Searching for Quality Within Safety: A Study of Occupational Safety Programs

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SEARCHING FOR QUALITY WITHIN SAFETY:
A STUDY OF OCCUPATIONAL SAFETY PROGRAMS

A THESIS SUBMITTED TO
THE FACULTY OF THE INSTITUTE OF HUMAN RESOURCES AND
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BY
MARY ANN LAUTZENHISER

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This is dedicated to the memory of my mother, Noreen Lautzenhisser, and to my father, Robert Lautzenhisser, for always encouraging me to work hard, and do my very best.
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CHAPTER 1

INTRODUCTION

The Problem

"Safety First" is a popular theme, inside and outside of the workplace. Yet every day, accidents happen. In the business world, an accident automatically results in lost productivity. Production and/or service is delayed while the area is secured, reports made, and medical treatment applied, if necessary. In the last two decades safety has carried a high level of importance. The passage of the Occupational Safety and Health Act of 1970 is one reason. In addition, as American companies face increased competition in the global arena, they are looking for ways to increase quality and decrease costs. In today's competitive environment, every second counts.

Workers' accidents are extremely costly in more than one way. In terms of moral responsibility, society now expects employers to provide a safe working environment. Morally, the costs of accidents must be expressed in terms other than monetary. The employees involved and/or injured may suffer emotional damage, and society also pays the price in terms of death or serious disabilities of individuals (Finkin, Goldman, & Summers, 1989).

Employers' legal responsibilities have been accentuated
by the passage of OSHA. In the case of an employee’s death caused by willful violations of the employer, not only are substantial monetary fines imposed, but individuals of the company may face criminal prosecution, and imprisonment (Finkin et al., 1989). In addition, companies have a financial responsibility for safety. Costs of accidents can be broken down into two categories. The first category is insurable costs, which cover medical treatment and temporary and permanent disability payments to the employee(s). Uninsurable costs are those involving administration, such as accident investigation and reporting. Also involved are the costs of lost productivity because of work stoppage at the time of the accident, repair or replacement of damaged equipment, loss of the injured employee(s)’ production, and overtime or replacement costs necessary to fill in for the injured employee. There is the added cost of providing the injured employee benefits while out on disability (Meola, 1990). In addition, companies face an incredible liability in terms of possible OSHA fines. The financial costs can add up quickly, no matter how minor the accident/injury. The company’s responsibility to its shareholders is to make profit. Yet, accident costs can greatly affect the success or failure in this goal.

As companies look for ways to prevent accidents from occurring, many causes may surface. The use of unsafe equipment, lack of knowledge, and the push for speed in
production are some of these reasons.

Many employers feel that employees themselves do not care about safety, or at least are not aware of its importance. To change this prevailing attitude, employers look for ways to increase safety awareness. One popular means of reducing accidents is the use of safety incentive programs. By offering employee awards for an accident free time period, employers are attempting to lower the accident rate. Another approach to reduce accidents is through behavior management, where an employee’s job is broken down into steps, and safe behavior applied to each step of the process. The use of incentives are often used in this type of program, rewarding employees for their safe behavior. Studies have shown, however, that training and knowledge, combined with feedback, will induce employees to practice safe behavior (Komaki, Heinzmann, and Lawson, 1980).

Problem Statement

This thesis researches occupational safety programs, and attempts to define the factors necessary for success in developing a safe workplace. The following chapters will discuss the evolution of safety management, review studies of the various types of safety programs, and discuss the similarity of safety and total quality management. In addition, a research study of the effectiveness of one company’s safety program will be discussed. All of these topics are covered in the search for the answer to the
research question:

How can a safety program be more effective?
CHAPTER 2
THE EVOLUTION OF SAFETY MANAGEMENT

The beginning of safety programs evolved as workers began the fight for unionization and workers compensation laws. At this time, if an employee was injured, there was no economic support available for the employee who was not able to continue working. Common law favored the employer in the form of the "'Unholy Trinity'" (Finkin, et al., 1989, p. 364). This term represented the three defenses used by employers to win lawsuits. Assumption of risk, contributory negligence, and/or the fellow servant rule prevented employees from collecting money from the employer for injuries incurred on the job.

However, the issue of safety was becoming a public concern, and in 1867 Massachusetts began factory inspections (Colling, 1990, p.3). In 1869 the Bureau of Labor Statistics was formed to begin study on the kind and causes of accidents in factories. The first safety legislation was passed in 1877, requiring use of guards for hazardous machinery. In 1892, the first recorded safety program was developed at the Illinois Steel Company, in response to an explosion of a flywheel. A committee of executives was formed to evaluate the accident, and as a result, all
flywheels were then inspected and tested.

Finally, in 1908, the first worker's compensation law was passed, covering federal employees. In 1911, New Jersey became one of the first states to pass workers' compensation laws. As a result, one writer concludes: "Workmen's compensation laws have done more to promote safety than all other measures collectively, because employers found it more cost effective to concentrate on safety than to compensate employees for injury or loss of life" (Colling, 1990, p. 4).

The approach toward safety during this period had been greatly affected by Frederick W. Taylor's work, The Principles of Scientific Management in 1911. Taylor's efficiency studies highlighted the effects of lost time, lost personnel, and lost materials due to accidents on efficiency. This "led to an early understanding of the important interrelationship between safety and management that we recognize today" (Colling, 1990, p.1). The responsibilities of management in the early part of the century were defined differently than they are today. In a 1921 study, The Health of the Industrial Worker, the researchers discuss the prevalence of eye injuries in the stone-cutting industry. They write:

These injuries (called by the men "fires" in the eye) are practically entirely preventable by the wearing of suitable goggles; the glass of goggles, however, in a few weeks becomes frosted from the frequent impact of
particles and requires renewal. The men prefer to run the risk rather than take this small trouble, and men are to be seen at work, who have already lost the sight of one eye, still declining to wear goggles (Collis & Greenwood, 1921, p. 187).

In situations like these, injuries were viewed as the result of worker carelessness. As long as safety equipment was provided, even if not utilized, management accepted no further responsibility to the worker.

In 1931, Herbert W. Heinrich made a major impact on the field of safety with the publication of *Industrial Accident Prevention*. While working for the Travelers Insurance Company, Heinrich analyzed 75,000 industrial accidents. He concluded that 88% of accidents were due to unsafe acts of workers, 10% to unsafe conditions, and 2% of accidents were unavoidable. Heinrich created the first theory of accident causation, built upon a list of ten statements he termed the "Axioms of Industrial Safety" (Heinrich, 1931, pp. 13-14). Heinrich’s theory became known as the "Domino Theory" (Heinrich, 1931, pp. 14-15), in that he named five sequential accident factors (ancestry and social environment, fault of person, unsafe act and/or mechanical/physical hazard, accident, and injury) which affect each other just as dominoes placed on end do. The removal of the third factor, that of the unsafe act/hazard, can prevent the other factors from resulting in an injury.
This theory greatly influenced how management approached safety control for years. "Most safety programs which are built upon the principles of control have their roots in the original Domino Theory and its management-oriented updated forms" (Collings, 1990, p.30).

In a 1939 work titled *Industrial Hygiene*, the authors provide management with a checklist for promoting the health of workers. Under the topic of work place they discuss factors such as noise level, work positions, and body mechanics. They advise that provision of a safe environment can be accomplished through safety engineering and safety education. Other topics covered are employment and placement, the organization of work, supervision, health instruction for the worker, and extra factory activities. In a prelude to management theory of today, the authors advise "the want for a feeling of personal worth is one of the most fundamental desires of man. This feeling of personal worth comes largely from satisfactory relationships with one's superior and with one's associates" (Lanza & Goldberg, 1939, p. 587).

Greatly influenced by Heinrich's work, other researchers have continued building theories on safety. The Ferrell Human Factor Model is based on the premise that accidents are the result of a chain of incidents beginning with human error. Ferrell defines three situations of human error: 1) overload, which occurs when the work load and the
capacity of the person is mismatched, 2) an incorrect response by the person to the situation, and 3) an improper activity (Collings, 1991, p. 31).

A contemporary safety researcher, Dan Peterson, further developed the Ferrell system, to include system failure. Peterson's Accident/Incident Causation Model has more clearly defined categories of human error: 1) overload, 2) ergonomic traps, and 3) decision to err (Heinrich, Petersen, & Roos, 1980). Peterson expands on the category of decision to err. He acknowledges that the employee is often able to choose to perform the task unsafely, and that this choice may be made either consciously or unconsciously. Major reasons in this decision are peer influences, time pressures, and priorities set by social, political, and/or economic forces. Peterson's model has moved the field of safety to the point of acknowledging that an unsafe act is not just the result of a poor decision by an employee, but rather, may be pre-determined by extenuating factors. This then poses new challenges to safety professionals.

Management theory needs to be incorporated into the field of safety in order to create an environment which values and promotes safety.

In review of management theories of today, Collings connects Herzberg's (1968) two-factor theory to safety. In Herzberg's theory, motivators are those factors that provide sources of satisfaction, while hygiene factors are those
that are the source of dissatisfaction. Safety falls under
the area of hygiene factors. As a result, meeting all
safety needs can only reduce job dissatisfaction.
Therefore, "to create job satisfaction, we must turn to the
motivators. In other words, we have to set up a competent
safety program to eliminate dissatisfaction, and then
determine what else our people need to provide satisfaction"

The use of management theory incorporated into the
field of safety has increased the success of safety
programs. However, new challenges from the technological
growth have continued to affect employees’ safety. The
actual work environment of most businesses has experienced
major change. New products, chemicals, and machinery
continued to increase the threat to worker’s health and
safety. Although by 1960 most states had some type of
safety and occupational health laws, there was often little
enforcement (Finkin, et al., 1989, p. 365). In
congressional testimony, the Secretary of Labor testified
"that in 1968 an estimated 14,500 workers were killed and
2.2 million were disabled each year in industrial accidents,
resulting in a loss of 250 million man days of work and $8
billion loss in Gross National Product" (Finkin, et al.,
1989, p. 366). Congress decided that national legislation
was necessary to force all companies to create safer working
environments. The Occupational Safety and Health Act of
1970 was passed as a result. OSHA places two duties on employers. The first is that of the "general duty clause: Each employer--1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serous physical harm to his employees..." (Finkin et al., 1989, p. 367). In addition, the second duty is that every employer must comply with OSHA standards. The passage of OSHA has made it even more important that employers utilize all of their resources to create and promote a safe environment.

In summary, the area of safety has grown from one of individual responsibility to the legal, moral, and economic responsibility of corporations. New technology, as well as an increasingly diverse workforce has forced companies to look for different and innovative ways to achieve safety. While provision of a safe environment is an important base factor for safety, individual behavior remains as the area in which companies search for the best method to inspire safety. The next chapter will review the literature on the diverse types of safety programs.
CHAPTER 3
LITERATURE REVIEW

Overview

Because it is usually impossible to eliminate all environmental deterrents to safety, it is necessary to influence employees to avoid unsafe acts. In a review of safety literature, Peters (1991) identifies five strategies to improve safety performance: incentives, disciplinary actions, fear messages, behavior modeling, and employee surveys. In selecting one of these strategies, he advises that the cost and effectiveness of the method be reviewed, as well as the nature of work, the social and physical components of the work environment, the attitudes of both management and labor, and the available resources.

In the area of incentives for safe behavior, after reviewing the literature, Peters identifies the need for further research to determine which incentives are more successful, and under what conditions they are helpful. In addition, the longevity of the effects of the incentive needs to be studied. While reviewing the use of disciplinary actions, Peters reveals that there is little evidence of those organizations who utilize discipline in safety, and whether or not it is effective. He concludes
that positive reinforcement is more widely advocated than the negative actions of discipline.

In regards to the use of fear messages, the longevity of attitude and behavior changes due to fear messages are two areas also needing further research. In addition, the discrepancy between attitude changes and behavior changes continues to be unexplained. Behavior modeling, defined as (a) viewing the approved behavior, (b) practicing the behavior, and (c) transferring the behavior learning to the actual environment, has not yet been determined to be an effective technique for motivating employees to increase their self-protective behavior.

