doors, glass walls, etc., which are subject to human impact, of sufficient thickness and type for the condition of use?
Are grates or similar type covers over floor openings such as floor drains of such design that foot traffic or rolling equipment will not be affected by the grate spacing?

Are unused portions of service pits and pits not actually in use either covered or protected by guardrails or equivalent?

Are manhole covers, trench covers and similar covers, plus their supports designed to carry a truck rear axle load of at least 20,000 pounds when located in roadways and subject to vehicle traffic?

Are floor or wall openings in fire resistive construction provided with doors or covers compatible with the fire rating of the structure and provided with a self-closing feature when appropriate?

Stairs and Stairways

Are standard stair rails or handrails on all stairways having four or more risers?

Are all stairways at least 22 inches wide?

Do stairs have landing platforms not less than 30 inches in the direction of travel and extend 22 inches in width at every 12 feet or less of vertical rise?

Do stairs angle no more than 50 and no less than 30 degrees?
Are step risers on stairs uniform from top to bottom?

Are steps on stairs and stairways designed or provided with a surface that renders them slip resistant?

Are stairway handrails located between 30 and 34 inches above the leading edge of stair treads?
Do stairway handrails have at least 3 inches of clearance between the handrails and the wall or surface they are mounted on?

Where doors or gates open directly on a stairway, is there a platform provided so the swing of the door does not reduce the width of the platform to less than 21 inches?

Where stairs or stairways exit directly into any area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees stepping into the path of traffic?

Do stairway landings have a dimension measured in the direction of travel, at least equal to the width of the stairway?

Elevated Surfaces

Are signs posted, when appropriate, showing the elevated surface load capacity?

Are surfaces elevated more than 30 inches above the floor or ground provided with standard guardrails?

Are all elevated surfaces (beneath which people or machinery could be exposed to falling objects) provided with standard 4-inch toeboards?

Is a permanent means of access and egress provided to elevated storage and work surfaces?
Is required headroom provided where necessary?

Is material on elevated surfaces piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading?

Are dock boards or bridge plates used when transferring materials between docks and trucks or rail cars?

HAZARD COMMUNICATION

Is there a list of hazardous substances used in your workplace?

Is there a written hazard communication program dealing with Material Safety Data Sheets (MSDS), labeling, and employee training?

Is each container for a hazardous substance (i.e., vats, bottles, storage tanks, etc.) labeled with product identity and a hazard warning (communication of the specific health hazards and physical hazards)?
Is there a Material Safety Data Sheet readily available for each hazardous substance used?

Is there an employee-training program for hazardous substances?

Does this program include:

- **An explanation of what an MSDS is and how to use and obtain one?**

- **MSDS contents for each hazardous substance or class of substances?**

- **Explanation of "Right to Know?"**

- **Identification of where an employee can see the employers written hazard communication program and where hazardous substances are present in their work areas?**

- **The physical and health hazards of substances in the work area, and specific protective measures to be used?**

Details of the hazard communication program, including how to use the labeling system and MSDS's?

Are employees trained in the following:

How to recognize tasks that might result in occupational exposure?

How to use work practice and engineering controls and personal protective equipment and to know their limitations?

How to obtain information on the types selection, proper use, location, removal handling, decontamination, and disposal of personal protective equipment?

Who to contact and what to do in an emergency?

Disclaimer:

The above checklists are by no means all-inclusive. You should add to them or delete portions or items that do not apply to your operations; however, carefully consider each item as you come to it and then make your decision. You will also need to refer to OSHA standards for complete and specific standards that may apply to your situation. (NOTE: These checklists are typical for general industry but not for construction or maritime.)

Source: OSHA Office of Training and Education, May 1997
www.osha.gov

APPENDIX D

SAMPLE ACCIDENT INVESTIGATION FORM

SAMPLE ACCIDENT INVESTIGATION FORM

Employer_____

Person(s) Conducting Investigation_____

Title(s)_____

Date of Accident/Injury/Illness_____

Name(s) of Affected Employee(s)_____

Work Area/Job Title of Affected Employee(s)_____

Nature of Accident/Injury/Illness_____

Part(s) of Body Affected_____
_____

What Workplace Condition, Work Practice or Protective Equipment Contributed to the Incident_____

Was a Protocol of Safe Practice Violated?_____

If So, Which One?_____

What Corrective Actions Will Prevent Another Occurrence?_____

Will an Additional Protocol of Safe Practice Be Needed?_____
If So, State It_____

Was the Unsafe Condition, Practice or Protective Equipment Problem corrected?_____

Until Corrected, What Actions Have Been Taken to Prevent Recurrence in the Interim?_____

Source: www.dir.ca.gov/DOSH/WorkersPage.htm

APPENDIX E

SAMPLE TRAINING DOCUMENTATION FORM

SAMPLE - DEPARTMENT SAFETY TRAINING IS PROVIDED INITIALLY OR IN THE FOLLOWING CIRCUMSTANCES:

- ☐ **Initial training for all current employees upon establishment of this employer's program or prior to July 1, 1991.**
- ☐ **New employees are provided initial training upon hiring prior to assignment.**
- ☐ **Employees are provided training when assigned to a new task for which training has not been received.**
- ☐ **Supervisors are trained on hazards and safe practices in their area of responsibility.**
- ☐ **Training includes general area safety and specific assignment or job title training, and the potential occupational safety and health hazards and the Code of Safe Practices for the area.**
- ☐ **Documentation of training is maintained on Form IV(a) for individual initial training and/or Form IV(b) for group training sessions. This documentation is maintained at the following location(s): _____**
- ☐ **Refresher training is provided at the following frequency**

OR

- ☐ **Equally effective alternative training has been provided in the manner described below or on the attached page (include EH&S required courses)**

SAMPLE INITIAL SAFETY TRAINING DOCUMENTATION
EMPLOYEE TRAINING SIGN-UP SHEET

Date

Name of Trainer
Subject(s) Covered

Training Aids Used

Work Location/Job Safety Class(es) Included

Attenders (Please print and sign your name legibly.) (Use additional sheets if necessary.)

