

AN ABSTRACT OF THE THESIS OF

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Title: Impact of Voluntary Compliance and Compliance  
Inspection Programs on Experience Rates Among  
Small Employers in California

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Abstract Approved: David C. Lawson

This study was conducted to evaluate government intervention as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The central issue was to determine if participation in the California Occupational Safety and Health (Cal/OSHA) Small Employer Voluntary Compliance Program (SEVCP) or compliance inspections conducted by the Division of Occupational Safety and Health (DOSH) influenced workers' compensation experience rates among small employers in California.

The sample populations examined in this study consisted of three groups: (1) twenty-five California companies that participated in the SEVCP during 1982; (2) twenty-five California companies that were inspected for safety standards compliance by DOSH officials in 1982; and (3) a control group that consisted of twenty-five

California companies that did not participate in the SEVCP and were not inspected by DOSH. The problem was analyzed in three stages. First, the data were analyzed to determine if there was a significant difference in experience rates between the three sample groups. Second, the three groups were evaluated for significant difference in accident prevention program components. Third, the study analyzed the effect of accident prevention program components on workers' compensation experience rates.

This study indicated that companies that participated in the SEVCP developed significantly lower workers' compensation experience rates when compared to companies that were inspected for safety standards compliance by DOSH. A significantly higher proportion of SEVCP companies provided new employees with job specific safe work practice training when compared to the DOSH and control group companies. Statistical analyses of the effect of individual accident prevention program components on experience rates revealed a significant reduction in the experience rate of companies that conducted regularly scheduled workplace safety inspections.

This study supports the need for continued development, implementation, and evaluation of voluntary compliance programs as an effective means for reducing occupational injuries. Although this study failed to identify accident prevention program components as the primary factor in the SEVCP group's significantly lower

experience rate, government sponsored voluntary compliance programs based on consultation, education, and training have the ability to significantly reduce occupational injuries.

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Impact of Voluntary Compliance and  
Compliance Inspection Programs on Experience Rates  
Among Small Employers in California

by

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Impact of Voluntary Compliance and  
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CHAPTER I

INTRODUCTION

Since the passage of the Williams-Steiger Occupational Safety and Health Act (OSHAct) of 1970, researchers have questioned the ability of the OSHAct to effectively reduce occupational injuries (Smith, 1976; Mendeloff, 1979; McCaffrey, 1984). Mendeloff (1979) stated that only 10 to 30 percent of all occupational injuries were caused by violating OSHAct safety standards and that significant improvement in injury rates was unlikely under a program that emphasized compliance inspection.

In an article published in the California Western Law Review, McCaffrey (1984) stated that "the basic logic of the enforcement program is that OSHA can make it unprofitable for firms to violate it's (sic) regulations" (p. 101). A number of researchers have questioned the effectiveness of the Occupational Safety and Health Administration's enforcement program. McCaffrey (1984), Viscusi (1983), Mendeloff (1979), and Smith (1976) have concluded that the incentives for a company to comply with OSHA standards are weak due to the low probability of a compliance inspection and the relative low cost of any potential fine.

In 1982, the Occupational Safety and Health Administration (OSHA) published a notice in the Federal Register requesting comments and information from interested parties concerning the development of voluntary compliance programs to supplement enforcement and compliance inspections. In the notice, OSHA stated:

"...that workplace compliance with OSHA standards cannot by itself accomplish the goals spelled out in the Act. The standards, no matter how carefully conceived and properly developed, will probably never cover all unsafe conditions. Furthermore, because of limited resources, the agency will never be able to inspect all of the Nation's workplaces regularly or exhaustively."  
(p. 2796)

In 1979, the California Occupational Safety and Health Administration (Cal/OSHA) developed the first voluntary compliance program (Staff, 1981a). The purpose of the voluntary compliance program was to increase management and employee involvement in safety as a means to reduce occupational injury rates.

#### Statement of the Problem

This study was conducted to evaluate government intervention as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The study evaluated two government strategies, (1) compliance inspection and (2) voluntary compliance programs.

### Purpose of the Study

The purpose of this study was to contrast the impact of two types of government sponsored occupational safety programs on workers' compensation experience rates. The central issue was to determine if (1) participation in the California Occupational Safety and Health Administration (Cal/OSHA) Small Employer Voluntary Compliance Program (SEVCP) or (2) compliance inspections conducted by the Division of Occupational Safety and Health (DOSH) influenced the experience rates calculated by the Workers Compensation Insurance Rating Bureau for small employers in California.

The objectives of the study were:

1. To determine if two types of occupational safety programs had an impact on experience rates.
2. To determine if implementation of individual accident prevention program components differed between survey groups.
3. To identify specific accident prevention program components that impact on experience rates.
4. To provide interested personnel with researched based data which can be useful in reducing occupational injuries and workers' compensation costs.

### Background

In 1981, Carl Gersuny identified three major reforms as having a major effect on occupational safety in the United States. The first reform involved the passage of Workers' Compensation Acts by state governments between 1911 and 1948. The second was the passage of the National Labor Relations Act of 1935 (Wagner Act) by the Federal government. The third major reform was the passage of the Occupational Safety and Health Act (OSHAct) of 1970.

Prior to the enactment of the OSHAct, occupational safety standards and enforcement were primarily the responsibility of the states. In addition to standards enforcement and compliance inspections, many state safety agencies had developed consultation programs that were designed to provide safety training and education services to employers. At the time of the OSHAct's passage, the Act did not include a provision for the development or funding of a consultation program (Mendeloff, 1979).

By the late 1960s, the Federal government had concluded that existing state safety legislation was not well enforced. When the OSHAct was implemented, intervention by the Federal government in the enforcement of safety and health standards was considered to be a major shift in philosophy (Smith, 1976). The purpose of the Williams-Steiger Occupational Safety and Health Act (OSHAct) of 1970 was "to assure safe and healthful working



conditions for working men and women" (U.S. Senate, 1971, p. 1003). Two key elements of OSHA's regulatory program were (a) the ability to set safety standards, and (b) to inspect, cite, and fine employers who failed to comply with OSHA standards.