In discussing the fifth area, Peters recommends using employee survey results to facilitate group discussions. These discussions can result in higher levels of interest, in-depth thinking, and commitment to safety rules. The increase in employee involvement also results in elevated awareness, a strengthening of employee beliefs of the seriousness of hazards, as well as an individual's sense of control over their personal safety.

In summary, Peters' review demonstrates the varied approaches to safety while highlighting the need for further research in all areas. Behavior-modeling and the use of incentives are the most widely studied systems, and this paper will review some of the more recent works. In addition, studies on employee attitudes, fear messages, and
quality of work life and their affect on safety will be reviewed.

Positive Reinforcement and Feedback

In a paper by McAfee and Winn (1989), 24 studies on the use of positive reinforcement and feedback on safety are reviewed. All of the studies evaluated utilized statistical data, a before and after design, and provided enough details to compare with the other studies. The independent variables of the overall review are "(a) monetary incentives, (b) praise and feedback, and (c) team competitions which may also have involved the use of cash awards" (McAfee & Winn, 1989, p. 9). The dependent variables were the causal variables, such as using protective equipment, and the end-result variables, or the actual injuries. All of the studies looked at short-term outcome variables rather than long-term ramifications, such as employee satisfaction.

The review of studies found that each concluded that the use of incentive/feedback improved safety and or reduced the number of accidents. However, limitations were found, and the causal relationship between the reward/feedback and the outcome were not explained in the studies. McAfee and Winn developed a model that "suggests that the relationship between incentives/feedback and these end-result variables may be moderated by three situational variables (environmental, individual, and task characteristics)"
(McAfee & Winn, 1989, p. 16). While concluding with several topics of proposed future studies, these researchers reflect that the reviewed works serve as alternatives to traditional safety programs, as well as provide examples of how to design safety programs to fit specific work conditions.

Karan and Kopelman (1986) researched the effects of feedback on the safety related outcomes of vehicular accidents and industrial accidents. The use of feedback can act as a reinforcer as well as a punisher. Three vehicle maintenance and dispatch facilities of a nation-wide package forwarding organization were studied. During a 43-week period, Facility A was provided feedback in regards to the number of accidents during the current fiscal year to date, the number of accidents during the same period the previous year, the number of days since the last accident, and a ranking in terms of improvement. The results were given for each shift of employees in the facility. Facilities B and C were utilized as comparison groups. The researchers concluded that the institution of objective outcome feedback resulted in a 22.32% improvement in vehicular safety performance and a 15.88% improvement in the industrial safety performance. The use of feedback was successful in that accidents occurred less frequently in the experimental facility. In addition, the implementation of the program was inexpensive, while the dollar savings gained from the overall improvement in vehicular safety were about $28,129.
The researchers conclude their study with the challenge for future research in the comparison of the relative efficacy of outcome feedback versus behavioral feedback in the area of safety performance.

Haynes, Pine, and Fitch (1982) also studied the use of outcome feedback. However, in addition, they utilized team competition and incentives. Their study evaluated the effectiveness of a researcher-created intervention package intended to reduce the accident rate of an urban mass transit operation. This operation was experiencing rising accident costs. The authors developed an intervention package with three parts: 1) performance feedback, in terms of number of accidents, 2) team competition, where teams accrued points based on accident rates, and 3) incentives. The program was conducted during an 18 week period using the incentives. Data was also collected for an 18 week period after the completion of the incentive program. The experimental group reduced their accident rate 24.9% per 100 operators during the incentive period. In the following period, the numbers were non-significant. Because this study was conducted during an unusually severe winter, the use of a control group allowed the results to be evaluated independent of the changes in weather. This study was unable to measure unsafe driving behavior, due to the logistics of vehicles, drivers, and their routes. The authors concluded that the combination of performance
feedback, team competition, and inexpensive incentives support a reduction in the experimental group's accident rate. In terms of cost, they concluded that the relationship between monies spent on incentives, versus monies spent on average accident claim settlement costs, was cost effective. They write: "The use of low cost contingent monetary incentives in conjunction with other reinforcers such as feedback and competition can be justified based on cost effectiveness alone" (Haynes et al., 1982, p. 415).

While all of the programs claimed to be successful, there still remains a question as to the causal relationship between the lowered accident rates and the feedback and incentives. In the Haynes et al. study, there is the additional question as to whether the feedback, team competition, and incentives all played an equal part in the result. The next section reviews the use of incentives on their own to inspire the desired results, and reviews a study in which safety posters alone are used to increase hazard awareness.

Incentives and Safety Posters

Another study of the use of incentives to improve safety performance was completed by Fox, Hopkins, and Anger (1987). The study was conducted at two open pit mines, and ran for 12 years at one site, and over 11 years at the other. Tokens were awarded to all employees each month for
1) not suffering a lost time injury or injury with physician's care, 2) if all the workers under one supervisor did not suffer lost time or physician-treated injury, 3) for safety suggestions, preventative acts, and miscellaneous actions recognized by the safety committee. In addition, stamps were withheld based on the length of time missed from work, and none of the group members could receive any tokens until the injured employee returned to work. The failure to report accidents and damage to equipment also resulted in the loss of tokens. The tokens were in the form of trading stamps that could be exchanged at stores or a catalog for a wide range of merchandise, such as household appliances.

The researchers write: "All of the results are strong evidence that behavioral programs can be faithfully administered and that the effects of those programs can be maintained for extensive periods of time" (Fox et al., 1987, p. 222). They report a substantial decrease in the number of days lost to accidents during the first year of the program. By the end of the second year, the number of lost-time injuries ran about 15% of the average baseline rates at one location, and at 32% of the average baseline rate at the other location. In terms of the costs of accidents and injuries, both locations saw decreases of approximately 90%: from $294,000 to $29,000 at location one, and from $367,696 to $38,972 at the other. The cost ratios of dollars saved to dollars spent on the program ranged from 18.1 to 27.8,
and 12.9 to 20.7 at the two locations, adjusted for inflation and hours worked. In addition, the mine managers suggested that the token program also increased the morale of the staff at both locations.

While contests may promote an increase in the desired behavior, there are also possible negative side effects that can result. Hampton (1970) focuses on the negative affects that any type of contest can cause within an organization. Hampton researched eight contests of eight companies in diverse industries. He found that all the contests were successful in meeting their purpose, but additionally, that all had side effects. The majority of the behavioral side effects fall into three classes. Neglect occurs when a contest is so successful that efforts are drawn away from routine concerns. The second side effect is conflict, which can occur between superiors and subordinates, those in lateral or work-flow relations, or between salesman and customers. The last side effect is that of dishonesty, or abuse of the standards. The study also revealed three sources for the side effects: defective design, defective implementation, and employee values. "The systemic effects of contests on organizational behavior are, therefore, more diverse than the contest objectives, but contest administrators look for and measure results only in terms of contest objectives" (Hampton, 1970, p. 86). To avoid this situation, before implementation of a contest, a company
needs to ask "Is what the contest does for the company worth what it does to it?" (Hampton, 1970, p. 86).

Another popular process to promote safety is the use of safety posters. These may be used with or without an incentive program. In an European study, the use of safety posters was studied to determine whether hazard consciousness among workers could be significantly enhanced (Saarela, 1989). The campaign materials were developed after a safety analysis was completed on the number of scaffold accidents within a shipyard in Finland. The poster campaign began with a training seminar for 10% of the personnel. Posters and handouts were then circulated and posted throughout the department. The design of the study included pre- and post- campaign interviews and observation sessions. In addition, a before and after accident analysis was completed.

The results demonstrated that workers were more conscious of the hazards associated with scaffolds after the campaign’s conclusion. All the employee recognized the poster, while every fifth worker had heard his/her supervisor discuss the kick-off training session material. Observations, however, did produce continued unsafe behaviors. While the numbers of accidents did decrease, the decrease actually followed a trend that had begun prior to the study. Overall, the researcher concluded that the campaign was effective in enhancing hazard consciousness and
that a written message was more effective than an oral message. The fact that some improvement was noticed in work practices, yet that the campaign’s effect was modest is supported by other studies that demonstrate that informational safety campaigns are seldom strong enough to provide outstanding improvements. "Awareness of hazards cannot alone ensue safety" (Saarela, 1989, p. 184).

While safety posters themselves may not be sufficient to change all behaviors to be more safe, perhaps when combined with an incentive program success will follow. The Fox et. al study is especially significant in the field of safety in that it was conducted for such a long period of time with such success. However, the Hampton (1970) review demonstrates that careful preparation and implementation is necessary to ensure that an incentive program provides strong enough results to override any negative side effects. The use of incentives and safety posters provide companies with some options when designing a safety program. With any program, however, a careful review of the organization’s culture is necessary to best tailor the program for success. Employee’s attitudes and their perception of hazards are important issues to address when designing a safety program. The next section reviews studies conducted on these two topics.

Employee Attitudes and Fear Messages

In a study of an European company, Cox and Cox (1991)
found that "safety cultures reflect attitudes, beliefs, perceptions and values that employees share in relation to safety" (1991, p. 93). The company studied was very safety conscious and applied four principles: 1) that all accidents are preventable, 2) safety is a line management responsibility, 3) safety is a condition of employment, and 4) management is responsible for safety of its employees. The study itself was set up as a program to further develop the safety culture. A questionnaire was developed, and distributed. Of 821 respondents, there were 630 complete cases for factor analysis. The resulting data described five factors which support employee attitudes to safety: 1) effectiveness of arrangements for safety, 2) individual responsibility, 3) personal skepticism, 4) safeness of work environment, and 5) personal immunity. In conclusion, the researchers advise that expression of individual responsibility is rewarded, and that companies should build on employees knowledge and positive evaluation of arrangements for safety and safeness of the work environment. In addition, it is necessary to change unconstructive beliefs about personal immunity, and to reduce skepticism over safety.

Goldberg, Dar-El, and Rubin (1989) tested their ideas about the role that workers’ perception of threat plays in choice of behaviors. Beginning their study, they looked to see what promotes a worker to become fatalistic, and what
would promote an employee's willingness to become participative in promoting safety. The results of the study found that workers often overstate the potential dangerous conditions they work in. The study confirmed that this perceived threat did move the employee in one of the two ways, but was inconclusive as to how to move them toward participation, rather than a fatalistic attitude. They conclude: "the primary task for management in dealing with many organizational maladies may be to find ways to channel worker reactions away from withdrawal, and instead aim for collective security within participative activities" (Goldberg et al., 1989, p. 120).

Both of these studies enhance the field of safety, as well as demonstrate that safety is a complex issue. The Cox & Cox study provides employers with the variables that affect employees' attitudes toward safety, yet does so within an environment which had a history of promoting safety. Further study would be needed to compare these perceptions to those of employees from organizations that did not have such a history. In addition, study is needed to further define what motivates an employee to become more safety-confident rather than fatalistic. While the literature in these areas is limited, there is an array of literature on the topic of organizational behavior management. The next section will discuss the many recent studies available in this area.
Organizational Behavior Management

Even when an employee recognizes a safety hazard, he/she still has a choice of behaviors or actions within that area of safety. Geller (1989) argues that motivating people in the area of prevention is difficult, because in many cases, such as smoking, the unsafe act is followed by immediate pleasure, with the potential negative factor, such as cancer, being a distant possibility. Geller focuses solely on the application of organizational behavior management (OBM) on occupational safety in his 1989 study. In terms of preventing occupational accidents, one should look at the specific completed behaviors of those involved, and the behaviors that did not occur, since they could have prevented the accident. Findings from this study suggest that behavior modification can be applied to promote the use of safe behaviors, and to discourage the use of the unsafe behaviors. Geller has designed a program of OBM within the acronym of DO RITE:

1. Define the target behavior.
2. Observe the target behavior.
3. Record the observations.
4. Intervene to increase the occurrence of desired behavior.
5. Test the impact of behavior change strategies....
6. Evaluate whether to continue, refine, or discontinue the intervention program by examining
graphic displays of the target behavior(s) during baseline, intervention, and withdrawal phases. (Geller, 1989, pp. 183-185).