Print Signature

SAMPLE INDIVIDUAL EMPLOYEE TRAINING DOCUMENTATION
INITIAL TRAINING

Name of Trainer

Training Subject

Training Materials Used

Name of Employee

Date of Hire/Assignment

I, hereby certify that I received training as described above in the following areas:

- ☐ **The potential occupational hazards in general in the work area and associated with my job assignment.**
- ☐ **The safe work practices which indicate the work conditions, practices, and personal protective equipment required for my job title.**
- ☐ **The hazards of any chemicals to which I may be exposed and my right to information contained on material safety data sheets for those chemicals, and how to understand this information.**
- ☐ **My right to ask any questions, or provide any information to the employer on safety either directly or anonymously without any fear of reprisal.**
- ☐ **Disciplinary procedures the employer will use to enforce compliance with safe work practices.**

I understand this training and agree to comply with safe work practices for my work area.

_____

Employee Signature Date

Source: **www.dir.ca.gov/DOSH/WorkersPage.htm**

APPENDIX F

BLS WORKPLACE INJURIES AND ILLNESSES FOR 1997, 1998, 1999, AND 2000

News United States Department of Labor

Bureau of Labor Statistics Washington, D.C. 20212

Technical information: (202) 606-6179
Media information: (202) 606-5902
Internet address: http://stats.bls.gov/oshhome.htm

USDL 98-494
For release: 10 A.M. EST
Thursday, December 17, 1998

WORKPLACE INJURIES AND ILLNESSES IN 1997

A total of 6.1 million injuries and illnesses were reported in private industry workplaces during 1997, resulting in a rate of 7.1 cases per 100 equivalent full-time workers, according to a survey by the Bureau of Labor Statistics, U.S. Department of Labor. The number of cases was about the same as in 1996, although hours worked increased 3 percent. As a result, the case rate declined from 7.4 in 1996 to 7.1 in 1997. The rate for 1997 was the lowest since the Bureau began reporting this information in the early 1970s. (See "Background of the Survey" section for a discussion of the factors that can influence rate changes from one survey to the next.)

The following tabulation on incidence rates for injuries and illnesses shows the decline in rates per 100 full-time workers since 1993:

	1993	*1994*	*1995*	*1996*	*1997*
Private industry	8.5	8.4	8.1	7.4	7.1
Goods-producing	11.9	11.9	11.2	10.2	9.9
Service-producing	7.1	6.9	6.7	6.2	5.9

Among goods-producing industries, manufacturing had the highest incidence rate in 1997 (10.3 cases per 100 full-time workers). (See chart 1 and table 1.) Within the service-producing sector, the highest incidence rate was reported for transportation and public utilities (8.2 cases per 100 full-time workers), followed by wholesale and retail trade (6.7 cases per 100 workers).

This release is the second in a series of three releases covering 1997 from the BLS safety and health statistical series. The first release, in August 1998, covered work-related fatalities from the 1997 National Census of Fatal Occupational Injuries. In April 1999, a third release will provide details on the more seriously injured and ill workers (occupation, age, gender, race, and length of service) and on the circumstances of their injuries and illnesses (nature of the disabling condition, part of body affected, event or exposure, and primary source producing the disability). "More seriously" is defined in this survey as involving days away from work.

Lost workday cases

About 2.9 million injuries and illnesses in 1997 were lost workday cases, that is, they required recuperation away from work or restricted duties at work, or both. (See table 2.) The incidence rate for lost workday cases has declined steadily from 4.1 cases per 100 full-time workers in 1990 to 3.3 cases per 100 workers in 1997. (See chart 2.) The rate for cases with days away from work has declined for seven years in a row and, at 2.1 cases per 100 full-time workers in 1997, was the lowest on record. By contrast, the rate for cases involving only restricted work activity rose from 0.7 cases per 100 workers in 1990 to 1.2 cases in 1997. (See chart 3.) The latter types of cases may involve shortened hours, a temporary job change, or temporary restrictions on certain duties (for example, no heavy lifting) of a worker's regular job. In 1997, the rates in manufacturing for days-away-from-work cases and restricted-activity-only cases were the same (2.4 per 100 full-time workers); in all other divisions, the rate for days-away-from-work cases was higher than the rate for restricted-activity-only cases.

Chart 3. Lost workday case incidence rates, injuries and illnesses, 1976-97

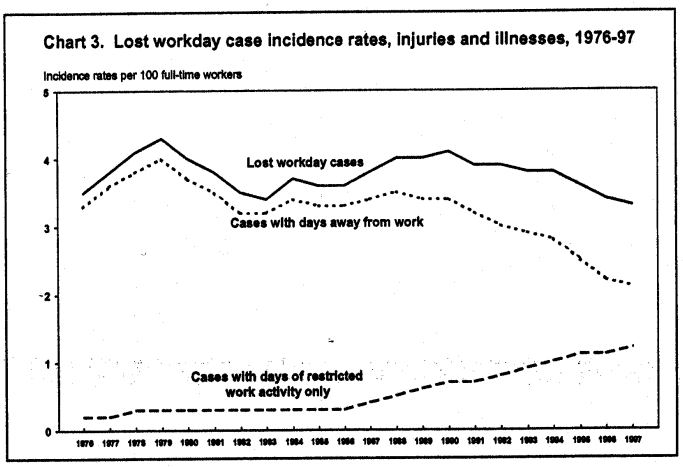

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and selected case types, 1997— Continued