Though the OSHAct brought the promulgation of safety standards and compliance under a single umbrella organization directed by the Federal government, the OSHAct permitted states to adopt their own safety and health standards and programs. If a state government wanted to retain a margin of control over occupational safety and health within the state's borders, the state had to (a) designate an agency to administer the program, (b) the agency had to have sufficient authority and funding to enforce the standards, and (c) the standards had to be "at least as effective" as the federal standards (Smith, 1976).

Prior to the passage of the OSHAct, California had promoted occupational safety and health through the Division of Industrial Safety (DIS). In addition to providing consultation services, the California program promulgated standards and conducted compliance inspections. Though the role of Division of Industrial Safety was primarily consultive in nature, the Division conducted approximately 20,000 inspections in 1970 (Mendeloff, 1979). After the passage of the OSHAct, California retained state control of occupational safety and health under the direction of the Department of Industrial Relations.

Although the Federal OSHA program was compliance oriented, California developed two separate safety and health agencies, the Division of Occupational Safety and Health (DOSH) and Cal/OSHA Consultation Service. Whereas DOSH was concerned with standards enforcement and compliance inspections, the Cal/OSHA Consultation Service was a radical departure from the Federal OSHA program. The purpose of the Consultation Service was to provide employers and employees with assistance in developing and implementing occupational safety programs.

As stated earlier, researchers have questioned the effectiveness of OSHA to reduce occupational injuries by relying strictly upon safety standards enforcement. Since 1979, there has been a movement towards the development of voluntary compliance programs. In an effort to respond to the safety needs of small employers, the Cal/OSHA Consultation Service developed the Small Employer Voluntary Compliance Program (SEVCP). The program was designed to promote occupational safety through voluntary compliance with Cal/OSHA standards. The program became effective on March 1, 1981 (O.S.H.A., 1982c).

Companies participating in the SEVCP were exempt from routine inspections by DOSH. The initial criteria for participation in the program was restricted to employers with fifty or fewer employees. In addition, employers were required to (a) request a wall-to-wall inspection by Cal/OSHA Consultation, (b) correct any safety or health

violations noted during the inspection, and (c) maintain an accident prevention program as required by the Cal/OSHA General Industry Safety Order (GISO) 3203 (O.S.H.A., 1982c). GISO 3203 required employers to maintain an effective safety program that included, but was not restricted to, an employee training program and scheduled periodic safety inspections to identify and correct unsafe work conditions (Appendix A).

After California introduced the Small Employer Voluntary Compliance Program, the Federal Occupational Safety and Health Administration developed two types of voluntary compliance programs in 1982 (O.S.H.A., 1982b). In 1986, the California Division of Occupational Safety and Health (DOSH) completed the development of two voluntary compliance programs, Cal/STAR and REACH.

With the movement towards utilizing voluntary compliance programs as a method for reducing occupational injuries, Swabacker and Ottoboni (1983) conducted a descriptive review of the Division of Occupational Safety and Health's six initial voluntary compliance projects. The researchers concluded that participation in the program had led to a reduction in occupational injury rates when compared to other company projects.

One of the problems in conducting research in the field of occupational safety is the lack of a universal safety measurement that meets the needs of all researchers (DeReamer, 1980). Measurement tools available for

researchers include lost-time injury and severity rates, OSHA reportable injury rates, and workers' compensation experience rates.

Levitt (1975) questioned the use of injury rates as a measurement tool because reliability is difficult to measure and the rates are influenced by company size. Mendeloff (1979) questioned the use of OSHA reportable injury rates because the rates can be influenced by an individual's interpretation of "reportable injury" as defined by OSHA.

In his study on management attitudes in the construction industry, Levitt (1975) used workers' compensation experience rates as a measure of the safety performance of the companies participating in the study. In addition, OSHA considers experience rates as an indicator of a company's safety performance (OSHA, 1982b).

### Hypotheses

A number of researchers have questioned the ability of OSHA compliance efforts to reduce occupational injuries. Do voluntary compliance programs, which include an educational component requiring employee training, provide a means to successfully reduce occupational injuries?

The problem was analyzed in three stages. First, the data were analyzed to determine if there was a significant difference in experience rates between the three sample groups (Hypothesis 1). Second, the three groups were

evaluated for significant differences in accident prevention program components (Hypotheses 2 through 8). Third, the effect of accident prevention program components on experience rates were analyzed (Hypotheses 9 through 19).

The following null hypotheses were analyzed:

H<sub>1</sub>: There is no significant difference in experience rates between the three study groups.

H<sub>2</sub>: There is no significant difference in maintaining an accident prevention program between the three groups.

H<sub>3</sub>: There is no significant difference in providing new employee general safe work practice training between the three groups.

H<sub>4</sub>: There is no significant difference in providing new employee job specific safe work practice training between the three groups.

H<sub>5</sub>: There is no significant difference in conducting workplace safety inspections between the three groups.

H<sub>6</sub>: There is no significant difference in conducting regularly scheduled workplace safety inspections between the three groups.

H<sub>7</sub>: There is no significant difference in conducting safety meetings between the three groups.

H<sub>8</sub>: There is no significant difference in conducting regularly scheduled safety meetings between the three groups.

H<sub>9</sub>: There is no significant relationship between

experience rates and maintaining an accident prevention program.

H<sub>10</sub>: There is no significant relationship between experience rates and maintaining an informal new employee orientation or training program.

H<sub>11</sub>: There is no significant relationship between experience rates and maintaining a formal new employee orientation or training program.

H<sub>12</sub>: There is no significant relationship between experience rates and providing new employee general safe work practice training.

H<sub>13</sub>: There is no significant relationship between experience rates and providing new employee job specific safe work practice training.

H<sub>14</sub>: There is no significant relationship between experience rates and conducting workplace safety inspections.

H<sub>15</sub>: There is no significant relationship between experience rates and conducting regularly scheduled workplace safety inspections.

H<sub>16</sub>: There is no significant relationship between experience rates and conducting safety meetings.

H<sub>17</sub>: There is no significant relationship between experience rates and conducting regularly scheduled safety meetings.