Geller (1989) makes an important comment, that "safety must not be considered a priority in an organization, because priorities can be shifted according to the demand of other priorities" (Geller, 1989, p. 185). Rather, according to Geller, safety needs to be built into the system.

Similarly, in a study by Komaki, Heinzmann, and Lawson (1980), another example of an immediate reward following an unsafe practice was found. Workers who performed an unsafe act were sometimes rewarded by completing their tasks more quickly. For this study, the authors defined safe behaviors for four sections of a city's vehicle maintenance department. Observations of behaviors were listed under the classifications of 1) proper use of equipment and tools, 2) use of safety equipment, 3) housekeeping and, 4) general safety procedures. These observations were made over a period of 45 weeks, broken into periods of 1) baseline data, 2) training only, 3) training and feedback, 4) training only a second time, and a final period of 5) training and feedback. While a slight increase of safe behavior was found in each period of training, an even greater increase was found during the training and feedback period. Thus, when the workers knew the level of their performance of safe behaviors, they continued and increased that behavior. The
authors also found that the workers responded favorably to the safety program, even starting an informal competition to increase safe behaviors.

The pinpointing of which safe behaviors to measure can play an important part in conducting a successful program. Sulzer-Azaroff and Fellner (1984) propose that "establishing criteria for using a more objective, valid, data-based system for identifying targets of change probably would be more cost effective and efficient over the long-term" (Sulzer-Azaroff & Fellner, 1984, p. 55). To do so, the authors reviewed records, conducted interviews, observed safety inspections, set priorities for items to be observed, refined and clarified items, and developed a recording system. The authors compare this system to the use of quality circles, in that input from workers, participative decision-making, and small-group work can make this process stronger.

Expanding upon the last study, Sulzer-Azaroff, Loafman, Merante, Hlavacek (1990) took a previously developed injury prevention model to test in a large industrial plant. The process they followed was to determine safe behaviors, make observations, and then apply feedback, reinforcement, and goal setting. Target behaviors, called pinpoints, were set for all levels of personnel involved in the program. The results showed a reduction in lost time accidents to almost zero, and a large drop in OSHA recordable accidents. The
safety scores ranged from 90% to 100% for the three departments that had previously had the highest injury rates in the plant. The authors observed: "workers comments were reported to be overwhelmingly positive. They often inquired about their safety performance prior to formal posting and asked what they could do to improve it" (Sulzer-Azaroff et al., 1990, p. 118). In addition, the company’s safety director commented that the design of this program fit the company’s need for a positive behavioral approach, in contrast to a program focused on the negative goal of accidents.

In another study on organizational behavior management, Reber, Wallin, and Chhokar (1984) designed a three part study based on Heinrich's (1959) theory that 88% of all accidents are caused by unsafe acts. To see if this three-tiered approach could reduce accidents, they used an observational checklist, goal setting and feedback, and a multiple baseline design. The results' negative correlation "indicates that the higher the behavioral safety performance, the lower the accident rate, thus furnishing an indirect proof of the validity of the safety measurement procedure" (p. 123). The authors conclude that employees, when provided with specific, achievable goals and feedback, would follow behavioral safety rules. The study also demonstrated the cost savings involved in using a behavioral safety program. The cost of the program was $25,000, yet
savings due to reduction of lost time accidents, and the lowering of the company’s accident insurance premiums were estimated at approximately $120,000.

In another study, Reber and Wallin (1983) demonstrate the direct relationship between behavioral measures of safety and injury rates. Since occupational accidents are considered "rare" events, due to their infrequent occurrence in relationship to the frequent occurrence of unsafe behavior, the researchers looked at data over a period of time. They used baseline data to reflect past performance, and found that departments with a higher level of performance per the rules tended to have a lower incidence rate, and vice versa.

Reber and Wallin stress the importance of knowledge of results in their study published in 1984. In this study, they looked at the effects of knowledge of results (KR) and goal setting on improving safety. Using the same study of a farm machinery manufacturer (Reber, Wallin, Chhokar, 1984) they designed four phases: 1) baseline, 2) training only, 3) training and goal setting, and 4) training, goal setting and knowledge of results. The same safety goals were set for each department, with all department supervisors in agreement that they were difficult, but achievable. During the last phase, knowledge of results was provided to employees up to two to four times a week. The authors conclude that knowledge of results was a key factor in
increasing employees' safe behavior: "although behavioral safety performance did improve significantly after a goal was assigned and apparently accepted, in general the goal was not achieved until KR was provided" (Reber & Wallin, 1984, p. 556). The authors proceed to hypothesize that knowledge of results adds an extra incentive to increase the use of safe behavior. In conclusion, this study showed that a behavioral safety program will be enhanced by the addition of difficult, but achievable goals, and providing feedback, so that employees know where they are in meeting those goals.

To demonstrate further the importance of goals and feedback to a behavioral safety program, Reber, Wallin, and Chhokar (1990) conducted a study at a farm machinery manufacturing plant using the three departments with the most safety problems. This project was designed to replicate the 1984 study in another field setting. The data was collected via an observational checklist for 55 weeks, resulting in a total of 167 observations. The dependent variables were the percentage of employees in each department performing the job in a safe manner, and the frequency of on the job injuries as defined by OSHA. Once again, the study incorporated a multiple baseline design across departments, with the four periods of 1) baseline, 2) training only, 3) training and goal setting, and 4) training, goal setting, and knowledge of results (KR).
The major finding of the study was that KR is beneficial for achievement of maximum performance when specific, difficult, and achievable goals are set. The researchers found that behavioral safety performance did improve significantly after the goal was assigned and accepted, but that the goal was not consistently achieved until KR was added. KR and goal setting are more effective in performance improvement than goal setting alone.

Lower accident rates, cost savings, and increased employee acceptance and participation are the positive results incurred from adoption of an organizational behavior management approach to safety. This approach is also attractive in that it can be applied to different industries and geographic regions as the studies demonstrate. By establishing the direct relation of unsafe behavior to accident rates, these studies also provide the causal link that many safety studies lack. An underlying theme of these programs lies in the importance of the employee acceptance and participation of the programs. Knowledge of results in the Reber et. al study, and employee's acceptance and participation cited in the Sulzer-Azaroff et al. study support the recent management theory of employee participation and empowerment. The next section reviews a study on how the quality of work life affects safety.

**Quality of Worklife**

In their study, Harshbarger and Rose (1991) began with
the hypothesis that success in improving industrial safety and reducing worker's compensation costs could be attained by accomplishing two goals: 1) a reduction in accidents, and 2) improvement in the quality of worklife. Based upon this, they developed a program for two corporations.

At company A, they visited plants and discussed the safety performance with management. They found that the plants with the lower safety records were distinguished by 1) hazards took longer to remove or repair, 2) managers describe workers as poor quality and not caring, and 3) workers described managers in the same terms. The researchers then selected the plant with the worst safety record for their pilot program. The first step was to "shift the paradigm" (Harshbarger & Rose, 1991, p. 136). The managers and supervisors were taught to move from the tradition of finding fault with employees and focusing on accidents to instead, focusing their attention on competence and safe performance. Incentives were established for safe performance, and feedback loops in the form of posters displaying current safety performance were also utilized. In addition, the plant began holding periodic meetings on safety, and safe performance became part of the management meetings as well as part of their evaluations. The second step of the program was to "Build the community" (Harshbarger & Rose, 1991, p. 136). A safety committee was empowered and listened to, while social networks were
developed via work groups. Employees who had repeated lost time injuries were counseled, re-trained, and shifted to less risky assignments. The result of this program was that within 60 days the number of lost time accidents dropped to zero and stayed at zero for nine months.

The researchers used the same evaluation procedures at Company B, and found the same results. At this location they developed a four component program. The first two parts were the same as at Company A: 1) Shift the paradigm and 2) Build the community. Step 3 was "Manage the crisis of an accident" (Harshbarger & Rose, 1991, p. 139). This meant that management changed their view of an accident as a disruption in work performance and began to see it as a crisis in the life of the employee and his/her work group. This lead to rapid response, and the attempt to reduce the accident severity via the use of support systems. Quick treatment, a prompt return-to-work, and outside rehabilitation services were essential to meet these goals. The final step was "Reinforce and maintain performance" (Harshbarger & Rose, 1991, p. 140). Organizationally, visible feedback loops such as posted results and active reports were utilized in this step. This program reduced the lost time accidents by 87%, from 67 to only nine. The researchers feel that "the management practices portion of the problem may be far larger than previously imagined" (Harshbarger & Rose, 1991, p. 142). They see safety and
worker's compensation as a problem of choice. Workers who have accidents can unnecessarily choose the role of injured or disabled employee, management can choose to ignore human needs, and senior management can choose to make safety a priority or to ignore it.

This appears to be the only study in this area of quality of work life and safety, but perhaps it is just the beginning. Empowerment, quality circles, and total quality management (TQM) are still relatively new theories, and their applications to safety are beginning to come to light. Chapter 6 addresses the area of TQM and safety, as well as discusses companies that have successfully combined the two. This literature review has reviewed the diverse approaches to safety that exist. Incentives, posters, knowledge of employees' attitudes and perceptions, and organizational behavior management are all tools that can be used to create a safe environment. The various program successes demonstrate that different approaches can be successful in different environments. The next section reviews a study of successful safety program characteristics. This information can be valuable in helping a company choose the right approach to safety. However, without the right support and commitment, no program will be able to succeed.

**Characteristics of Successful Safety Programs**

In a further search to define the characteristics of successful safety programs, Smith, Cohen, Cohen, and
Cleveland (1978) conducted a companion study to a 1975 mail-out questionnaire survey in which matched pairs of high and low accident rate plants were compared. In the second study, a team of safety professionals visited seven pairs of plants with two purposes. "1) To evaluate and validate the results of the earlier questionnaire study, and 2) to add to the knowledge gained from that study by looking at safety program features in more detail and by examining features that could not be examined in a questionnaire" (Smith et al., 1978, p. 5).

Information was collected via interviews with all levels of management and workers, and from plant walk-throughs and observation. The program areas of management complexity, management commitment, management involvement, financial commitment, safety policy statement, safety rules, safety staff, management efficiency, and plant solvency were rated on a scale of one (very poor) to seven (excellent). The data verified the 1975 questionnaire study and indicated differences in the practices of the high and low accident rate plants in several areas.

The researchers found that the low accident rate plants showed greater management commitment to safety and had more extensive or comprehensive employee relations programs. Managers had greater one to one interaction with employees, and more sophisticated selection techniques were also used at the low accident rate plants. In addition, those plants
also had higher financial stability and solvency, in that they appeared to be more efficient, and conformed to good management procedures. Both types of plants received comparable ratings in terms of buildings and equipment, yet the low accident rate plants had better housekeeping practices.

In regards to safety program characteristics, more high accident rate plants had specific personnel in safety spending more time on safety matters, as well as a higher level of employee participation on safety committees. The low accident rate plants more often used lead workers to train new employees in safety while high accident rate plants more often used supervisors or training personnel in that function. Both types of plants used on-the-job training. The low accident rate plants had more formal hazard inspection procedures yet neither used very formal procedures. There was little follow-up as to whether spotted hazards were taken care of. In terms of safety policy, accident investigations, and record-keeping all of the plants were rated the same. Few plants investigated more than accidents with serious injuries.

In summary, the low accident rate plants had greater management commitment to safety, with active involvement of management in the safety program being the key to promoting safety. The low accident rate plants' management dealt with employees on a human level. They had a higher regard for
employees, treated employees with respect and sympathy. There was lots of communication between management and employees, more frequent and positive contacts between management and employees, and management appeared closer to employees in that they knew the names of the employees. In addition, the low accident rate plants had more employee relations programs such as training, affirmative action, and benefits. The researcher concluded that the low accident rate plants have better safety performance because they have better core workforces, or that they have better core workforces because they have better work conditions, employee selection techniques, and better management styles.