Industry[2]	SIC code[3]	1997 Annual average employment[4] (000's)	Injuries and illnesses				Injuries			
			Total cases	Lost workday cases		Cases without lost workdays	Total cases	Lost workday cases		Cases without lost workdays
				Total[5]	With days away from work[5]			Total[5]	With days away from work[5]	
Offices and clinics of dentists	802	630.6	1.8	0.3	0.3	1.8	1.8	0.3	0.3	1.5
Offices of osteopathic physicians	803	49.0	.6	.1	.1	.5	.6	.1	.1	.5
Offices of other health practitioners	804	435.5	2.4	.8	.6	1.6	1.9	.7	.5	1.2
Nursing and personal care facilities	805	1,745.7	16.2	8.8	5.3	7.5	15.9	8.7	5.2	7.3
Hospitals	806	3,824.3	10.0	4.0	2.9	6.0	9.2	3.9	2.8	5.4
Medical and dental laboratories	807	196.7	3.8	1.5	1.2	2.3	3.3	1.4	1.1	1.9
Home health care services	808	708.8	8.9	4.5	3.5	4.3	8.5	4.5	3.4	4.1
Health and allied services, n.e.c.	809	328.6	6.7	2.5	1.7	4.2	6.2	2.3	1.5	3.9
Legal services	81	947.9	.8	.3	.3	.5	.7	.3	.2	.5
Educational services	82	1,532.0	2.9	1.1	.9	1.8	2.7	1.1	.9	1.6
Elementary and secondary schools	821	429.9	2.6	1.2	1.0	1.5	2.6	1.1	1.0	1.5
Colleges and universities	822	842.1	3.4	1.3	1.0	2.1	3.2	1.2	.9	1.9
Libraries	823	22.5	1.6	1.3	1.3	.2	1.6	1.3	1.3	.2
Vocational schools	824	83.0	1.2	.6	.5	.6	1.2	.6	.5	.6
Schools and educational services, n.e.c.	829	154.8	2.1	.6	.6	1.4	1.8	.6	.5	1.2
Social services	83	2,450.1	6.4	3.0	2.0	3.4	6.2	2.9	2.0	3.3
Individual and family services	832	678.3	4.7	2.1	1.5	2.6	4.6	2.1	1.4	2.5
Job training and related services	833	275.3	9.7	4.8	2.7	4.9	9.1	4.5	2.5	4.6
Child day care services	835	576.6	3.0	1.1	.8	1.9	2.7	1.0	.8	1.7
Residential care	836	716.5	9.9	4.8	3.4	5.1	9.8	4.7	3.4	5.0
Social services, n.e.c.	839	203.4	3.8	1.6	1.3	2.2	3.6	1.5	1.2	2.1
Museums, botanical, zoological gardens	84	89.2	7.4	3.4	2.4	4.0	7.0	3.2	2.3	3.8
Museums and art galleries	841	67.7	6.0	2.2	1.5	3.7	5.6	2.1	1.4	3.5
Botanical and zoological gardens	842	21.5	11.1	6.4	4.7	4.7	10.7	6.3	4.7	4.5
Membership organizations	86	1,003.2	3.4	1.3	1.1	2.1	3.2	1.2	1.0	2.0
Business associations	861	107.8	2.0	1.2	1.0	.8	1.5	.8	.8	.7
Labor organizations	863	142.3	1.2	.7	.7	.5	1.1	.7	.6	.5
Civic and social associations	864	483.7	4.9	1.7	1.4	3.2	4.7	1.6	1.3	3.1
Religious organizations	866	131.7	2.5	.9	.7	1.7	2.5	.9	.7	1.6
Membership organizations, n.e.c.	869	72.8	4.3	1.5	1.1	2.8	4.1	1.5	1.0	2.7
Engineering and management services	87	3,002.2	1.9	.8	.5	1.1	1.7	.7	.5	1.0
Engineering and architectural services	871	870.7	1.7	.7	.6	1.0	1.6	.7	.6	1.0
Accounting, auditing, and bookkeeping	872	597.6	.7	.3	.2	.4	.6	.2	.2	.4
Research and testing services	873	586.7	2.4	1.0	.6	1.4	2.1	.9	.6	1.2
Management and public relations	874	947.2	2.5	1.1	.6	1.4	2.3	1.0	.5	1.3
Services, n.e.c.	89	49.6	1.3	.8	.7	–	1.2	.8	.7	–

[1] The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where

N = number of injuries and illnesses
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year).

[2] Totals include data for industries not shown separately.
[3] *Standard Industrial Classification Manual*, 1987 Edition.
[4] Employment is expressed as an annual average and is derived primarily from the BLS-State Covered Employment and Wages program. Employment for private households (SIC 88) is excluded.
[5] Total lost workday cases involve days away from work, or days of restricted work activity, or both.
[6] Days-away-from-work cases include those which result in days away from work with or without restricted work activity.
[7] Excludes farms with fewer than 11 employees.
[8] Data conforming to OSHA definitions for mining operators in coal, metal, and nonmetal mining and for employers in railroad transportation are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor; and the Federal Railroad Administration, U.S. Department of Transportation. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries.
[9] Incidence rate less than 0.05.

NOTE: Because of rounding, components may not add to totals.
n.e.c. = not elsewhere classified.
– Indicates data not available.

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor
January 1999 - Updated from December 1998 to reflect additional published estimates.

News United States Department of Labor

Bureau of Labor Statistics Washington, D.C. 20212

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WORKPLACE INJURIES AND ILLNESSES IN 1998

A total of 5.9 million injuries and illnesses were reported in private industry workplaces during 1998, resulting in a rate of 6.7 cases per 100 equivalent full-time workers, according to a survey by the Bureau of Labor Statistics, U.S. Department of Labor. Employers reported a 4 percent drop in the number of cases and a 3 percent increase in the hours worked compared with 1997, reducing the case rate from 7.1 in 1997 to 6.7 in 1998. The rate for 1998 was the lowest since the Bureau began reporting this information in the early 1970s. (See "Background of the Survey" section for a discussion of the factors that can influence rate changes from one survey to the next.)