H<sub>18</sub>: There is no significant relationship between experience rates and conducting accident investigations.

H<sub>19</sub>: There is no significant relationship between

experience rates and management's perception of safety program effectiveness.

### Study Population

The sample populations examined in this study consisted of three groups. The first treatment group (participants) consisted of twenty-five California companies that participated in the Small Employers Voluntary Compliance Program (SEVCP) in 1982. The second treatment group (compliance) consisted of twenty-five California companies that were inspected for safety standards compliance by DOSH officials in 1982. The control group consisted of twenty-five California companies that did not participate in the SEVCP and were not inspected by DOSH.

### Limitations

The following limitations have been acknowledged:

1. As a result of the three year minimum premium requirement set by the Workers' Compensation Insurance Rating Bureau of California, not all small employers develop a workers' compensation experience rate. To have qualified for experience rating during the 1986 policy year, an employer had to have paid a minimum of 13,300 dollars in premium during the period used to calculate the experience rate.

2. Experience rates are influenced by a number of

variables. These variables include payroll classification, payroll rates, state workers' compensation benefit rates, and workers' compensation litigation rates.

3. Whereas the Division of Occupational Safety and Health selected those companies that were inspected in 1982, companies which participated in the Small Employee Voluntary Compliance Program (SEVCP) did so voluntarily.

4. Participation in the SEVCP is based on an agreement between two groups; (1) the Cal/OSHA Consultation Service and (2) the owner or manager of the participating company. Participation in second generation voluntary compliance programs, such as OSHA's STAR, Cal/OSHA's Cal/Star, or REACH, requires agreement by three groups; (1) the sponsoring government agency, (2) company management, and (3) company employee representative or organization.

5. Though the telephone survey was validated by a Delphi committee and pre-test procedures, the accuracy of the respondents' answers were not cross validated by personal face-to-face interviews or inspections.

#### Definitions

1. Employee: "every person in the service of an employer for whom the employer is obligated to provide workers' compensation benefits" (Workers' Comp., 1986a. p. 3).

2. Employer: "one or more entities meeting the ownership standards set forth in the California Experience



Rating Plan" (Workers' Comp., 1986a, p. 2).

3. Experience rating: "type of merit rating approved by the Insurance Commissioner under which previous years' loss experience of that particular employer is used to develop an experience modification" (Workers' Comp., 1986a, p. 4).

4. Formal Safety Program: A program based on written safety rules and employee training guidelines (Cooke & Gautschi, 1981).

5. Performance Standard: A standard that requires "that certain goals be achieved, without specifying how they are to be achieved" (U.S. Senate, Committee on Governmental Affairs, 1978, p. xxi).

6. Premium: "the sum derived from the application of the rates to the remuneration of employees..., after application of any duly authorized experience modification" (Workers' Comp., 1986a, p. 3).

7. Rate: The rate that is "applied to each \$100 of remuneration" as set forth in the manual for each payroll classification (Workers' Comp., 1986a, p. 3).

8. Specification Standard: A standard that requires a "particular means of achievement, such as specific design, equipment, or techniques" (U.S. Senate, Committee on Governmental Affairs, 1978, p. xxi).

9. Workers' Compensation: "The obligation imposed upon an employer by the Workers' Compensation Laws..." of a state or governmental agency, "...to pay the benefits

prescribed by such laws" (Workers' Comp., 1986a, p. 2).

### Summary

The purpose of this study was to contrast the workers' compensation experience rates between participants in two types of government sponsored occupational safety programs, (1) the California Occupational Safety and Health Administration (Cal/OSHA) Small Employer Voluntary Compliance Program (SEVCP) and (2) the California Division of Occupational Safety and Health compliance inspection program. The central issue was to determine if DOSH compliance inspections or participation in the SEVCP influenced a company's workers' compensation experience rate.

The Occupational Safety and Health Administration has attempted to reduce occupational injuries through the development and enforcement of safety standards. Since the 1970s, additional programs have been developed to supplement OSHA's compliance enforcement strategy. Have reductions in occupational injuries been obtained through implementation of employee education programs and participation in a voluntary compliance programs?

## Chapter II

### REVIEW OF RELATED LITERATURE

This study was designed to evaluate government intervention in occupational safety programs as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The study evaluated two government strategies, (1) compliance inspection and (2) voluntary compliance programs. The evaluation of the problem required examining (1) the programs' effect on experience rates; (2) compliance with accident prevention program components; and (3) accident prevention program components' effect on experience rates.

Chapter 2 will review literature relevant to an examination of government intervention, accident prevention program components, and experience rates. The topics that will be discussed in the review of the related literature include regulatory strategies, the Federal and California Occupational Safety and Health Administrations, compliance and voluntary compliance effectiveness, occupational safety and small employers, workers' compensation experience rating, and research measurements and strategies.

### Background

The importance of this study rests upon the conclusions of prior studies conducted by researchers in the areas of occupational safety, accident prevention program components, and occupational safety standards. Can the justification for a study on the impact of voluntary compliance and compliance inspection programs on experience rates be found in the review of related literature?

To justify the need and importance of a study, a series of crucial questions must be answered. In a study which involves occupational safety, small employers, and government sponsored occupational safety programs, three questions must be asked:

1. Is there a relationship between accident prevention program components and a reduction in occupational injuries?

2. Is there a relationship between occupational safety standards and a reduction in occupational injuries?

3. Is there a difference in occupational safety programs between small and large employers?

These questions form the foundation upon which the review of related literature is based.

### Regulatory Strategy

A discussion relating to government regulatory strategies forms an important base for discussing government intervention and sponsorship of occupational safety programs. There are two types of Federal regulations. One type of regulation is economic based and is concerned with the pricing, availability, and profit of goods and services. Agencies which rely on this form of regulation include the Civil Aeronautics Board and the Interstate Commerce Commission. The second type of regulation is primarily concerned with social objectives, which would include issues relating to safety, health, and environmental protection (U.S. Senate, 1978). The latter type of government regulation is of primary importance to this study.