The researchers did find two areas of safety that lacked sufficient attention. Few of either types of plants offered formal safety training, an area that needed improvement. In addition, the researchers advise "whatever the case, the failure to investigate non lost-time accidents and incidents was a major deficiency in the safety programs of both the low and high accident rate plants studied" (Smith et al., 1978, p. 14).

**Conclusion**

The purpose of this literature review is to provide an overview of the various approaches to safety. The first step in achieving a safe environment, as per Smith et al., 1978, is to provide a good working environment, with management commitment, communication, and solid employee
relations. In addition, training and accident investigation are also needed. From this point, perhaps it is best to review the organizational culture and resources, in deciding whether to use incentives, posters, fear messages, or organizational behavior management. A program well prepared, implemented, and evaluated on effectiveness seems to be the most conducive way towards a safe work environment.
CHAPTER 4
PARADIGM SHIFT

Safety is not a resource; it is not an influence; it is not a procedure; and it certainly is not a program. Rather, safety is a state of mind, an atmosphere that must become an integral part of each and every procedure that the company has (Petersen, 1988, p. 91).

Incident-Focused Safety Management

For many companies, the approach to a safer work place has been founded on an incident-focused approach to safety. This type of approach is based on three assumptions: 1) Employee commitment and awareness can be gained via pledges, campaigns, and incentives, 2) Individual responsibility, commitment and awareness will result in safe behavior and few incidents, and 3) Accident rates are valid indicators of safe performance (Dial, 1992, p.37). However, there are several problems with these assumptions. One problem is that responsibility is confused with culpability. Awareness of a hazard does not necessarily result in a change of behavior. Additionally, the use of incentive programs assume that the work environment is supportive of safety, and that safety is not part of the organization’s
culture. Dial (1992) notes, "In fact, working safely is so far outside the culture that management is willing to tender superfluous rewards in an attempt to coax employees to work safely" (p. 38). The use of incentives can also lead to a dependency on them. To continue promoting safety, bigger and better incentives must be used. In addition, when incident-focused, management assumes that the only obstacle to safety is an employee's lack of care and caution. If employees would only set their minds to avoid all exposure, zero incidents would occur. This mindset ignores all of the possible system errors that cause employees to perform unsafe behaviors.

Another major problem with using the incident-focus approach to safety is that for many organizations, their accident rates only reflect random fluctuations (Dial, 1992, p. 39). Often, an organization will meet their goal in reducing accidents, but as soon as the resources once applied to safety are redirected, the numbers of incidents rise again. A basic safety axiom is that is impossible to eliminate all accidents (Gilmore, 1970). If the capability of an accident exists, mathematical probability will direct the frequency. A safe organization should set the goal of reducing the probability of accidents to occur.

Even if an organization's incident rate is statistically valid, it still only provides after-the-fact information. Mere review of the numbers of accidents does
not define the internal problems that caused them. If an organization sets its safety goal at zero incidents, their focus will be on the outcome, not on the steps toward safety. Instead, organizations need to work toward continuous safety improvement. The first step is to develop an organizational culture that values safety. Top management needs to be transformed, so that everyone truly believes in safety. Then, by using a behavior based safety process, the barriers to safety can be overcome.

Paradigm Shift

To maximize safety, a paradigm shift must occur. The new way to look at safety is that unsafe acts and conditions, and the resulting accidents and injuries, are all symptoms of something wrong with the management system (Ezell, 1992, p. 152). Safety needs to be seen as an operational strategy, not as a social strategy. Charles Ezell, a safety director, links safety to Philip Crosby’s Absolutes of Quality Management (1984). Ezell suggests three principles of total safety management: 1) management must be a vital part of the total safety organization, 2) management must be held accountable for safety performance, and 3) management must be a part of accident causation sequence (Ezell, 1992, p. 152).

Another safety researcher, Thomas Krause, writes "safety and quality are two sides of the same coin" (Krause, 1993, p. 47). Krause defines the ordinary safety Cycle:
1) low safety performance leads to 2) high quality attention to safety leading to 3) improved safety performance leading to 4) scarce resources moved elsewhere leading to 1) low safety performance (Krause, 1993, p. 48).

Statistical Process Control (SPC)

Just as in quality, the use of statistical process control can be applied to safety. In SPC terms, upstream factors are processes such as practice, research, or hard work, while downstream factors are the results such as skill, new product, or better pay. Traditional safety programs measure the downstream factors of accident rates. In SPC management, the measurement of the upstream factors, in this case unsafe behaviors, are the key to safety. These upstream factors are predictive of the defects in the system.

In the old systems of safety, "in part because the linkage is indirect between the upstream and downstream factors of safety performance, management does not know what to pay attention to and, therefore, tends to overreact to random variability in accident rates" (Krause, 1993, p. 48). This focus on the accident rates bypasses the possible problems of exposure, the management system, the culture, and ignores how the management system directly affects employee behavior. Meanwhile, the blame placed on the employee often results in employee resentment and resistance. The behavior-based approach to safety coincides
with Deming's point that management has the responsibility to fix management programs. Quality and safety are linked together.

Deming's 14 Points

Another safety researcher, Stephen Motzko (1989) has applied Deming's 14 Points of Quality (1986) to safety (see table 1). The first point can be translated into improving safety and employee health. Motzko challenges safety professionals in point two to move from accident reduction and common sense programs to finding new approaches for the same problems. In point three, he advises that program audits be stopped, in that they audit compliance, but do nothing to help the system. In regards to the fourth point, companies can minimize total cost by working with a single supplier. Safety is usually the last program to receive money, and many times purchase decisions are made on the basis of cost alone. Investment in good equipment pays off in the long run.

In order to meet point five, safety must be looked at as a process, not just in terms of end results. Point six refers to the need for training. Not only must the amount of training be increased, but training must be done in terms of skill development. The appropriate training techniques must be used for different types of training, and different types of employees. In regards to point seven, it is important to remember to help people to be more safe, not
just merely rate them. One of Deming’s strongest points is

number eight, which is to drive out fear. This includes the
fear of reporting incidents, and the fear of speaking up
about hazards and system problems. In order to achieve the

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<th>DEMING’S 14 POINTS APPLIED TO SAFETY</th>
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<td>1.</td>
<td>Create constancy of purpose for improvement of product and service.</td>
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<td>2.</td>
<td>Adopt the new philosophy.</td>
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<td>3.</td>
<td>Cease dependence on inspection to achieve quality.</td>
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<td>4.</td>
<td>End the practice of awarding business on the basis of price tag alone.</td>
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<td>5.</td>
<td>Improve constantly and forever every process for planning, production and service.</td>
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<td>6.</td>
<td>Institute training on the job.</td>
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<td>7.</td>
<td>Adopt and institute leadership.</td>
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<td>8.</td>
<td>Drive out fear.</td>
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<td>9.</td>
<td>Break down barriers between staff areas.</td>
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<td>10.</td>
<td>Eliminate slogans, exhortations, and targets for the work force.</td>
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<td>11.</td>
<td>Eliminate numerical quotas for the work force and numerical goals for management.</td>
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<td>12.</td>
<td>Remove barriers that rob people of pride of workmanship. Eliminate the annual rating or merit system.</td>
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<td>13.</td>
<td>Institute a vigorous program of education and self-improvement for everyone.</td>
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<td>14.</td>
<td>Put everybody in the company to work to accomplish the transformation.</td>
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ninth point, safety must be for everyone, and communication and team work are essential. The tenth point often confuses many companies who have made slogans, exhortations, and goals a common practice. However, if these items are used in an environment that does not support them, they only lead to employee frustration.

Deming’s 11th point has always created much controversy, since numerical quotas are firmly set into the structure of many American businesses. However numerical measures need to be statistically significant and consistently applied and interpreted. If they are not handled properly, it is better to delete them. The 12th point has also caused debate, in that many companies can not comprehend a world without performance appraisals. This point applied to safety merely points out that rewarding individuals or departments for accident competition can create a destructive atmosphere, since many factors of safety are usually out of the employees’ control. The last two points highlight the need for employees to be developed and challenged, and that everybody needs to be working for safety.

**Crosby’s Quality Program**

Philip Crosby, another quality spokesperson, has a list of eight quality improvement concepts which can be applied to a behavior-based safety program.

Just as the goal of quality is to minimize the variability of the quality of the product, the goal of safety
is to minimize the frequency and severity of incidents and accidents. By using the indicators of accident frequency,

TABLE 2
CROSBY'S EIGHT QUALITY CONCEPTS APPLIED TO SAFETY

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<tr>
<td>1.</td>
<td>Constancy of purpose.</td>
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<td>2.</td>
<td>Process, not program.</td>
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<td>3.</td>
<td>Do it right the first time.</td>
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<td>4.</td>
<td>Don’t blame the employee.</td>
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<td>5.</td>
<td>Specify standards in operational terms.</td>
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<td>6.</td>
<td>Use measurement of upstream factors to assess performance.</td>
</tr>
<tr>
<td>7.</td>
<td>Improve process, not downstream results.</td>
</tr>
<tr>
<td>8.</td>
<td>Use statistical techniques to distinguish variation due to common cause from variation due to special causes.</td>
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frequency of observation, the percentage of actions that rate as safe, safety-related maintenance information, and involvement indicators and surveys, organizations can make the timely changes necessary to management systems in order to eliminate unsafe behaviors. As the number of unsafe behavior incidents decreases, so will the probability of accidents.

Companies Who Have Achieved Safety Improvement

DuPont is known for its safety culture. In 1985 A Passion for Excellence cited DuPont for its approach to safety. The authors write "Dupont's safety record is
seventeen times better than the chemical industry average, and sixty-eight times better than manufacturing as a whole" (Peters & Austin, 1985, p. 282). This concentration on safety is a part of the culture, grounded in the history of the company. Management is held accountable for safety. One manager stated "'If I had to choose between losing a major account and taking a minor on-the-job lost-time accident, it would be easy. I'd prefer the loss of the account'" (Peters & Austin, 1985, p. 283). From the top down, safety is an integral part of the culture. While implementing a quality program, DuPont has kept safety out of it, because they see safety as too important to be part of a "program."

DuPont’s focus on safety has spread outside of the company itself. Philadelphia Electric Company (PECO) selected a DuPont Company safety seminar to begin their work on improving safety within their Transmission and Distribution Department (Donovan, 1989, p. 80). DuPont consultants helped PECO tailor the DuPont safety seminar to fit PECO’s needs. The seminar was then held for more than 650 management level employees. From there, PECO used field personnel as course trainers, who then went out and taught seminars covering how to recognize unsafe acts and conditions, as well as safety observation techniques. In addition, safety became the first item of business at staff meetings. Most importantly, the attitude of getting the job done quickly has changed to allowing enough time to do a job safely. PECO began to use
prizes and recognition for safety awareness and attitude, as well as completion of safety goals. The company looks at DuPont’s program as an approach to a safety culture, one "...which requires constant reinforcement and a continuing demonstration of company commitment" (Donovan, 1989, p. 81).

Another company who utilizes a safety program from DuPont is Florida Power and Light. S.T.O.P., or Safety Training Observation Program, trains employees to spot potential dangerous situations. Before implementing this program, Florida Power & Light would classify injuries by categories, and have appropriate training, such as back injury prevention training. This approach never really looked at the root causes. By using the S.T.O.P. program, and by developing a safety management protocol, with procedures and checks at all levels, the company was able to see improvement in the number of lost time accidents and doctor-treated cases. In addition, an increase in the number of reported unsafe acts and conditions demonstrates that safety is being taken seriously.