The following tabulation on incidence rates for injuries and illnesses shows the decline in rates per 100 full-time workers since 1994:

	1994	*1995*	*1996*	*1997*	*1998*
Private industry	8.4	8.1	7.4	7.1	6.7
Goods-producing	11.9	11.2	10.2	9.9	9.3
Service-producing	6.9	6.7	6.2	5.9	5.6

Among goods-producing industries, manufacturing had the highest incidence rate in 1998 (9.7 cases per 100 full-time workers). (See chart 1 and table 1.) Within the service-producing sector, the highest incidence rate was reported for transportation and public utilities (7.3 cases per 100 full-time workers), followed by wholesale and retail trade (6.5 cases per 100 workers).

This release is the second in a series of three releases covering 1998 from the BLS safety and health statistical series. The first release, in August 1999, covered work-related fatalities from the 1998 National Census of Fatal Occupational Injuries. In April 2000, a third release will provide details on the more seriously injured and ill workers (occupation, age, gender, race, and length of service) and on the circumstances of their injuries and illnesses (nature of the disabling condition, part of body affected, event or exposure, and primary source producing the disability). "More seriously" is defined in this survey as involving days away from work.

Lost workday cases

About 2.8 million injuries and illnesses in 1998 were lost workday cases, that is, they required recuperation away from work or restricted duties at work, or both. (See table 2.) The incidence rate for lost workday cases has declined steadily from 4.1 cases per 100 full-time workers in 1990 to 3.1 cases per 100 workers in 1998. (See chart 2.) The rate for cases with days away from work has declined for eight years in a row and, at 2.0 cases per 100 full-time workers in 1998, was the lowest on record. By contrast, the rate for cases involving only restricted work activity rose from 0.7 cases per 100 workers in 1990 to 1.2 cases in 1997 and remained at that level in 1998. (See chart 3.) The latter types of cases may involve shortened hours, a temporary job change, or temporary restrictions on certain duties (for example, no heavy lifting) of a worker's regular job. In 1998, the rate in manufacturing for days-away-from-work cases was lower than the rate for restricted-activity-only cases, 2.3 for days-away-from-work cases and 2.5 for restricted-activity-only cases. In all other divisions, the rate for days-away-from-work cases was higher than the rate for restricted-activity-only cases.

Chart 3. Lost workday case incidence rates, injuries and illnesses, 1976-98

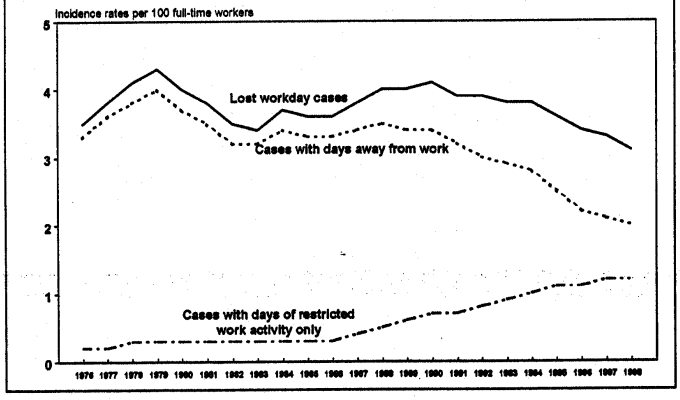

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and selected case types, 1998 — Continued

Industry[2]	SIC code[3]	1998 Annual average employment[4] (000's)	Injuries and illnesses				Injuries			
			Total cases	Lost workday cases		Cases without lost workdays	Total cases	Lost workday cases		Cases without lost workdays
				Total[5]	With days away from work[6]			Total[5]	With days away from work[6]	
Offices of other health practitioners	804	453.0	1.3	0.5	0.4	0.8	1.2	0.5	0.3	0.8
Nursing and personal care facilities	805	1,760.5	14.2	8.1	4.5	6.1	13.8	7.9	4.3	5.9
Hospitals	806	3,898.8	9.2	3.8	2.6	5.4	8.4	3.6	2.5	4.8
Medical and dental laboratories	807	198.1	4.0	1.4	1.0	2.5	3.5	1.2	.9	2.3
Home health care services	808	663.9	8.2	4.3	3.4	3.9	7.8	4.1	3.2	3.7
Health and allied services, n.e.c.	809	337.9	5.5	2.0	1.4	3.5	5.3	2.0	1.3	3.3
Legal services	81	973.7	.8	.4	.3	.4	.8	.3	.2	.4
Educational services	82	1,603.8	3.1	1.2	.9	1.9	3.0	1.2	.9	1.8
Elementary and secondary schools	821	446.5	3.5	1.5	1.2	2.1	3.5	1.4	1.2	2.0
Colleges and universities	822	876.9	3.3	1.2	1.0	2.1	3.1	1.2	.9	1.9
Libraries	823	23.1	2.9	1.5	1.5	1.5	2.8	1.4	1.4	1.5
Vocational schools	824	86.8	.9	.2	.2	.7	.9	.2	.1	.7
Schools and educational services, n.e.c.	829	170.5	2.4	1.0	.5	1.4	2.2	.9	.5	1.3
Social services	83	2,571.2	6.4	2.9	2.0	3.5	6.2	2.8	1.9	3.4
Individual and family services	832	713.6	4.9	2.2	1.7	2.7	4.7	2.1	1.6	2.6
Job training and related services	833	283.5	9.9	4.4	2.4	5.5	9.6	4.2	2.3	5.4
Child day care services	835	608.9	3.1	1.2	1.0	1.9	3.0	1.1	1.0	1.9
Residential care	836	754.4	9.8	4.6	3.0	5.2	9.6	4.5	2.9	5.1
Social services, n.e.c.	839	210.9	3.4	1.5	1.1	1.9	3.4	1.5	1.1	1.9
Museums, botanical, zoological gardens	84	93.0	8.1	4.5	2.0	3.6	7.8	4.4	2.0	3.4
Museums and art galleries	841	70.1	5.9	2.7	1.8	3.2	5.7	2.6	1.8	3.1
Botanical and zoological gardens	842	23.0	13.7	9.1	2.6	4.7	13.3	9.0	2.5	4.3
Membership organizations	86	1,030.0	2.9	1.1	.9	1.8	2.8	1.0	.8	1.7
Professional organizations	862	61.6	1.6	.1	.1	1.6	1.6	.1	.1	1.5
Labor organizations	863	142.3	.8	.3	.3	.4	.6	.2	.1	.4
Civic and social associations	864	499.2	4.5	1.6	1.3	2.8	4.3	1.5	1.2	2.7
Religious organizations	866	135.3	2.2	1.1	.9	1.1	2.2	1.1	.9	1.1
Membership organizations, n.e.c.	869	75.2	2.8	1.0	.8	1.8	2.6	.9	.5	1.8
Engineering and management services	87	3,170.3	2.1	.8	.5	1.3	1.9	.7	.5	1.2
Engineering and architectural services	871	911.2	2.0	.6	.5	1.4	1.9	.6	.5	1.3
Accounting, auditing, and bookkeeping	872	626.8	.7	.3	.2	.4	.7	.3	.2	.4
Research and testing services	873	610.0	2.5	1.0	.5	1.5	2.2	.9	.5	1.3
Management and public relations	874	1,022.3	2.7	1.0	.8	1.7	2.6	1.0	.7	1.6