The 1960s and 1970s was an era favorable to passage of protective regulations. During this period, the Federal government enacted a number of regulatory laws responding to and directed at a number of social issues. Prominent Federal regulations enacted during this period included the National Highway Traffic Safety Act, National Motor Vehicle Traffic Safety Act, Coal Mine Health and Safety Act of 1970, Clean Air Act Amendments of 1970, Water Pollution Control Act of 1972, and Occupational Safety and Health Act of 1973. By the late 1970s, government regulatory intervention was challenged by a growing movement that

opposed government intervention. Although the opposition movement slowed the expansion of government regulatory intervention, the movement did not stop government regulatory activities (Bardach & Kagan, 1982).

Regulatory standards are promulgated as a means to constrain the behavior of a target group of individuals or organizations (Oi, 1975). The promulgation and enforcement of standards ("command and control") is the dominant regulatory strategy utilized by federal, state, and local agencies in the United States (Bacow, 1980). Through this strategy a regulatory agencies identifies what is perceived to be a hazard that is harmful and should be eliminated. The agency then establishes a standard that mandates a reduction (Viscusi, 1983). Bacow identifies the "command and control" strategy as consisting of "bureaucratically defining a very limited range of acceptable behavior and fining regulated institutions that depart from it" (1980, p. 15). The regulatory strategy utilized by the Occupational Safety and Health Administration (OSHA) "epitomizes this approach" (Viscusi, 1983, p. 2).

In reviewing the history of American regulations, Zeckhauser and Nichols (1978) concluded that performance frequently failed to match expectations. In terms of the performance of occupational safety standards, Viscusi (1983) stated that OSHA standards were weakly enforced and that "noncompliance was rampant." One reason advanced for the low levels of compliance by employers to occupational

safety standards is the weak enforcement mechanism of the OSHAct, which includes infrequent inspections, low fine levels and few violations per citation. Based on the low levels of compliance with safety regulations, the Occupational Safety and Health Act has been challenged for failing to effectively impact on occupational safety (Nichols & Zeckhauser, 1977).

In addition to questions concerning OSHA's enforcement mechanism, researchers have questioned the effectiveness of safety standards as a means of reducing occupational injuries. The effectiveness of safety standards have been questioned on the basis that (1) it is difficult to set standards that cover all situations (Berkowitz, 1972); (2) safety standards are applied to firms and industries with significantly different needs and benefits; and (3) current standards cover only a small portion of the factors that contribute to occupational injuries. Based on a review of research, Zeckhauser and Nichols (1978) suggest that "even the most carefully drawn and rigorously enforced safety standards will not be successful in eliminating the majority of accidental injuries" (p. 190).

Although the effectiveness of occupational safety standards has been questioned, there are situations where a standards enforcement approach may be an effective alternative. Standards enforcement may be effective if there are major information problems or risks that involve severe consequences (U.S. Senate, 1978).

In developing regulatory strategies, there are two types of standards, specification and performance standards. The majority of occupational safety standards are specification based standards. Specification standards are designed to impact on workplace characteristics such as equipment guarding and railing. (Nichols & Zeckhauser, 1977). Performance standards require the achievement of certain goals. Performance standards are concerned with the outcome of compliance rather than means of compliance. Whereas specification standards require specific actions in design, equipment, or techniques which may limit the employer's options, performance standards allow the employer the flexibility to achieve compliance through the least costly method (Viscusi, 1983; U.S. Senate, 1978).

Morey (1974) stated that the success of safety standards enforcement requires training of employees, OSHA inspectors, and safety professionals. Though training may be an important aspect, performance standards relating to employee training and supervisory practices, such as Cal/OSHA's General Industry Safety Order 3203, are considered to be difficult to develop, write, and enforce (Zeckhauser & Nichols, 1983).

In Going by the book: The problem of regulatory unreasonableness, Bardach and Kagan (1982) presented two perspectives of standards enforcement, the legalistic and the official discretion perspectives. The legalistic perspective is based on the premise that all regulations



and standards should be uniformly applied across all situations. The official discretion perspective differs dramatically because of the belief that strict enforcement fails to understand the need for discretion in enforcing standards due to the diversity in facilities, equipment, and personnel that is found in the workplace.

Although regulatory strategies based on legalistic enforcement are easier to enforce, the strategy tends to become bureaucratic and creates rules that are excessively rigid. The Occupational Safety and Health Administration's relationship with employers has created a "culture of resistance" because of the agency's primary reliance on a legalistic enforcement strategy. The strategy restricts cooperation and regulatory efficiency has suffered because of the number of citations that have been appealed (Bardach & Kagan, 1982).

Due to the potential shortcomings of legalistic enforcement strategies, Bardach and Kagan stated that agencies must develop "enforcement strategies designed to persuade the regulated enterprise to do more than is strictly required by law" (1982, p. 123). Discretionary enforcement allows for adjustment in regulatory standards enforcement based on the differences between the facilities, equipment, and personnel. Though discretionary enforcement can increase cooperation, from a legal viewpoint discretionary enforcement can result in chaos due to unpredictable enforcement, unequal treatment, and a risk

of corruption. Because the interpretation of standards may vary among different inspectors, the potential seriousness of a specific violation may be interpreted in a different manner. By allowing inspectors discretion in enforcing regulatory standards, there is the potential that charges of inefficiency or irresponsibility can be levied against the agency because of the failure of an inspector to make the right judgment in enforcing standards (Bardach & Kagan, 1982).

The effectiveness of regulatory standards are dependent upon the ability of the standards to obtain the acceptance and cooperation of the regulated individuals or groups. The effectiveness of regulatory strategies relating to occupational safety have been challenged by Zeckhauser and Nichols (1978), Viscusi (1979), Bacow (1980), and McCaffrey (1984) for failing to develop effective incentive systems within the regulated population as a means for improving occupational safety. Whereas specification based standards prescribe rigid means for compliance, incentive systems are directed towards specific policy outcomes by means of economic incentives.