Florida Power & Light is known for being a leader in the area of total quality management, as a winner of the Deming Award. In addition to the use of the DuPont safety program, the application of TQM principles to safety has also helped the company to achieve a low safety record. In the West Palm Beach district, a team began working on employee safety in 1989. While analyzing doctor-treated cases, they found that of 19 total cases, 15 were wounds. Of these cases, ten were
due to dog bites. The team set a target goal for zero and then brain-stormed reasons for dog-bites. They compared their list to a survey of the ten cases to find the root causes. As a result, all meter readers were told that all dogs are a risk. A plastic meter reading card was created so that if the customer did not secure their dog, the customer could take the reading using the plastic card. The team then set up an action plan and timetable to put the new system in place. In April of 1989, the team reviewed the accident rates, and found five new dog bite cases. After analysis of those cases, the team made modifications. For example, they discovered that due to the size of the cards, the readers were not always carrying them. The cards were then modified to fold in half, in order to fit easily into a pocket. Again, while all accidents are not preventable, by searching for root causes, the probability of accidents can be severely decreased, resulting in a much safer environment.

In 1991, DuPont began a major restructuring which resulted in almost one-half of the company's reporting levels being eliminated. As a result, the 65 employees of the corporate safety and health department were replaced with the SHE (Safety, Health, and Environmental) Excellence Center. With only half the original staffing, the center works to continue networks and partnerships to help DuPont manage safety (LaBar, 1993, p. 28). By keeping their commitment to safety, DuPont has demonstrated that safety can be streamlined
and downsized like any other part of the business.

Another chemical company, Dow Chemical Company is working to achieve better safety rates while at the same time, reducing safety staffing levels 25 percent by 1997 (LaBar, 1993, p. 28). To do so, they created the Dow Safety Improvement System, which identifies ten key elements of a safety program, and 13 programs of emphasis for the company. The corporate director for safety, loss prevention, and security, John Oldner, attributes the emphasis on continuous improvement as an important reason why safety performance has improved while the staffing levels are reduced.

In another approach to safety, the Mecklenburg County Engineering Department began with a survey of employees' attitudes, opinions, and morale as a reaction to a costly year of work-related injuries. As a result, they discovered that employees were frustrated by department hierarchy, wanted input in decision making, participation in problem solving, and recognition for good performance. From 1985 until 1990 they developed a quality control program, employee suggestion program, recognition programs, and a team safety program. For the team safety program, management began with a analysis of the most hazardous areas. They then formed work groups in those areas, and analyzed their accidents. Management concluded that unsafe behaviors caused most of the accidents. A program was then developed where employees worked as a team to remove the safety problems, incentives were awarded
immediately, and employees were helped to see the impact of their unsafe behavior. Each team was to be rewarded based on its total safety performance. The pilot test conducted in one section of the department brought immediate results. However, when management expanded the team program to another section, they discovered that the program as is did not transfer well. In the second group tested, the organizational culture of the section was not as conducive for the team concept. As a result, management let the employees of that section re-design the teams. This reduced a lot of resistance to the program, and eventually resulted in success. The engineering department summarized the necessary ingredients to their team safety program as 1) positive awards, 2) team competition, team recognition, team rewards, and team peer pressure, and 3) employee input (Lanier, Jr., 1992, pp.22-25).

In 1983, when the Japanese company, Bridgestone Corporation bought Firestone’s LaVergne plant, the injury incidence rate was rising while production and employment were declining. However, Bridgestone was able to turn these figures around through the use of employee involvement. The first step was for the company to begin listening to employees. Quality circles were formed and named the Employee Involvement Group (EIG). Due to the employee improvement suggestions from these groups, incident rates dropped over five years from 11.8 per 200,000 work hours to 2.2 in 1986. The Safety Director said: "'I think the EIG’s have addressed
some things that nobody else would have seen. That is their biggest function. They know the equipment as well as anybody, or better" (LaBar, 1989, p. 103). In addition to the employee involvement groups, the plant also utilizes a safety committee, extensive training for new hires, and monthly departmental safety meetings. Again, by making safety an integral part of the work life, and by utilizing employee involvement, companies can see an incredible turn around of safety statistics.

Another chemical company, Occidental Chemical, began in 1983 to build a new safety culture. The new president and CEO, J. Roger Hirl decided to use the company's safety record to measure success. "Safety progress...ought to coincide with success in other aspects of the business like quality, customer satisfaction, and productivity" (Smith, 1992, p. 65). By focusing on the safety process, and how safety impacts on the other parts of the business, and vice versa, Occidental began promoting a safety culture. "Safety + Quality + Productivity = The Formula for Success" was adopted as a manufacturing slogan in 1985. Along the way, employee-run safety meetings, safety committees, and employee-conducted tours for visitors and clients all became a part of the safety culture. When Occidental began their TQM program "Oxy Quality Plus," the director of quality management stated that the safety program's use of employee involvement, training, and charting performance assisted in the implementation of the
quality program. "Like quality...safety is a continuous process of improvement" (Smith, p.66).

In 1987, Occidental began work on a Safety Congress, which took two years to design. In 1989, participants of all of the divisions of the company met to list their safety concerns. The employee and management lists were then combined, prioritized, and the top 19 ideas were analyzed by teams. At the end of the Congress, each team made presentations to the group. Because of the commitment to safety, honesty was a vital part of the Congress. At one point, during a discussion, one employee stated there were times when production came before safety. When management questioned the group for specific examples, other employees spoke up and provided them. Management listened and believed. After the Safety Congress, the participants returned to their own locations, and were able to work on their individual plant’s safety programs with the many new ideas shared at the Congress. In another big step toward safety, Occidental has become an OSHA Voluntary Protection Program participant. Five worksites have earned OSHA Star recognition, which means they have safety and health programs in excess of OSHA standards, and better than average incidence rates. The company joined the program to help get national recognition for their employees who make safety a part of the culture.

In 1988, the Delaware City plant of Georgia Gulf, a producer of PVC had the worst safety record in the company.
As a result, they created a safety process named H.E.A.D. (use your HEAD to Erase All Dangers). In 1988 the safety steering committee analyzed three years of accident reports. They discovered that over 30% of accidents in one area originated from one task; the opening and closing of valves. They found that the root problem was that the valves were difficult to open. The committee also found that 84% of hand injuries were due to a failure to wear proper equipment. As a result, the committee began observing and giving feedback on the use of equipment. In addition, management made sure that good equipment was provided and that the valves were standardized. After the implementation of the HEAD program, the plant only experienced one valve incident.

Georgia Gulf also recognizes the link between safety and quality. "Safety performance is trending toward continuous improvement. And along with that trend in safety has come improvement with quality" (Krause, 1993, p. 53). The plant discovered that when they keep regular sampling of the work force behavior and condition, quality is high. Quality slips just before their injury rates go up. Another side benefit of the safety process is that the plant has won awards for outstanding environmental performance. In addition, the company now looks at the safety programs of its suppliers. Once quality and safety becomes an integral part of a company, it begins a ripple effect. Suppliers are the next step in the both the quality and safety chain.
Another company which links quality and safety is Unocal. In 1984, Unocal began using Crosby's quality theories. In 1988, after a major explosion and fire at one of their plants which resulted in the death of an employee, the company reviewed their safety program. During the course of the review, Unocal realized they could apply quality principles to safety. The Safety Improvement Process (SIP) has four safety absolutes: 1) Conformance to requirements, 2) Prevention—look at root causes, not after the fact, 3) Zero Defects—which represents the goal of continuous improvement to strive for, and 4) Cost of Safety—the company needs to know the total costs of safety to help in prioritizing (Minter, 1991, p. 47).

After establishing the Four Absolutes of Safety, Unocal surveyed their employees about the current safety program. A safety council developed a mission statement, and set up a committee to develop a cohesive safety program and standards. The safety program was categorized into eight areas: 1) Procedures and Standards, 2) Reporting Responsibility, 3) Safety Equipment, 4) Training and Communications, 5) Maintenance and Inspection 6) Audits, 7) Recognition, and 8) Emergency Responses. The committee then developed a two volume set of safety regulations and procedures for the total company, which is subject to annual reviews. (Minter, 1991, p. 48).

Unocal found that the biggest challenge in developing the
SIP was changing peoples’ attitudes. The company was able to do so through management commitment and leading by example. At the corporate headquarters, 50% of staff meetings every two weeks were spent reviewing accidents, to find the lack of control. One senior vice president states: "An accident report is not a closed matter...until the cause is rooted out and proper controls are put in place to keep the same thing from happening again" (Kiesche, 1990, p. 25). Management commitment was also demonstrated via capital expenditures for supplies, for the program, and for training.

Training has played an important part in Unocal’s safety success. In opening a new plant, "Unocal took the approach that in teaching its new employees how to perform their jobs correctly, it would be teaching them how to work safely...safety is covered as one of the various requirements of performing a quality job" (Minter, 1991, p. 49). Contractors working on Unocal property are required to attend a one and one-half hour course on Unocal safety procedures. In addition, when Unocal opened their new corporate headquarters, each employee had to attend safety training before they could enter the new building (Kiesche, 1990, p. 25).

Other important parts of Unocal’s safety process include the use of self audits. In reporting, near misses and minor injuries are considered just as important as major incidents. In review of the minor injuries of truck drivers, the safety
council discovered that the company did not have a uniform design standard for trucks. Drivers, unfamiliar with how the trucks were outfitted, were experiencing burns, pulled muscles, or twisted ankles due to different equipment. As a result, Unocal required design standards to be met by truck manufacturers, and began standard training on the use of new equipment. Unocal also believes in teamwork in safety. They share safety ideas and information with other members of the Chemical Manufacturing Association through the industry's Responsible Care Program. In summary of the total Safety Improvement Process, however, Unocal has realized that "'You can't manage the outcome; you have to manage the process'" (Kiesche, 1990, p. 26).

In order to create a safe working environment while adapting to an extremely competitive, global and diverse workplace, companies need to stop being incident-focused. Using the tools of total quality management such as statistical process control, management commitment, and employee involvement is one way for companies to achieve their safety goals. Safety and quality should not just be the current buzzwords of a management fad. Rather, both are necessary for companies to survive successfully in this changing world.
CHAPTER 5
RESEARCH DESIGN

Hypotheses

In designing the research project, the following hypotheses were developed:

Hypothesis 1: Incentive programs focused on accident rates alone do not prevent accidents.
Hypothesis 2: A safety program that directs attention to safe behavior will help lower the number of accidents.

Upon review of the results of the research study, answers to the various questions will provide the researcher with information regarding the following:

1. Do the employees understand the current safety program?
2. How safe do employees feel in their jobs?
3. How important is safety?
4. What do employees feel help them in working safely?
5. What kind of impact, in terms of how well they remember from year to year, does the safety program have on employees?

This information can then be reviewed to help determine what parts of the safety program are useful. If the research project supports the first hypothesis, that incentives based
on accident rates alone do not prevent accidents, a company will then know where not to spend their money. If the second hypothesis, that safety programs focused directly on safe behavior do result in a lower accident rate is supported, companies will know where to best apply monies and action to increase safety. This knowledge will provide a solid stepping stone in the construction of an effective safety program.

Research Procedure

The hypotheses will be tested by a collection of survey data from all of the non-exempt employees of three divisions of a publicly-held company. The company is a warehouse distribution operation which currently has a safety incentive program in place, that awards for time without accidents.

Overview of Safety Program

For all three divisions, the current safety incentive program was implemented in April 1989, the beginning of the 1990 fiscal year for the company. At that time, employees began to accumulate points for each month they went accident free. A "lost time" accident resulted in a greater loss of points than an accident that only resulted in medical treatment. At the end of the fiscal year, each employee was allowed to order a prize from a catalog utilizing the points they earned for that year. The selection of items included jewelry, sport equipment, kitchen appliances, and electronics.

In fiscal year 1993 the program was expanded to also award points based on employee attendance at work and
attendance at safety meetings, in addition to the time without accidents. Also, at the end of the year, the accumulated points were paid out in the form of a gift certificate for a national retailer, instead of the use of the prize catalog. An employee who had no sick days, attended every safety meeting, and had no accidents was eligible to earn 60 points, which was then converted to a $60 gift certificate.