[1] The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where

N = number of injuries and illnesses
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year).

[2] Totals include data for industries not shown separately.

[3] *Standard Industrial Classification Manual*, 1987 Edition.

[4] Employment is expressed as an annual average and is derived primarily from the BLS-State Covered Employment and Wages program. Employment for private households (SIC 88) is excluded.

[5] Total lost workday cases involve days away from work, or days of restricted work activity, or both.

[6] Days-away-from-work cases include those which result in days away from work with or without restricted work activity.

[7] Excludes farms with fewer than 11 employees.

[8] Data conforming to OSHA definitions for mining operators in coal, metal, and nonmetal mining and for employers in railroad transportation are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor; and the Federal Railroad Administration, U.S. Department of Transportation. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries.

[9] Incidence rate less than 0.05.

NOTE: Because of rounding, components may not add to totals.
n.e.c. = not elsewhere classified.
– Indicates data not available.

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor
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WORKPLACE INJURIES AND ILLNESSES IN 1999

A total of 5.7 million injuries and illnesses were reported in private industry workplaces during 1999, resulting in a rate of 6.3 cases per 100 equivalent full-time workers, according to a survey by the Bureau of Labor Statistics, U.S. Department of Labor. Employers reported a 4 percent drop in the number of cases and a 2 percent increase in the hours worked compared with 1998, reducing the case rate from 6.7 in 1998 to 6.3 in 1999. The rate for 1999 was the lowest since the Bureau began reporting this information in the early 1970s. (See "Background of the Survey" section for a discussion of the factors that can influence rate changes from one survey to the next.)

The following tabulation on incidence rates for injuries and illnesses shows the decline in rates per 100 full-time workers since 1994:

	1994	*1995*	*1996*	*1997*	*1998*	*1999*
Private industry	8.4	8.1	7.4	7.1	6.7	6.3
Goods-producing	11.9	11.2	10.2	9.9	9.3	8.9
Service-producing	6.9	6.7	6.2	5.9	5.6	5.3

Among goods-producing industries, manufacturing had the highest incidence rate in 1999 (9.2 cases per 100 full-time workers). (See chart 1 and table 1.) Within the service-producing sector, the highest incidence rate was reported for transportation and public utilities (7.3 cases per 100 full-time workers), followed by wholesale and retail trade (6.1 cases per 100 workers).

This release is the second in a series of three releases covering 1999 from the BLS safety and health statistical series. The first release, in August 2000, covered work-related fatalities from the 1999 National Census of Fatal Occupational Injuries. In April 2001, a third release will provide details on the more seriously injured and ill workers (occupation, age, gender, race, and length of service) and on the circumstances of their injuries and illnesses (nature of the disabling condition, part of body affected, event or exposure, and primary source producing the disability). "More seriously" is defined in this survey as involving days away from work.

Case types

Of the 5.7 million total injuries and illnesses reported in 1999, about 2.7 million were lost workday cases, that is, they required recuperation away from work or restricted duties at work, or both. (See table 2.) The remaining 3 million were cases without lost workdays. The incidence rate for both types of cases declined from 1998 to 1999. For lost workday cases, the rate declined from 3.1 cases per 100 workers to 3.0 cases per 100 workers, and, for cases without lost workdays, the rate decreased from 3.5 cases per 100 workers to 3.3 cases per 100 workers.

Lost workday cases are comprised of two case types, those requiring at least one day away from work, with or without restricted work activity, and those requiring restricted activity only. The latter type of case may involve shortened hours, a temporary job change, or temporary restrictions on certain duties (for example, no heavy lifting) of a worker's regular job. At 1.9 cases per 100 workers in 1999, the rate for cases with days away from work declined from 2.0 in 1998 and was the lowest on record. (See chart 2.) In contrast to the decreases posted by all the other major case types in 1999, the rate for cases involving restricted activity only remained at its 1998 level, 1.2 cases per 100 employees. (See chart 3.) In 1999, the rate in manufacturing for restricted-activity-only cases (2.4) was higher than the rate for days-away-from-work cases (2.2). In all other divisions, the rate for days-away-from-work cases was higher than the rate for restricted-activity-only cases.