#### Occupational Safety and Health Act of 1970

Prior to the passage of the Occupational Safety and Health Act (OSHAct) of 1970, occupational safety had been primarily the concern of state agencies. With the passage of the OSHAct, enforcement of safety and health standards

became a function of the federal government (Mendeloff, 1979). One of the principal reasons cited as justification for the OSHAct was the belief that state safety legislation existing prior to 1970 was weak, marginally effective, and not well enforced (Smith, 1976; U.S. House, 1974). Supporters for federal intervention in occupational safety pointed to the increases in occupational injuries rates during the 1960s as additional justification for federal intervention (Zeckhauser & Nichols, 1978).

Mendeloff (1979) stated that the OSHAct was a major shift in the Federal government's safety philosophy due to the Act's compliance and enforcement orientation. But, the Act was not the Federal government's first incursion into the area of occupational safety. Compliance based safety laws enacted prior to the OSHAct included the Walsh-Healy Act, Longshoremen's and Harbor Workers' Compensation Act, and Coal Mine Health and Safety Act of 1969. A major difference between the OSHAct and its predecessors was the comprehensive nature of the Act (Moran, 1972). Whereas prior safety legislation was directed at specific industrial groups, the OSHAct was designed to protect the health and safety of employees excluded from previous legislation.

In addition to the compliance based nature of the OSHAct, the OSHAct differed from state programs due to the Act's "first instance sanctions" enforcement approach. Where state programs had heavily relied on persuasion, the

Federal legislation required inspectors to cite employers who were in noncompliance with the OSHAct's standards on the first visit. The effectiveness of the "first instance sanctions" approach has been questioned on the basis that the sanctions (citations) are appropriate only if the employer is aware of the standards prior to the inspection (U.S. House, 1974). Supporters of this position believe that employers should not be held accountable for standards for which they are not aware, but be provide with information and education programs which would assist employers in developing effective occupational safety programs.

The purpose of the Occupational Safety and Health Act was "to assure safe and healthful working conditions for working men and women" (U.S. Senate, 1971). The major compliance incentives utilized by OSHA include standards promulgation, enforcement inspections, and financial penalties (Smith, 1975; Bacow, 1980; Viscusi, 1983; McCaffrey, 1984).

During the development of the OSHAct, a strong argument was made for federal intervention in occupational safety. But, Nichols and Zeckhauser stated, "Information that might have helped structure the agency's approach- for example, data on the causes of accidents- was ignored" (1977, p. 67).

OSHA's reliance on a compliance enforcement based regulatory strategy has been challenged by both labor and

management. Management groups have challenged OSHA on the basis that the agency has failed to weigh the cost of standards implementation. Labor groups have challenged the agency on the basis that the agency has been slow in developing standards that protect the health and safety of workers and has failed to keep workers informed of health and safety issues (Mendeloff, 1979).

California Occupational Safety  
and Health Administration

The history of state involvement in safety and health regulations dates to 1867, when Massachusetts created a department that was responsible for factory inspections. By the first decade of the 1900s, many industrialized states had enacted some form of safety legislation (Ashford, 1976).

Though the Federal Occupational Safety and Health Administration (OSHA) credits California's involvement in occupational safety to the enactment in 1937 of Section 6312 of the California Labor code (O.S.H.A., 1984a), the history of the California Division of Occupational Safety and Health (DOSH) dates back to 1914 (Scharrenberg, 1954). The Industrial Accident Commission, an early predecessor of DOSH, was responsible for the promulgation and enforcement of occupational safety regulations (Jordan, 1915). Between 1915 and 1945, California safety agencies had adopted, and published in individual booklets, twenty-eight safety

orders (Scharrenberg, 1946).

In 1914, the Industrial Accident Commission, through the Department of Safety, developed the "Safety First" program for employers and employees. Based on the early efforts of the Department of Safety, occupational safety among California employers proceeded in "leaps and bounds because of the cooperative methods organized by the safety department in conjunction with employers and employees" (Jordan, 1915, p. 526). Twenty-seven years after the creation of the Department of Safety the California occupational death rate had declined from 23.5 per 100,000 in 1914, to 6.8 in 1941 (Moore, 1942).

In 1945, the California legislature reorganized the Department of Industrial Relations. The reorganization relieved the Industrial Accident Commission of the responsibility for directing the state's safety efforts by creating the Division of Industrial Safety (DIS). The DIS assumed all of the duties that had been the responsibility of the Accident Prevention Bureau of the Industrial Accident Commission. Though the main purpose of the DIS was the promulgation of occupational safety standards, DIS authority included the administration and enforcement of safety standards and investigation of serious industrial injuries and fatalities. Initially the DIS consisted of six sections, which included boiler, construction, electrical, elevator, industrial, and mining and petroleum (Scharrenberg, 1946). A seventh section, education, was

created prior to 1950 (Scharrenberg, 1950).

The effectiveness of the Division of Industrial Safety was challenged due to the Division's record relating to employee prosecutions and fines. In 1970, DIS conducted 20,000 inspections, identified 200,000 standards violation, but only five firms were prosecuted and fined (Calif. Dept. Finance, 1976; Mendeloff, 1979).

With the enactment of the Occupational Safety and Health Act of 1970, occupational safety enforcement became the responsibility of the Federal government. The OSHAct permitted individual states to develop, promulgate, and enforce safety and health standards if the state (1) designated an agency to administer the program; (2) the agency responsible for safety and health had sufficient authority and funding to enforce the state standards; and (3) the state standards had to be "at least as effective" as the federal standards (Smith, 1979). States that planned to retain control over occupational safety and health were required to submit a plan to the Federal Occupational Safety and Health Administration for approval. After a state plan was approved, there was a three year transitional period before state standards replaced those promulgated by the Federal agency (Commission on Federal Paperwork, 1976).

In 1977, twenty-three states operated their own occupational safety and health programs under the provisions of the OSHAct of 1970. By the early 1980s, two

states withdrew their state plans and returned occupational safety and health enforcement to the Federal government. In examining levels of state participation, Thompson and Scicchitano (1985) noted that there was a significant regional factor with higher participation levels in the western region. The authors suggested that states in the western region developed state plans due the distance of the West from Washington, D.C. and the perception that federal regulatory agencies were not sensitive to the region's particular problems.