Although attendance at the monthly safety meeting was only awarded in Fiscal Year 1993, for the most part, attendance at the meetings was strongly recommended since the beginning of the program. Safety meetings were implemented as part of the corporate safety program in 1986. Lasting approximately 30 minutes, the meetings would cover topics supplied by the corporate office. Materials such as hand-outs and video-tapes were often utilized. Many topics were repeated yearly, such as fire safety and tornado safety. Some months when no topic was provided, each division could then create its own program. In addition to covering the topic of the month, the safety meetings were also utilized as a forum for the local division to bring up safety issues specific to their current needs, and for employees to raise any safety concerns to be addressed by management and/or the safety committee.

The safety committee was added to the company program in 1990. Each division recruited volunteers to serve on the committee. Walk-throughs of the local plant to catch safety
violations and/or potential problems, as well as identifying educational needs are the main responsibilities of the committee. Each division is allowed the autonomy to expand the safety committee’s responsibilities as need requires.

The safety incentive program, monthly safety meetings, and the safety committee are the key components of the safety program developed by the corporate office and implemented company wide. In addition, individual divisions were allowed the autonomy to address safety in other ways if they felt the need. For example, in 1990 Division A held a couple drawings for several $100 bills. The names of all employees who had been accident free for the specified time period were put into a box, and several names were drawn. This was done in an attempt to highlight the rewards of being accident free, due to a sharp increase in the number of accidents the previous year.

Methodology

The design of this study includes a survey. This allowed for some degree of anonymity for those surveyed to respond honestly on the issues of safety within their work environment. Three separate surveys were designed for this study, in order to collect information directly from the non-exempt employees, the management staff involved in the administration of the program, and the accident statistics.

The first survey (see Appendix 1) is comprised of three pages. This questionnaire was distributed to all of the non-
exempt employees that participate in the safety incentive program. Questions were asked to determine the employees' perceptions of safety within the work environment. Employees were asked to respond to statements such as "I follow safety procedures" and "Safety meetings provide me with information that helps me in my job" on a four-point scale. The employees were also asked whether they felt that certain aspects of their work and the safety program were important to the safety of the work environment. On the last page of the questionnaire, employees were asked to list the number of both reported and non-reported accidents they had, as well as demographic information.

At the end of the questionnaire, the non-exempt employees were asked questions to determine whether they remembered parts of the incentive program and the safety meetings from year to year. The final question, "What do you think would make ______ a safer place to work?" was asked to solicit additional ideas for the occupational safety program.

The second survey (see Appendix 2) was designed to retrieve the archival data on OSHA 200 recordable accidents. This information is necessary to determine if the accident rates of the three divisions had declined after the implementation of the safety incentive program. Each division was given one survey, and asked to fill in the number of OSHA 200 recordable accidents per month for the calendar years of 1988 through 1993. In addition, a miscellaneous comments
section was given, in order to provide the opportunity for a
division to elaborate on any information they felt might have
affected the accident rates during this time period.

The final survey (see Appendix 3) was created to survey
the top three operation managers of each division. All of
these managers share the responsibility for implementation and
monitoring of the division's safety program, as well as for
the safety meetings. The managers were surveyed to confirm
that the safety program had been implemented per the corporate
guidelines for all of the years being reviewed. In addition,
the managers were given the opportunity to list any factors
that they felt had an impact on the number of accidents. The
managers were also asked whether they felt that the current
safety program should be continued. The final question, "I
think we could improve safety by______" was asked to solicit
their feelings on how to improve safety.

Sample Size and Response Demographics

Each month, every division of the company is required
to hold safety meetings. Depending on the size of the
division, two to three meetings are held within a 24 hour
period. All non-exempt employees are expected to attend the
safety meeting. In fact, at the time of the survey, one of
the criteria to earn the safety incentive was attendance at
each month's safety meetings. Because of management support,
all employees present at work on the day of the meeting do
attend. Therefore, the sample included all non-exempt
employees of the three divisions employed the day of the meeting. The only employees missing would be those who were sick or on vacation. The resulting sample was 241 employees. The breakdown was as follows: 129 at Division A, 47 at Division B, and 65 at Division C. The average age of the non-exempt employees was 30, with 56% male and 44% female. The majority (71%) of the employees surveyed held warehouse positions. Twelve percent were in office positions, such as customer service and accounting. The remaining 17% of the employees reported to the inventory control, data processing, facility services, quality control, and transportation departments. Each division had both a day and night shift. The average tenure of the employees was four and one-half years, with three years being the average length of service in the current position. Of the three divisions surveyed, Division A was the only union facility. Forty percent of the non-exempt employees surveyed were union, while 60% were non-union.

No demographics were collected in the survey of operation managers, because of the small sample size. Each division had a distribution center manager, a day operations manager, and a night operations manager. Of the nine managers surveyed at the three divisions, eight of these managers responded.

Procedures

The questionnaires were distributed to the non-exempt
employees during each division’s monthly safety meeting. The researcher was present at one of the divisions; the meetings at the other two divisions were led by a proctor. At all sites, the questionnaires were filled out on site during the meeting, collected immediately, and sealed in an envelope. The two divisions then mailed the envelopes directly to the researcher. In addition, the top three operation managers were surveyed via the separate questionnaire. The management questionnaires were left for the managers to complete during that same week. Self-addressed stamped envelopes were provided, so that the surveys could be mailed directly to the researcher.

A written script and set of directions were mailed with the surveys to the two divisions, so that the questionnaires were presented and handled in the same manner at each site. Confidentiality for each survey response was promised. The employees were informed that the envelope with the completed surveys was to be sealed at the end of the meeting, and mailed directly to the researcher. No one from the company would look at the individual responses, and the results were to be reported in the aggregate to protect the confidentiality of the responses.

Coding and entry of the survey results were done by the researcher due to the small sample size. The data were processed and analyzed, using SPSSPC. Basic statistics including mean, mode, and standard deviation were run.
Correlations among different demographic groups were also reviewed. Results of the open-ended questions were transcribed, and some are reported in the result section.

**Variables**

In this study the independent variables are the incentive program and safety meetings currently in place at the company participating in the study. In the current program, all non-exempt employees receive a non-cash material item upon completion of the designated time period without an accident. The type of incentive has changed throughout the years of the program implementation. Therefore, data was collected specific to each type of incentive used: gift certificate to a major retailer, and/or choice of products from a catalog.

The dependent variable of this research is the number of accidents. This will be defined in terms of accidents recorded on the OSHA 200 Log, which are those accidents that require medical attention (greater than first aid), or lost time from work.
CHAPTER 6
RESEARCH RESULTS

Accident Rates

The number of accidents per month for each division can be found on the OSHA 200 form. This document is required per federal law. Reporting is done on a calendar year basis. Table 3 reflects the OSHA recordable accident totals for the three divisions together. Tables 4, 5, and 6 show the number of OSHA recordable accidents broken down by month for each division for the calendar years of 1988-1993. Overall, there was a significant decline in the number of OSHA recordable accidents for the three divisions since the implementation of the safety program: in 1988, the last year before implementation of the safety incentive program, there were 65 total accidents for all of the divisions. In 1989 the number of accidents increased to 79, but for each year after, there was a steady decline in the number of accidents. In 1993, there were only 42 accidents recorded for the three divisions.

When the number of accidents is examined for each division separately, there is also a reduction in the number of accidents throughout the years of the safety program implementation. However, an erratic pattern of increases, as
well as decreases emerge. Division A, which is the largest of the three divisions in terms of number of employees, is

**TABLE 3**

**TOTAL OSHA 200 RECORDABLE ACCIDENTS FOR 3 DIVISIONS**

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<td>8</td>
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<td>6</td>
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<td>4</td>
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<td>48</td>
<td>52</td>
<td>64</td>
<td>79</td>
<td>65</td>
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</table>

the most erratic of the three. In 1988 there were 27 accidents recorded. This number increased to 38 in 1989, and to 46 in 1990. A decrease to 22 accidents in 1991 reflects the year with the least number of accidents. 1992 reflects a jump up to 36 accidents, and in 1993 there was another slight decrease to 26 recordable accidents. This erratic pattern makes it difficult to discern whether or not the safety program directly affected the number of accidents.
Of the three divisions, Division B demonstrates the greatest overall decrease in number of recordable accidents. While there was an increase in the number of recordable accidents from 1988 (20) to 1989 (23), the following years show a large decrease in accidents. In 1992 only four accidents occurred, and in 1993 that number increased only to seven. Overall, the decrease in the number of accidents was greater than 50%, suggesting that the safety program was successful in this division.

Division C also experienced a reduction of 50% in the
number of recorded accidents, but also through an erratic pattern. While only 18 accidents were recorded in both 1988 and 1989, this division experienced a peak number of 22 accidents in 1991. A decrease in the number of accidents brought the number down to nine in 1993. Again, the decrease in the number of accidents points to success of the safety program. However, the fact that of the years surveyed, this division experienced the highest number of accidents in the third year of the program's implementation casts some doubt as the direct relationship between the program and the number of accidents.

Of the three divisions, there appears to be no pattern to the fluctuation in the number of recorded accidents that is consistent among them. This inconsistency suggests the possibilities of other factors affecting the accident rate, or that the safety program itself did not affect the number of accidents. Division A experienced the greatest increase (14) in accidents during the third year of the safety program, from 1991 to 1992, while their greatest decrease was from 1990 to 1991 (24). This decrease could possibly be attributed to the drawings for $100 bills utilized by only Division A. Division B saw no increase in recorded accidents after the implementation of the safety incentive program, and had its greatest decrease the next year, 1989 to 1990, from 23 to seven. From 1990 to 1991 division C reported a 100% increase in the number of accidents, and an even greater decrease the
following year.

Both Divisions B and C have experienced a more steady work flow, and number of employees. Division A, in contrast, completed a major expansion in 1989-1990 in terms of both business and the number of employees. The differences in the work flow as well as in tenure of employees may also have affected the accident rates. When the work flow is erratic, safety can sometimes take second place to meeting production. In terms of tenure, newer employees may be more prone to

| TABLE 5 |
| DIVISION B OSHA 200 RECORDABLE |
| January | 0 | 0 | 0 | 2 | 2 | 3 |
| February | 1 | 0 | 2 | 0 | 2 | 1 |
| March | 1 | 0 | 1 | 1 | 7 | 1 |
| April | 1 | 0 | 1 | 0 | 3 | 2 |
| May | 0 | 1 | 0 | 2 | 1 | 0 |
| June | 0 | 0 | 2 | 0 | 1 | 3 |
| July | 0 | 2 | 0 | 0 | 3 | 2 |
| August | 2 | 0 | 0 | 0 | 2 | 4 |
| September | 0 | 0 | 0 | 1 | 0 | 3 |
| October | 0 | 0 | 1 | 1 | 0 | 1 |
| November | 1 | 1 | 1 | 0 | 1 | 0 |
| December | 1 | 0 | 0 | 0 | 1 | 0 |
| Total | 7 | 4 | 8 | 7 | 23 | 20 |

accidents, as they are often unfamiliar with work procedures
and equipment. However, as a norm, all three divisions work under the same basic operating procedures. The only noted difference among the divisions in terms of the implementation and administration of the safety program was that of Division’s A $100 bill drawings in 1990. Otherwise, all the divisions conducted the safety program per the corporate instructions.

### TABLE 6

DIVISION C OSHA 200 RECORDABLE ACCIDENTS

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<tr>
<td>March</td>
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<td>22</td>
<td>11</td>
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</table>

While the three divisions did see a decrease in the number of accidents overall during the course of the safety program, there has been no causal relationship demonstrated.
Increased training, continued tenure and therefore experience level of the employees, as well as new OSHA requirements are some of the other factors that could greatly affect the number of accidents in the divisions. Therefore, it is difficult to state definitively that the safety program resulted directly in the decrease in the number of accidents for the three divisions. In fact, the erratic pattern of increases and decreases in the number of recorded accidents for each division suggest a need for further study of this area.

Management Perceptions

Because of the small sample size of the management survey, a general review of the comments made on the surveys allows a limited view of how those managing the safety program perceive it. One of the managers surveyed commented: "Personally I think our facility is extremely safe. People rarely get hurt by accident. They usually get hurt by being careless." This manager felt that the safety program should not be continued in its present format. However, the other seven management responses all answered "yes" to the statement, "I would like to see the current safety program continue in its present format." Suggestions to improve safety included having individuals involved in accidents discuss the situation to the other employees during the safety meetings, being more severe with careless employees, increasing employee awareness and involvement, and utilizing the safety committee in accident investigation. Another
manager proposed the creation of a corporate position in charge of safety with a budget for training films and materials for use of all the divisions.