Chart 3. Lost workday case incidence rates, injuries and illnesses, 1981-99

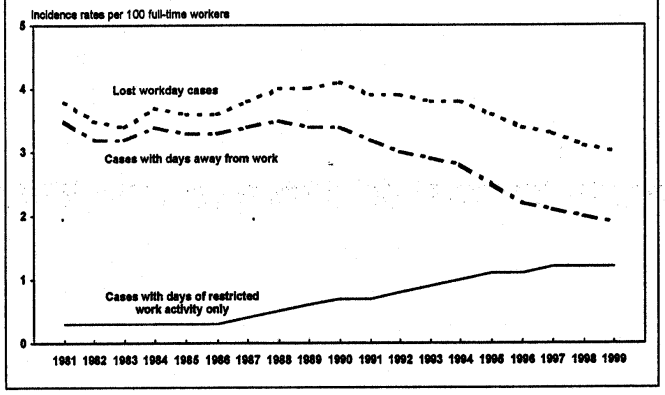

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and selected case types, 1999 — Continued

Industry[2]	SIC code[3]	1999 Annual average employment[4] (000s)	Injuries and illnesses				Injuries			
			Total cases	Lost workday cases		Cases without lost workdays	Total cases	Lost workday cases		Cases without lost workdays
				Total[5]	With days away from work[5]			Total[5]	With days away from work[5]	
Services		36,374.0	4.9	2.2	1.5	2.6	4.6	2.1	1.4	2.5
Hotels and other lodging places	70	1,835.8	7.8	3.7	2.1	4.1	7.5	3.6	2.0	3.9
Hotels and motels	701	1,772.0	7.8	3.8	2.1	4.1	7.6	3.6	2.0	3.9
Camps and recreational vehicle parks	703	46.2	3.5	1.2	.9	2.3	3.3	1.1	.9	2.2
Personal services	72	1,226.1	3.0	1.6	1.0	1.4	2.8	1.5	1.0	1.3
Laundry, cleaning, and garment services	721	443.9	5.4	3.0	1.8	2.4	5.2	2.9	1.7	2.3
Photographic studios, portrait	722	66.8	2.7	1.1	.8	1.5	2.6	1.1	.8	1.5
Beauty shops	723	415.0	.9	.4	.4	.5	.8	.4	.4	.4
Funeral service and crematories	726	100.5	1.8	.8	.5	1.1	1.5	.6	.5	.9
Miscellaneous personal services	729	185.2	1.4	.8	.8	.5	1.3	.8	.7	.5
Business services	73	9,248.0	3.0	1.4	.9	1.6	2.8	1.3	.9	1.6
Credit reporting and collection	732	151.4	.9	.3	.3	.6	.8	.3	.2	.5
Mailing, reproduction, stenographic	733	319.7	2.4	1.0	.6	1.4	2.4	1.0	.6	1.4
Services to buildings	734	980.0	5.7	2.8	2.2	2.9	5.6	2.8	2.1	2.8
Miscellaneous equipment rental and leasing	735	270.8	7.0	3.6	2.3	3.3	6.9	3.6	2.3	3.2
Personnel supply services	736	3,588.6	3.7	1.5	1.0	2.1	3.5	1.5	1.0	2.1
Computer and data processing services	737	1,843.5	.9	.4	.3	.5	.8	.3	.2	.5
Miscellaneous business services	738	1,811.3	3.7	1.6	1.1	2.1	3.5	1.5	1.0	2.0
Auto repair, services, and parking	75	1,192.9	6.1	2.9	2.3	3.2	5.9	2.8	2.3	3.1
Automotive rentals, no drivers	751	209.6	5.9	2.6	1.8	3.3	5.6	2.6	1.7	3.2
Automobile parking	752	77.4	3.4	1.7	1.3	1.7	3.2	1.6	1.2	1.6
Automotive repair shops	753	656.7	5.1	2.0	1.6	3.1	5.1	2.0	1.6	3.1
Miscellaneous repair services	76	375.7	5.2	2.6	1.8	2.6	5.1	2.5	1.8	2.5
Electrical repair shops	762	110.3	4.8	2.2	1.6	2.6	4.7	2.1	1.6	2.6
Reupholstery and furniture repair	764	23.1	2.4	1.6	.7	.8	2.3	1.5	.7	.8
Miscellaneous repair shops	769	236.4	5.8	3.0	2.1	2.8	5.6	2.9	2.0	2.7
Motion pictures	78	599.4	2.9	.8	.5	2.1	2.8	.8	.5	2.0
Amusement and recreation services	79	1,706.5	6.7	3.0	1.7	3.8	6.4	2.8	1.6	3.6
Producers, orchestras, entertainers	792	167.8	6.2	1.9	1.0	4.4	6.1	1.8	.9	4.2
Bowling centers	793	80.9	3.8	1.0	.8	2.8	3.7	1.0	.8	2.7
Commercial sports	794	139.4	7.2	3.2	2.7	3.9	6.9	3.2	2.6	3.8
Miscellaneous amusement, recreation services	799	1,290.1	6.9	3.2	1.7	3.7	6.5	3.0	1.7	3.5
Health services	80	9,946.9	7.5	3.4	2.2	4.0	7.0	3.3	2.1	3.7
Offices and clinics of medical doctors	801	1,878.9	2.8	.7	.5	1.9	2.2	.6	.4	1.7
Offices and clinics of dentists	802	666.5	1.8	.3	.3	1.5	1.6	.2	.2	1.5
Offices of other health practitioners	804	439.8	1.3	.6	.4	.8	1.2	.5	.4	.7
Nursing and personal care facilities	805	1,782.1	13.5	7.6	4.5	5.9	13.2	7.5	4.4	5.7
Hospitals	806	3,948.1	9.2	4.0	2.5	5.2	8.5	3.8	2.4	4.7
Medical and dental laboratories	807	203.1	5.0	2.1	1.2	2.9	4.3	1.8	1.1	2.5
Home health care services	808	630.8	7.6	3.7	2.8	3.9	7.3	3.6	2.8	3.7
Health and allied services, n.e.c.	809	348.8	4.9	2.1	1.4	2.8	4.7	2.0	1.4	2.7
Legal services	81	995.3	1.0	.4	.3	.6	.8	.3	.3	.5
Educational services	82	1,667.0	2.9	1.1	.8	1.8	2.7	1.0	.8	1.7
Elementary and secondary schools	821	466.9	3.0	1.1	.8	1.9	2.9	1.0	.8	1.9
Colleges and universities	822	900.8	3.2	1.2	.9	2.0	3.0	1.1	.9	1.8
Vocational schools	824	93.1	1.5	.7	.5	.7	1.5	.7	.5	.7
Schools and educational services, n.e.c.	829	181.9	1.4	.4	.4	1.0	1.3	.4	.3	1.0
Social services	83	2,674.9	5.6	2.7	1.9	2.9	5.4	2.6	1.9	2.8
Individual and family services	832	754.4	4.5	2.0	1.5	2.5	4.2	1.8	1.4	2.4
Job training and related services	833	296.0	9.2	4.5	3.2	4.7	9.0	4.5	3.1	4.6
Child day care services	835	649.3	2.6	1.0	.8	1.5	2.5	1.0	.8	1.5
Social services, n.e.c.	839	202.3	4.2	1.7	1.3	2.5	4.1	1.6	1.3	2.4
Museums, botanical, zoological gardens	84	99.7	7.0	2.5	1.7	4.5	6.6	2.4	1.5	4.2
Museums and art galleries	841	74.3	5.1	1.9	1.4	3.2	4.9	1.8	1.3	3.1
Botanical and zoological gardens	842	25.5	11.8	4.1	2.3	7.7	11.0	3.8	2.1	7.2