The Department of Industrial Relations (DIR) is responsible for the administration of California's occupational safety and health program under provisions of the Federal OSHAct of 1970. Under the agreement with the U.S. Department of Labor the Department of Industrial Relations, through the Division of Industrial Safety, assumed the responsibility for implementing the OSHAct. California's occupational safety and health program was approved in 1973 and implemented in January of 1974 with the enactment of the California Occupational Safety and Health Act of 1973 (Cal/OSHAct). Standards promulgated under the Cal/OSHAct are contained in the California Administrative Code, Title 8, Chapter 4 (Calif. Dept. of Ind. Relat., 1986; California, 1975).

The purpose of the California Occupational Safety and Health Act was to provide safe and healthful working conditions for all California employees (Calif. Assembly,



1976a). With the enactment of the Cal/OSHAct, the legislature expected a reduction in the number of occupational injuries. But in 1976, the Assembly's Labor Relations Permanent Subcommittee on Industrial Safety noted that the legislature's expectation had not been realized (Calif. Assembly, 1976). The Subcommittee identified five reasons for the failure of the Cal/OSHAct:

1. Administrative inefficiencies.
2. A lack of imaginative approaches in implementing the program.
3. A failure of leadership in directing the program.
4. The inability of the Division of Industrial Safety to direct the division's limited inspection resources to areas where the most serious accidents and highest number of injuries occurred.
5. A lack of continuity in program leadership.

Currently, the occupational safety and health component of the Department of Industrial Relations consists of the Division of Occupational Safety and Health (DOSH), Cal/OSHA Consultation Service, Standards Board, and Appeals Board. DOSH is responsible for standards enforcement, inspections, and accident investigations. With the enactment of the Hazardous Substances Information and Training Act, DOSH assumed enforcement of the act with the creation of the Right-to-Know Unit. The Cal/OSHA Consultation Service is responsible for assisting employers in solving their occupational safety and health problems.

The Consultation Service developed the Small Employer Voluntary Compliance Program as a means to assist and encourage standards compliance among small employers (Calif. Dept. Ind. Relat., 1986).

### Occupational Safety Compliance Enforcement

The goal of occupational safety compliance enforcement was the reduction of occupational injuries and illnesses (Smith, 1975). Thus, the relevant question is whether compliance enforcement has been effective in impacting on occupational injuries and illnesses.

The effectiveness of compliance enforcement and inspection programs have been questioned by a number of researchers. Studies by Smith (1975), Mendeloff (1979), and Viscusi (1979) concluded that, at the very most, OSHA's impact on occupational injuries was negligible. In reviewing studies relating to OSHAct effectiveness, Nichols and Zeckhauser concluded that OSHA "has had virtually no noticeable impact on work-related injuries and illnesses" (1977, p. 42). Litchy (1982) presented the position that the OSHAct had failed to provide a safe and healthful work environment. In 1984, Mintz concluded that OSHA's statistical record "has been ambiguous" (p. 345).

With the passage of the OSHAct, Congress expected major improvements in occupational safety. But, as Nichols and Zeckhauser stated, "even the small gains that might realistically have been wished for have proven difficult to

detect" (1977, p. 51).

The railroad and bituminous coal mining industries were excluded from the OSHA Act because the industries were already covered by federal safety legislation prior to OSHA's enactment. In 1973, Christenson and Andrews published a study examining the possibility of shifts in injury data in the bituminous coal mine industry due to changes in federal regulatory policy. In 1952, the Federal government implemented the Coal Mine Safety Act. The legislation applied to underground mines employing fifteen or more individuals. The researchers compared the 1946-1952 bituminous coal mine industry injury rates to the 1953-1965 rates. Based on the results of the study, Christenson and Andrews concluded that:

1. There was no significant decline in the fatal injury rate among the mines that were subject to more rigorous regulatory control after 1952.

2. There was a significant decline in the nonfatal injury rate and the permanent disability rate after the implementation of Coal Mine Safety Act.

3. Further reductions in the rates would not be achieved without additional cooperation from labor and management.

A 1968 study by Sands examined construction safety regulations in Ohio and Michigan. At the time of the study, Ohio had comprehensive safety standards which included specific standards relating to construction safety. Though

Michigan had enacted safety legislation dating back to 1909, the state's safety legislation did not include specific standards relating to the construction industry. Based on a random sample of twenty-five contractors drawn from each state, Sand conclude that:

"the construction safety legislation and the safety services and enforcement provided by the state government in Ohio did not result in a significantly lower rate of injuries or seem to promote increased safety precautions" (p. 179)

Based on the results of the study, Sands recommended that government assistance should be directed at increasing employer cooperation by providing information and education programs.

The Wisconsin Department of Industry, Labor and Human Resources released a study in 1971 which examined the relationship between standards violations observed by state safety inspectors and the reported general industry injury rate in Wisconsin. The study indicated that only twenty-five percent of the accidents examined in the study would have been controlled by a compliance enforcement based inspection system. The remaining seventy-five percent where due to "behavioral problems and physical hazards that were of a momentary nature" (p. 19). Based on these two points, the department concluded that the effectiveness of a regulatory strategy based on compliance inspections would be low. The Department recommended that an approach which integrated specification and performance codes with training and education programs directed at developing "in-

house" safety programs might be more effective in reducing occupational injuries.

In 1976, Mendeloff published a research study that evaluated the effects of OSHA standards on occupational injury rates among California employers. The study reported that accident types that were related to standards compliance (e.g.- caught-in-machine and slips and falls) were significantly lower than Mendeloff's regression model had predicted. Conversely, accident types which were not related to standards (e.g.- strains and overexertions) were determined to be higher than the model predicted. Overall, the general injury rate was not lower than predicted. Mendeloff questioned OSHA's impact on the "caught-in" injury rate due to the possibility of technological factors such as improved manufacturing design. Based on the results of the study, Mendeloff concluded "that OSHA has had little effect, or alternatively, that OSHA has had some effect" (p. 106).