All of the surveys received did not answer fully whether the divisions had implemented the corporate safety programs per the company guidelines in all of the applicable fiscal years. However, all eight responses did answer affirmatively in regards to holding the safety meetings each month for all employees.

**Employee Perceptions**

Overall, the majority of the employees of the three divisions felt that the work environment was safe (see Table 7). Sixty-nine percent felt that safety procedures were followed most of the time. However, 29% responded (some of the time) that safety procedures are only followed when convenient. Almost half (49%) of the employees answered that they follow safety procedures, as well as report safety hazards "always." Fifty-eight percent of the respondents state that they correct any safety hazards that are in their control. In regards to supervisors, 88% of the employees answered affirmatively to "I feel my supervisor believes in safety," while 81% agreed that their supervisor practices "safety first." The largest area of disagreement was to the statement "Safety is not important in my job." Thirty-nine percent responded with always/most of the time: 61% responded some of the time/never. However, 95% of the employees agree
that they follow safety procedures always/most of the time.

In regards to the specific parts of the company's safety program, it appears that the employees perceive the safety meetings as having the greatest impact on their behavior.

**TABLE 7**

**EMPLOYEES' PERCEPTIONS OF FREQUENCY OF SAFETY PHENOMENON**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Always/ Most of the time</th>
<th>Some of the time /Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this company, safety procedures are followed.</td>
<td>86%</td>
<td>14%</td>
</tr>
<tr>
<td>I follow safety procedures.</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td>I report safety hazards.</td>
<td>84%</td>
<td>16%</td>
</tr>
<tr>
<td>I correct those safety hazards that are in my control.</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>I feel the company believes in safety.</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>I feel my supervisor believes in safety.</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Management corrects safety problems quickly.</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>I feel that my safety concerns are treated seriously.</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>Safety meetings provide me with information that helps me in my job.</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>Safety hazards are not corrected in a timely manner.</td>
<td>32%</td>
<td>67%</td>
</tr>
<tr>
<td>Safety is not important in my job.</td>
<td>39%</td>
<td>61%</td>
</tr>
<tr>
<td>Safety procedures are only followed when convenient.</td>
<td>33%</td>
<td>64%</td>
</tr>
<tr>
<td>My supervisor practices &quot;safety first.&quot;</td>
<td>81%</td>
<td>19%</td>
</tr>
</tbody>
</table>
Eighty-two percent responded strongly agree/agree to the statement "I feel the safety meetings actually help change my behavior to be safe." Seventy-seven percent responded positively to the statement "I feel the safety incentive programs actually help change my behavior to be safe." When these statements were re-worded, "The safety incentive program does not help me to be safe," and "the safety meetings do not help me to be safe," similar results followed, suggesting the measures provide reliable results. The use of safety posters in affecting the employees' behavior was seen as helpful only by half of those responding. When asked if it is possible to reach both productivity rates and work safely, 74% responded positively. Eighty-nine percent of the employees believe it is possible to reach both quality standards and work safely. These responses are reinforced by the 75% of the employees responding positively to the statement: "I believe it is possible to reach both productivity and quality standards and work safely."

In another section of the questionnaire, the employees were asked to respond yes or no as to the importance of the individual parts of the safety program, as well as other factors that could affect safety. The total results can be found in Table 9. While 87% of the employees felt that both the safety incentive program and the monthly safety meetings were important, three other factors received greater positive responses. Ninety-six percent of the employees responded that
orientation training was important to safety. Employee morale (90%) and quality standards (89%) also received high positive responses. When asked to rank the top two factors that are important to employee safety at the company, the most often

TABLE 8

EMPLOYEES' PERCEPTIONS OF SAFETY PROGRAM AND WORK STANDARDS

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree/ Strongly Agree</th>
<th>Disagree/ Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the safety meetings actually help change my behavior to be safe.</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>I feel the safety incentive programs actually help change my behavior to be safe.</td>
<td>77%</td>
<td>23%</td>
</tr>
<tr>
<td>I feel the safety posters actually help change my behavior to be safe.</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>I believe it is possible to both reach productivity rates and work safely.</td>
<td>74%</td>
<td>26%</td>
</tr>
<tr>
<td>I believe it is possible to both reach quality standards and work safely.</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>The safety incentive program does not help me to be safe.</td>
<td>26%</td>
<td>74%</td>
</tr>
<tr>
<td>The safety meetings do not help me to be safe.</td>
<td>18%</td>
<td>82%</td>
</tr>
<tr>
<td>The safety posters do not help me to be safe.</td>
<td>36%</td>
<td>63%</td>
</tr>
<tr>
<td>I believe it is possible to reach both productivity and quality standards and work safely.</td>
<td>75%</td>
<td>24%</td>
</tr>
</tbody>
</table>
cited first and second choices were orientation training (18%) and employee morale (15%). The safety incentive program and monthly safety meetings were the second most cited factors.

TABLE 9
EMPLOYEES' PERCEPTIONS OF FACTORS CONTRIBUTING TO SAFETY

<table>
<thead>
<tr>
<th>Items Relating to Safety</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Incentive Program</td>
<td>87%</td>
<td>13%</td>
</tr>
<tr>
<td>Monthly Safety Meetings</td>
<td>87%</td>
<td>13%</td>
</tr>
<tr>
<td>Orientation Training</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td>Productivity Standards</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Safety Posters</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>Work Hours</td>
<td>78%</td>
<td>22%</td>
</tr>
<tr>
<td>Quality Standards</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Employee Morale</td>
<td>90%</td>
<td>10%</td>
</tr>
</tbody>
</table>

The question "I receive the safety incentive "Fox Bucks" for: (check any/all that apply)" was asked to survey the employees' understanding of the company's safety program. The results are shown in Table 10. The highest response was for having no accidents, and the second highest response was for attending safety meetings. These are the top two components of the company safety program. The other program requirement of showing up for work only received a response rate of 42%. However, this factor had just been added to the safety incentive program during the past year. It is interesting to note that 60% of the employees ranked working safely as a
component of the safety program. While this factor could be interpreted as being the same as having no accidents, per the literature review it is known that having no accidents does not necessarily imply working safely. The difference rate in responses, 74% for having no accidents, while 60% responded working safely, may reflect that some employees realize the difference between the two points.

**TABLE 10**

**EMPLOYEES' KNOWLEDGE OF SAFETY PROGRAM REQUIREMENTS**

<table>
<thead>
<tr>
<th>%</th>
<th>Activity</th>
<th>%</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>74%</td>
<td>having no accidents</td>
<td>63%</td>
<td>attending safety meetings</td>
</tr>
<tr>
<td>42%</td>
<td>showing up for work</td>
<td>18%</td>
<td>completing tasks</td>
</tr>
<tr>
<td>18%</td>
<td>helping others</td>
<td>60%</td>
<td>working safely</td>
</tr>
</tbody>
</table>

When asked questions about their recognition and retention of the format of the safety program, there was an increase in the numbers of no responses. However, 45% of those responding had participated in the safety incentive program for all four years. When asked to list the amount of "Fox Bucks" they received last year, 14% replied that they had received the maximum amount, while almost half did not answer. The employees were also asked whether or not they remembered any of the prizes they had selected from the catalog in
previous years. A little over half of the employees responded that they did. Although the lack of responses affects the data, it appears that the prizes themselves are better remembered than the Fox Bucks. In fact, over 50 different prize items were recorded by the researcher in response to the request to list those prizes received.

When surveyed as to which safety meeting topics were seen as most helpful, 42 topics were mentioned. However, there were several topics that were listed multiple times. Fire safety was the most often cited (n=25) topic that helped employees work more safely at home, while forklift safety (n=12) was the most popular work topic. Proper lifting techniques (n=14) was cited for both work and home. Lock out/Tag out, an OSHA safety training requirement was also cited (n=10) as a helpful work safety topic. The employees listed kitchen safety, electrical safety and tornado/storm safety as other popular home safety topics.

A review of the correlations between different demographic groups and various sets of questions from the employee survey did produce some areas for further study. Correlations run between sex and assorted questions resulted in no significant relationships. In the divisions surveyed, there was a fairly equal balance of both male (56%) and female (44%) employees. From these results, it appears that the employees' attitudes on safety within this company are not affected by gender.
Correlations run between tenure and other variables, for the most part did not produce any significant results. However, in responses to the statement "I feel the safety incentive programs actually help change my behavior to be safe," there was a one-tailed significance ($r=-.15, p \approx .01$). This may signify that the more tenured employees feel that the incentive program does help safety within the organization. As a result, the organization could look at ways of attracting the attention of less tenured employees to the program. This correlation may have connections to the high rating given by the surveyed employees to the importance of orientation training in safety. Perhaps increased training in safety, and on the safety incentive program should be built into the orientation training program, in order to help the less tenured employees perceive the value of the safety incentive program.

In another correlation run, there was significant response to the statement "I feel the company believes in safety" and the number of non-reported accidents experienced ($r=.15, p \leq .01$). This may reflect that those employees who experience few or none non-reported accidents strongly believe the company supports safety, and vice versa. For further review, it may be beneficial to encourage employees who have accidents, reported or non-reported, to speak openly and honestly as to what they perceive to be the cause of the accidents. Until root causes of accidents are found, there
will continue to be accidents.

Those employees who had few or no non-reported accidents also strongly responded to the statement "I feel that my safety concerns are treated seriously." \((r=0.16, p<0.01)\) As demonstrated throughout the literature review, employee autonomy and the state of labor-management relations can play an important role in safety. This correlation tends to support the theory that employees who feel that their comments and ideas are both listened to and acted upon will feel that their environment is more safe.

It is interesting that the strongest correlation among those reporting few/no non-reported accidents is that to the statement "I believe it is possible to reach both productivity and quality standards and work safely" \((r=0.23, p<0.001)\). This may also be linked to the issue of employee satisfaction, in that employees are more productive when there is quality of worklife, autonomy, and solid communication between employees and management.

The demographic group that resulted in the most correlations was that of union status. In response to "I feel safety meetings actually help change my behavior to be safe", the negative correlation \((r=-0.25, p<0.001)\) reflects that union employees may tend to respond more negatively, while non-union employees responded more on the positive side. There was a negative correlation to the statement "I feel the safety incentive programs actually help change my behavior to be
safe" \( (r=-.30, p<.001) \), and a positive correlation to "The safety incentive program does not help me to be safe" \( (r=.22, p<.001) \). These results suggest reliability on the correlation that those of union status do not feel the safety incentive program helps in promoting safety.

The union status employees also demonstrated a negative correlation to the statements "I believe it is possible to both reach productivity rates and work safely," \( (r=-.34, p<.001) \) and "I believe it is possible to reach both productivity and quality standards and work safely" \( (r=-.30, p<.001) \). In fact, the researcher had specifically developed these questions with the union status in mind, as many union members had previously commented that the standards forced employees to work at a pace that did not allow time to complete tasks safely. This may be an area for further research by the company, in searching for root causes and system problems causing accidents.
 CHAPTER 7

CONCLUSION

Implications

In looking for the answer to the research question:

Can the safety program be more effective?

a definitive answer may not be necessarily found. However, as with any program, the research project can be used as a tool for evaluation. A review of the questions asked earlier in this thesis sets up an evaluation of the safety program.

1. Do the employees understand the current safety program?

The majority of the employees were able to correctly identify the two main components of the program. However, a little less than half (42%) were able to identify the third factor of showing up to work. In reviewing the significance of this difference, a review of the safety program reveals that the attendance factor had only been added to the safety incentive program during the past year. Perhaps the company might be more successful in making additions to the program by utilizing a different and/or better form of communication of changes to the program. On the other hand, perhaps the different levels of recognition highlight the disparity between the area of safety (having no accidents and attending
the safety meetings) and the area of attendance (showing up for work). The safety program may be better understood by the employees if only behaviors directly related to safety are included.