See footnotes at end of table.

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WORKPLACE INJURIES AND ILLNESSES IN 2000

A total of 5.7 million injuries and illnesses were reported in private industry workplaces during 2000, resulting in a rate of 6.1 cases per 100 equivalent full-time workers, according to the Bureau of Labor Statistics, U.S. Department of Labor. Employers reported about the same number of cases compared with 1999 and a 2 percent increase in the hours worked, reducing the case rate from 6.3 in 1999 to 6.1 in 2000. The rate for 2000 was the lowest since the Bureau began reporting this information in the early 1970s. (See "Background of the Survey" section for a discussion of the factors that can influence rate changes from one survey to the next.)

The following tabulation on incidence rates for injuries and illnesses shows the decline in rates per 100 full-time workers since 1995:

	1995	*1996*	*1997*	*1998*	*1999*	*2000*
Private industry	8.1	7.4	7.1	6.7	6.3	6.1
Goods-producing	11.2	10.2	9.9	9.3	8.9	8.6
Service-producing	6.7	6.2	5.9	5.6	5.3	5.1

Among goods-producing industries, manufacturing had the highest incidence rate in 2000 (9.0 cases per 100 full-time workers). (See chart 1 and table 1.) Within the service-producing sector, the highest incidence rate was reported for transportation and public utilities (6.9 cases per 100 full-time workers), followed by wholesale and retail trade (5.9 cases per 100 workers).

This release is the second in a series of three releases covering 2000 from the BLS safety and health statistical series. The first release, in August 2001, covered work-related fatalities from the 2000 National Census of Fatal Occupational Injuries. In the spring of 2002, a third release will provide details on the more seriously injured and ill workers (occupation, age, gender, race, and length of service) and on the circumstances of their injuries and illnesses (nature of the disabling condition, part of body affected, event or exposure, and primary source producing the disability). "More seriously" is defined in this survey as involving days away from work.

Case types

Of the 5.7 million total injuries and illnesses reported in 2000, about 2.8 million were lost workday cases, that is, they required recuperation away from work or restricted duties at work, or both. (See table 2.) The remaining 2.9 million were cases without lost workdays. The incidence rate for lost workday cases was the same in 2000 as in 1999 (3.0 cases per 100 workers), while the rate for cases without lost workdays decreased from 3.3 cases per 100 workers to 3.2 cases per 100 workers.

Lost workday cases are comprised of two case types, those requiring at least one day away from work, with or without restricted work activity, and those requiring restricted activity only. The latter type of case may involve shortened hours, a temporary job change, or temporary restrictions on certain duties (for example, no heavy lifting) of a worker's regular job. At 1.8 cases per 100 workers in 2000, the rate for cases with days away from work declined from 1.9 in 1999 and was the lowest on record. (See chart 2.) The rate for cases involving restricted activity only was 1.2 cases per 100 employees, the same level as in 1998 and 1999. (See chart 3 and table 7.) Also for the third consecutive year, the rate in manufacturing for restricted-activity-only cases (2.5) was higher than the rate for days-away-from-work cases (2.0). In all other divisions, the rate for days-away-from-work cases was higher than the rate for restricted-activity-only cases.

Chart 3. Lost workday case incidence rates, injuries and illnesses, 1981-2000

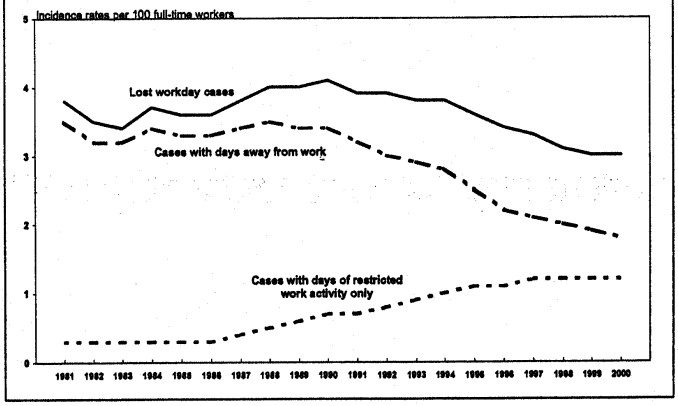

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and selected case types, 2000— Continued