Based on the differences in injury rates between types of industry, OSHA developed the Target Industry Program as a means to direct limited inspection resources to industries that historically had higher injury rates than the general industry average. The Target Industry Program included meat and meat products, logging, sawmills and planing mills, millwork, plywood and related products, wooden containers, miscellaneous wood products, and miscellaneous transportation equipment. Smith (1976)

conducted a study designed to evaluate changes in injury rates utilizing pre- and post-OSHA rates in target and non-target industries. Based on the pre- and post-test analysis, Smith concluded that there was no significant difference in injury rates between the target and non-target groups.

Smith (1979) conducted a second study to analyze the impact of OSHA inspections conducted in 1973 and 1974 on injury rates. Using pre- and post-test measures, Smith's analysis detected a statistically significant difference in injury rates based on data relating to inspections conducted in 1973, but an insignificant difference based on data relating to 1974 inspections. Due to the mixed results of the statistical analysis, Smith stated, "All estimates in this research suggest benign effects" (p. 168).

Ten years after the passage of the OSHAct, Currington (1980) published a study examining OSHA's impact on manufacturing industry injury rate data obtained from New York, Texas, and Florida. Though the study noted that some industry groups developed lower injury rates, the reductions were statistically insignificant. Based on Currington's analysis of the general manufacturing injury rate, the author concluded that OSHA standards did not lower the general manufacturing injury rate.

An analysis of the effectiveness of the California Occupational Safety and Health Administration (Cal/OSHA) was conducted by the California Department of Finance

(1976). The study was based on injuries that occurred during the first nine month of 1974 and the second quarter of 1975. The researchers reported that the reduction in injury rates observed during the periods examined was statistically insignificant. Though analysis of the data failed to substantiate the position that Cal/OSHA had been effective in reducing occupational injury rates, the Department of Finance stated that the data did not prove Cal/OSHA had been ineffective. The Department advanced the position that the failure to detect Cal/OSHA's impact on injury rates could have been due to the obscuring of the agency's impact by changes in "noninspection preventable injuries." Thus, the Department of Finance's position concerning the relationship between injuries and standards compliance was similar to the position taken by Mendeloff (1976).

Studies that utilized injury rates without accounting for injury severity were challenged by Cooke and Gautschi (1981) on the basis that OSHA compliance efforts might reduce injury severity, but fail to reduce injury frequency. Cooke and Gautschi conducted a study that examined the influence of safety programs and OSHA compliance inspections on average lost work time injury rates in various sized companies. The authors concluded that (1) OSHA compliance enforcement significantly reduced the average lost work days injury rate in firms employing 200 or more production employees; and (2) larger firms with

jointly administered safety programs had significantly reduced average lost work days injury rate over the time of the study.

Based on the conclusions of the studies presented in this section, few researchers doubt that the OSHAct and Cal/OSHAct have failed to obtain the major reductions in injury rates that were expected to have been obtained by the programs. In 1979, Senator Richard Schweiker stated, "We can find little evidence that the act has directly improved workplace safety" (U.S. Senate, 1979, p. 37135).

Three reasons advanced for OSHA's inability to dramatically impact on occupational injuries relate to the Act's reliance on standards, infrequent inspections, and low level of monetary fines. Smith (1976) and Mendeloff (1979) have presented the position that there is a limited relationship between occupational injuries and noncompliance with OSHA and Cal/OSHA standards. Mendeloff claimed that injuries related to noncompliance with OSHA standards account for only ten to thirty percent of all occupational injuries.

The effectiveness of compliance inspection procedures have been challenged due to the (1) infrequency of compliance inspections (Bacow, 1980; Viscusi, 1983); (2) inadequacies in the inspection format (Litchy, 1982); and (3) compliance inspections' transitory impact (Oi, 1975); In 1982, Cal/OSHA conducted 17,024 compliance inspections (Staff, 1983a). Based on the number of employers in



California, approximately three percent of the employers were inspected by the agency. The efficiency of the inspection format is dependent on the experience and knowledge of the inspector. The California Department of Finance (1976) noted that many Cal/OSHA inspectors have specialized backgrounds which makes it difficult for the inspector to recognize standards violations that are not in the inspector's area of expertise. In addition, Zeckhauser and Nichols (1978) indicated that compliance inspectors had a tendency to cite violations that were obvious.

#### Occupational Safety Consultation

OSHA's compliance enforcement strategy has been challenged by employers based on the belief that first instance sanctions are punitive and unreasonable. The concept of developing a consultation services that was independent of the compliance unit was advanced as an alternative to the compliance enforcement strategy. The concept for developing government occupational safety and health consultation services was to provide safety and health education to employers and employees. The educational programs developed by the consultation service could assist employers in the interpretation of safety standards and implementation of occupational safety programs (Barnako, 1975; Smith, 1976). Whereas compliance enforcement has cast government safety agencies in the role of a police-force, on-site consultation services would cast

the agencies in a cooperative rather than adversarial role (Zeckhauser & Nichols, 1978).

The Occupational Safety and Health Act of 1970 failed to provide for the development of "on-site" consultation programs in states that were under the jurisdiction of the Federal Occupational Safety and Health Administration (OSHA). Though OSHA was prevented from developing an on-site consultation service, eighteen states with federally approved State plans provided on-site consultation services under section 18 in 1974. On May 20, 1975, the Department of Labor approved ninety percent funding for on-site consultation services in states without approved plans under sections 21(c) and 7(c)(1) (O.S.H.A., 1977). By 1980, Forty-five states, the District of Columbia, Puerto Rico, and Virgin Islands provided on-site consultation services (Mintz, 1984).

In 1984, Fed/OSHA revised the regulations pertaining to consultation services by broadening the focus of consultation from primarily hazard identification and correction to a concern for assisting employers in developing a total safety and health management system. In addition, the revised regulations expanded the scope of consultation services by allowing off-site consultation and education programs for employers and employees. When the revised regulations were published in the Federal Record, states were directed to give priority to small employers based on the belief that the occupational safety resources

available to small employers were limited (O.S.H.A., 1984b).