2. How safe do employees feel in their jobs?
Overall, most employees felt that the work environment was safe. Employees themselves felt that they followed safety procedures and reported and/or corrected safety hazards. A large majority of employees also reported that their supervisors believed in and practiced safety. This last factor is extremely important in creating a safe environment, because management commitment, in this case demonstrated by the supervisors' actual practices, is vital to a strong safety program.

3. How important is safety?
While the employees recognize the safe environment they work in, there seems to be disagreement as to the importance of safety. The response to the statement "Safety is not important in my job" resulted in 39% answering "always/most of the time." Perhaps the safe environment is being taken for granted, or that employees of a specific area, for example the office, do not see their environment as particularly hazardous.

4. What do employees feel help them in working safely?
The answer to this question is interesting in that it differs from the emphasis the company places on various parts of the
safety program. The employees rated safety meetings as having a greater impact on their behavior (82%) than the safety incentive program (77%). However, when asked to respond to the importance of individual parts of the safety program, orientation training received the highest response (96%), even though this area has not received as much emphasis by management as others. Employee morale and quality standards were also highly rated, with the safety incentive program and monthly safety meetings also mentioned. The main emphasis of the company has been on the incentive program and monthly meetings. The implications of the employee’s perceptions are mirrored by the findings of the many safety studies reviewed in this paper. Training and quality of worklife are very important components of a successful safety program.

5. **What kind of impact, in terms of how well they remember from year to year, does the safety program have on employees?**

The increase in the numbers of no responses to questions in regards to the incentive part of the safety program may suggest that the impact of the prizes over the years is minimal. The responses also reflect that employees may remember individual prizes more than the FoxBucks. This may help the company in choosing items for incentives in future programs. The varied response to the question of which safety meeting topics were seen as helpful suggests that the safety meetings themselves had a strong impact on the employees. It
appears that topics that were repeated each year, such as fire safety and lock out/tag out were well remembered and appreciated.

For this research project, two hypotheses were developed. **Hypothesis 1:** Incentive programs focused on accident rates alone do not prevent accidents.

In terms of the numbers of accidents, while the overall numbers did decline for the three divisions surveyed, there were erratic increases from year to year. In addition, the employees' perceptions of the safety program reflect that they believe other components of the safety program were more beneficial to their safety. The low recall of prizes from the incentive program as compared to the high recall of safety meeting topics might demonstrate that attention to safety hazards is more beneficial to employees than attention to accident rates. And, in conclusion, more employees responded that safety meetings affect their behavior than the safety incentive program. Therefore, some factors do support hypothesis one.

**Hypothesis 2:** A safety program that directs attention to safe behavior will help lower the number of accidents.

There was an overall decrease in the number of accidents during the implementation of the safety program. The safety meetings, in addressing specific topics, provide attention to safe behavior in hazardous situations. The strong support of the employees on the issue of safety meetings, and the fact
that the safety meetings are the oldest part of the company's safety program might be perceived as support for this hypothesis. Most importantly, the literature review cites many studies and success stories of companies that focus on safe behavior as the root cause of an accident problem. The fact that the employees rated quality standards as an important factor for safety reflects that employees can see themselves the similarity of quality and safety. Getting employees involved in creating a safe environment is just as important as having the management commitment. In conclusion, there is support for hypothesis 2 in both the research results and the literature review.

In summary, this research has shown that the company is on the right track in providing a safe environment. Less emphasis on the incentive side of the program, and more emphasis on employee involvement and training may help make the company safer. In addition, switching from review of the downstream factor of the OSHA 200 accident rates, to the upstream factors of safe behaviors may aid the company in focusing their time and money on the specific parts of the safety program that need further development.

Ideas for Further Studies

If the company were to decide to alter the safety program in the future, it might be beneficial to design both a pre- and post-study which could isolate the various components of the safety program. Establishing a direct causal link between
variables would provide the most beneficial advice on improving a safety program. While much research has been conducted on various safety programs, it appears that the causal links between the program itself and the end result is most often the area of biggest uncertainty. Once causal links are established, the longevity of results would be another area of research to pursue.

In summary, there are many factors to review in setting up a safety program for an organization. Most importantly, there must be a fit between the organization and the program itself. The Association of American RailRoads studied all of the United States' railroad safety programs. "They found little program uniformity and no elements really essential to program success. Their results suggest the safety program must be right for the specific organization...There is no one safety program that is right for all" (Petersen, 1988, p. 27). Continued research in the areas of incentives, positive reinforcement and feedback, employee attitudes, and organizational behavior management will assist in providing more insight in how to tailor safety programs specifically to an organization's culture. In our quest for the ultimate safety program, that may be the most important factor of all.
APPENDIX 1

EMPLOYEE SURVEY
SAFETY SURVEY

The purpose of this survey is to ascertain your ideas and feelings regarding ______’s safety program. Specifically, we would like to determine what parts of the program are more effective than others. By taking the time to complete this survey, you will be able to help improve the safety program, and overall safety at ______. THE INFORMATION IN THIS SURVEY WILL ONLY BE USED IN A SUMMARY FORM: YOUR INDIVIDUAL ANSWERS WILL BE HELD CONFIDENTIAL. Thank you for your time and contributions.

DEFINITIONS
Safety incentive program: program held during fiscal year which awards "FoxBucks" for attendance at safety meetings, time with no accidents, and daily attendance.
Safety meeting: monthly meeting held at each division, where safety topic is presented, and safety issues/concerns are addressed.
Productivity standards: standard set for warehouse workers regarding amount of work accomplished.
Quality standards: standard set for warehouse workers regarding allowable amount of errors.

PLEASE ANSWER THE FOLLOWING BY CIRCLING THE BEST RESPONSE:

<table>
<thead>
<tr>
<th>ALWAYS</th>
<th>THE TIME</th>
<th>SOME OF</th>
<th>NEVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this company, safety procedures are followed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I follow safety procedures.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I report safety hazards.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I correct those safety that are in my control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I feel the company believes in safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I feel my supervisor believes in safety.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Management corrects safety problems quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I feel that my safety concerns are treated seriously.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Safety meetings provide me with information that helps me in my job.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Safety hazards are not corrected in a timely manner.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Safety is not important in my job.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Safety procedures are only followed when convenient.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>My supervisor practices &quot;safety first.&quot;</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
safety survey page 2
Do you think the following items are important to your safety on the job?

CIRCLE Y FOR YES, OR N FOR NO

<table>
<thead>
<tr>
<th>Item</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) safety incentive program</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>b) monthly safety meetings</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>c) orientation training</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>d) productivity standards</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>e) safety posters</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>f) work hours</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>g) quality standards</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>h) employee morale</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Please choose two items from above that you feel are the most important to your safety at [ ], and put a #1 and a #2 in front of them to rank them.

I receive the safety incentive "Fox Bucks" for: (Check any/all that apply.)

____ having no accidents
____ attending safety meetings
____ showing up for work
____ completing tasks
____ helping others
____ working safely

PLEASE ANSWER THE FOLLOWING BY CIRCLING THE BEST RESPONSE:

STRONGLY AGREE   AGREE   DISAGREE   DISAGREE

I feel the safety meetings

actually help change my behavior to be safe.

I feel the safety incentive

programs actually help change my behavior to be safe.

I feel the safety posters

actually help change my behavior to be safe.

I believe it is possible

to both reach productivity rates and work safely.

I believe it is possible to

both reach quality standards and work safely.

The safety incentive

program does not help me to be safe.

The safety meetings do not

help me to be safe.

The safety posters do not

help me to be safe.

I believe it is possible to

to reach both productivity and quality standards and work safely.
safety survey page 3

Please place number of accidents you have been involved in while working at ____, under the appropriate categories. (med = medical treatment)

<table>
<thead>
<tr>
<th>Accidents:</th>
<th>No Med Treatment Necessary</th>
<th>Med Treatment &amp; No Time Off Work</th>
<th>Med Treatment &amp; Time off work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Reported</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Demographics

Age ______ Sex: ___ male ___ female

Functional Area of Work (please circle one):
- office
- warehouse
- facility services
- data processing
- inventory control
- quality control
- transportation

Length of time in current position ______ years ______ months
Length of time with ______ _ years ______ months

Previous work functional area (if applicable)

Are you (please circle one): Union Non-Union

What division are you in: ________________________________

I have participated in the safety incentive program in: (Please circle ALL that apply)

- Fiscal year '94 (4/1/93-3/31/94) (current year)
- Fiscal year '93 (4/1/92-3/31/93) (Sears gift certificate)
- Fiscal year '92 (4/1/91-3/31/92) (prize catalog)
- Fiscal year '91 (4/1/90-3/31/91) (prize catalog)

Please list the amount of "Fox Bucks" you received last year:

If you participated in the program one of the years using the prize catalog, do you remember what you ordered?

_____ yes  _____ no

If yes, please list the prizes you received:

Please list any safety meeting topics that you think specifically helped you to work safely at work & home:

What do you think would make ______ a safer place to work?
APPENDIX 2

DIVISION ARCHIVAL SURVEY
Management Questionnaire--Safety Survey

PLEASE NOTE THAT THIS PAGE NEEDS ONLY BE FILLED OUT ONCE PER DIVISION.
However, this information is crucial to the study; please complete as thoroughly as possible.

Please list the number of OSHA 200 recordable accidents, as recorded on your OSHA 200 form for each year.

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Misc. notes/comments:
APPENDIX 3

MANAGEMENT SURVEY
Management Questionnaire--Safety Survey

THIS PAGE SHOULD BE COMPLETED BY 1) DISTRIBUTION CENTER MANAGER, 2) DAY OPERATIONS MANAGER, AND 3) NIGHT OPERATIONS MANAGER. Separate envelopes have been provided to ensure confidentiality. THE INFORMATION IN THIS SURVEY WILL ONLY BE USED IN A SUMMARY FORM: YOUR INDIVIDUAL ANSWERS WILL BE HELD CONFIDENTIAL. Thank you for your time and contributions.

We implemented the corporate safety programs per guidelines in (please circle all that apply):

| FY'91 | FY'92 | FY'93 | FY'94 |

If any changes or additions were made, please explain:

In FY'94, what have you done with the FoxBuck cards provided by corporate?

Are there any other factors that you feel would have had impact on the number of accidents? If so, please explain:

1) Factor:

2) Time Frame:

3) Proposed impact:

We hold a safety meeting for all employees every month. (please circle one)

YES  NO

If you circled no, please explain when you hold safety meetings:

who attends:

I would like to see the current safety program continue in its present format. (please circle one:) Yes  No

I think we could improve safety by:

THANK YOU!
REFERENCES


Lanza, A.J., MD, & Goldberg, Jacob A. MA, PhD. (Eds.).


The author, Mary Ann Lautzenhiser, was born in Waukegan, Illinois.

In September, 1980, Ms. Lautzenhiser entered the University of Minnesota--Twin Cities, receiving the degree of Bachelor of Arts in English in March, 1984. While at the University of Minnesota, she served in various panhellenic and student government positions, including student representative on the University Sexual Harassment Board. In 1984 she was selected for Mortar Board.

Ms. Lautzenhiser began working on her graduate coursework part-time at Loyola University Chicago in January, 1992. In September, 1993, she received a graduate assistant position and began studying full time. Ms. Lautzenhiser was selected to present her thesis at a "Work in Progress" session at the Midwest Academy of Management’s Annual Meeting in Chicago, IL, in April, 1994. After completing her coursework in June, 1994, Ms. Lautzenhiser will receive a Master of Sciences in Industrial Relations in January 1995.

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The thesis submitted by Mary Ann Lautzenhiser has been read and approved by the following committee:

Dr. Linda K. Stroh, Director  
Associate Professor, HRIR  
Loyola University Chicago

Dr. Alan J. Fredian  
Professor, HRIR  
Loyola University Chicago

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Science.

10/13/94  
Date  
Director's Signature