Industry[2]	SIC code[3]	2000 Annual average employment[4] (000)	Injuries and illnesses				Injuries			
			Total cases	Lost workday cases		Cases without lost workdays	Total cases	Lost workday cases		Cases without lost workdays
				Total[5]	With days away from work[6]			Total[5]	With days away from work[6]	
Miscellaneous amusement, recreation services	799	1,345.7	6.5	3.2	1.7	3.3	6.2	3.1	1.7	3.1
Health services	80	10,073.9	7.4	3.5	2.1	3.9	6.9	3.4	2.0	3.6
Offices and clinics of medical doctors	801	1,936.9	2.3	.6	.4	1.7	2.0	.5	.4	1.4
Offices and clinics of dentists	802	686.5	1.7	.3	.3	1.4	1.5	.2	.2	1.3
Offices of osteopathic physicians	803	48.8	.8	.4	.2	.5	.8	.3	.2	.5
Offices of other health practitioners	804	440.3	1.6	.6	.3	1.0	1.6	.6	.3	1.0
Nursing and personal care facilities	805	1,799.9	13.9	7.9	4.2	6.0	13.7	7.8	4.1	5.8
Hospitals	806	3,958.2	9.1	4.1	2.5	5.0	8.3	3.9	2.3	4.5
Medical and dental laboratories	807	209.7	4.4	1.8	1.2	2.7	3.9	1.5	1.0	2.4
Home health care services	808	636.6	7.4	3.5	2.5	3.9	7.0	3.5	2.4	3.5
Health and allied services, n.e.c.	809	357.1	4.8	2.2	1.3	2.6	4.5	2.0	1.3	2.5
Legal services	81	1,011.6	.7	.3	.2	.5	.6	.2	.2	.4
Educational services	82	1,739.1	3.2	1.1	.8	2.1	3.1	1.1	.8	2.0
Elementary and secondary schools	821	493.0	3.7	1.4	1.0	2.3	3.6	1.3	1.0	2.3
Colleges and universities	822	924.2	3.6	1.2	.9	2.4	3.4	1.1	.8	2.2
Libraries	823	25.9	1.4	.8	.5	.6	1.3	.8	.5	.5
Vocational schools	824	99.5	.6	.2	.2	.4	.6	.1	.1	.4
Schools and educational services, n.e.c.	829	196.5	2.1	.6	.5	1.5	2.1	.6	.5	1.5
Social services	83	2,798.8	6.1	2.8	1.9	3.2	5.9	2.7	1.9	3.2
Individual and family services	832	807.0	4.7	2.2	1.9	2.5	4.6	2.1	1.8	2.4
Job training and related services	833	303.6	8.4	4.6	2.5	3.8	8.1	4.4	2.5	3.7
Child day care services	835	880.0	2.7	1.3	1.1	1.4	2.7	1.3	1.1	1.4
Residential care	836	805.4	9.5	4.1	2.6	5.3	9.3	4.1	2.5	5.2
Social services, n.e.c.	839	202.7	4.9	2.0	1.4	2.9	4.8	2.0	1.4	2.8
Museums, botanical, zoological gardens	84	106.5	5.2	2.3	1.5	2.9	4.9	2.1	1.3	2.8
Museums and art galleries	841	79.3	4.3	1.7	1.1	2.6	4.1	1.6	1.0	2.5
Membership organizations	86	1,094.1	3.0	1.1	.9	1.8	2.8	1.1	.8	1.7
Business associations	861	114.7	1.4	.7	.7	.7	1.2	.6	.6	.6
Civic and social associations	864	520.4	4.5	1.7	1.3	2.8	4.3	1.7	1.3	2.6
Religious organizations	866	155.9	2.1	.9	.8	1.2	2.0	.8	.7	1.2
Membership organizations, n.e.c.	869	80.5	4.9	1.4	.8	3.4	4.6	1.3	.8	3.3
Engineering and management services	87	3,440.5	1.7	.7	.5	1.0	1.5	.7	.5	.9
Engineering and architectural services	871	1,011.8	1.7	.8	.6	1.0	1.6	.7	.6	.8
Accounting, auditing, and bookkeeping	872	676.9	1.0	.4	.3	.6	.8	.3	.2	.5
Research and testing services	873	843.4	2.0	.8	.5	1.2	1.8	.8	.5	1.0
Management and public relations	874	1,108.5	2.0	.8	.6	1.2	1.9	.7	.5	1.1

[1] The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where

N = number of injuries and illnesses
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

[2] Totals include data for industries not shown separately.
[3] *Standard Industrial Classification Manual*, 1987 Edition.
[4] Employment is expressed as an annual average and is derived primarily from the BLS-State Covered Employment and Wages program.
[5] Total lost workday cases involve days away from work, days of restricted work activity, or both.
[6] Days-away-from-work cases include those which result in days away from work with or without restricted work activity.
[7] Excludes farms with fewer than 11 employees.
[8] Data conforming to OSHA definitions for mining operators in coal, metal, and nonmetal mining and for employers in railroad transportation are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor, and the Federal Railroad Administration, U.S. Department of Transportation. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries.
[9] Incidence rate less than 0.05.

NOTE: Because of rounding, components may not add to totals. Dash indicates data not available. The n.e.c. abbreviation means that the category includes those components not elsewhere classified.

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor
December 2001

APPENDIX G

ANONYMOUS COMPANY’S OSHHA LOG FOR RECORDABLE INJURIES

ANONYMOUS COMPANY'S RECORDABLE INJURIES AND LOST WORKDAY CASES

The following information regarding recordable injuries and lost workday cases were gathered from the OSHA Log for the anonymous company for years 1997, 1998, 1999, 2000, and 2001 respectively:

YEAR	TOTAL RECORDABLE INJURIES	TOTAL LOST WORKDAY CASES
1997	98	42
1998	222	69
1999	327	44
2000	201	72
2001	105	79

Source: Anonymous Company's OSHA Log

APPENDIX H

ANONYMOUS COMPANY’S PAYROLL LOG FOR PAYROLL HOURS

ANONYMOUS COMPANY'S PAYROLL HOURS

The following information regarding payroll hours was gathered from the anonymous company for years 1997, 1998, 1999, 2000, and 2001 respectively:

YEAR	PAYROLL HOURS
1997	5,982,515
1998	11,903,368
1999	11,701,653
2000	8,383,925
2001	8,813,650

Source: Anonymous Company's Payroll Log