The Cal/OSHA Consultation Service receives Federal funding under sections 7(c)(1) and 23(g). Section 7(c)(1) provides funds for consultation services and promotional activities provided to private employers. Section 23(g) provides funding grants for consultation services and promotional activities to public agencies and employees in the public and private sectors (Calif. Dept. Ind. Relat., 1981).

#### Voluntary Compliance

Studies by Smith (1975) and Mendeloff (1976) have concluded that reliance on a standards based compliance strategy has failed to significantly reduce occupational injuries. The strategy has failed because (1) regulators have found it difficult to develop standards that cover all unsafe conditions; (2) limited resources have prevented regular or exhaustive inspections of the Nation's workplaces; and (3) regulatory agencies had failed to focus on whether a cooperative strategy between the agencies, employers, and employees can be more effective than the compliance enforcement strategy (Litchy, 1982; O.S.H.A., 1982a).

But, voluntary compliance programs may provide an effective means for promoting occupational safety and health. David Valoff, Chief of California's Division of

Occupational Safety and Health in 1983, said, "The cooperative approach is the best one for reducing accidents and illnesses on the job" (Staff, 1983b). In addition, voluntary programs would permit safety agencies the ability to focus their enforcement resources more effectively (O.S.H.A., 1982a). Voluntary compliance programs are based on the belief that occupational safety and health can be improved by employers and employees in ways which regulatory agencies are unable to influence (O.S.H.A., 1982a).

Some opponents of voluntary compliance programs have interpreted the programs to mean that employers have the option whether or not to comply with safety and health regulations. The interpretation is inaccurate because voluntary compliance programs are voluntary only in the sense that the employer has the option to choose to participate in the program, not whether the employer will comply with safety and health standards (O.S.H.A., 1982b). Due to the misunderstanding and misleading nature of the term voluntary, recently developed programs have selected to use the term "cooperative compliance" (Calif. Senate, 1983).

The Interagency Task Force on Workplace Safety and Health (1978) concluded that successful safety programs required cooperation between employers, employees, and government agencies. A cooperative safety approach was implemented in Sweden in the 1970s and has obtained

impressive results. The program was designed to illicit cooperation between labor and management as a means for reducing occupational injuries. Litchy (1982) rejected the argument that the Swedish approach could not be transferred to the U.S. because of America's lack of a cooperative labor-management history. Litchy's position was cooperation between labor and management could be "nurtured".

The first voluntary compliance program in the U.S. was a pilot program established in 1979 at a construction project in California known as the San Onofre Nuclear Generating Station, Units Two and Three. The San Onofre voluntary compliance program included a joint management-labor safety committee, regularly scheduled safety meetings and job-site inspections (Staff, 1981a; Swabacker & Ottoboni, 1983). Bectel Corporation, the General contractor on the project, reported saving 2.4 million dollars through the accident prevention program implemented at the San Onofre project.

In 1980, the Federal Occupational Safety and Health Administration conducted an evaluation of the San Onofre voluntary program. The evaluation resulted in a critical report which the Chief of the Division of Occupational Safety and Health, Art Carter, challenged by stating that the report reflected "Fed/OSHA's unwillingness to take any risks experimenting with innovative programs" (Staff, 1981a, p. 00-2417).

The March 16, 1981 edition of the Cal/OSHA Reporter

announced Cal/OSHA Consultation Service's development of the Small Employer Voluntary Compliance Program (SEVCP) (Staff, 1981b). The program became effective on March 1, 1981. The SEVCP was designed to recognize the efforts of small employers in complying with California safety and health standards as a result of the joint efforts of the employer and Cal/OSHA Consultation Service (O.S.H.A., 1982a).

The SEVCP was developed for private employers with a fixed worksite and fifty or fewer employees. If a company participated in the program, the employer was required to:

1. Request and receive a free wall-to-wall on-site inspection from Cal/OSHA Consultation Service.

2. Voluntarily comply, or have a schedule for compliance, with any health or safety violations observed during the inspection.

3. Develop and implement a written accident and illness prevention program meeting the requirements of General Industry Safety Order (GISO) 3203 (Staff, 1982).

The complete Small Employer Voluntary Compliance Program was described in Cal/OSHA's Policy and Procedure Manual, C-14, Attachment B (O.S.H.A., 1982c).

The Occupational Safety and Health Administration (1984b) reported significant reductions in the average occupational injury rates among company's that participated in the SEVCP. The agency reported that SEVCP participants had an average reduction of sixty percent in lost time

injuries and an eighty-five percent improvement in the safety consciousness of the employers and employees.

By the late 1970s, OSHA concluded that the agency was not going to make any dramatic improvements in occupational safety solely by relying on compliance enforcement (Bingham, 1978). While Cal/OSHA was developing voluntary compliance program, OSHA began to evaluate voluntary compliance programs as a viable occupational strategy (Whiting, 1979). Though OSHA reaffirmed the importance of health and safety standards, the agency began to shift to a less confrontational approach in 1983 (McCaffrey, 1984).

From July 12, 1982 through July 1, 1983 OSHA conducted an experimental program for inspection exemption through consultation in seven states under federal enforcement jurisdiction in the Atlanta and Dallas Regions (O.S.H.A., 1983; O.S.H.A., 1984a). One of the primary objectives of the experimental program was to motivate and assist employers in improving workplace safety through voluntary methods. The agency concluded that the program (1) resulted in an increase in requests for occupational consultation services; (2) reduced duplication of services by enforcement and consultation (O.S.H.A., 1983); and (3) would result in greater employer safety efforts "through nonadversarial means" (O.S.H.A., 1984a, p. IX-3). Based on the results of the experimental program, OSHA distributed Notice TED 3 outlining the implementation of OSHA's voluntary compliance programs (O.S.H.A., 1984a).

After the implementation of the Small Employer Voluntary Compliance Program and San Onofre's experimental program, the Division of Occupational Safety and Health developed the Cooperative Self Inspection Program (CSIP) [originally called the Voluntary Self Inspection Program (VSIP)]. Whereas the SEVCP was an arrangement between the employer and Cal/OSHA Consultation Service, CSIP involved participation by management, labor, and DOSH. The program was created to foster cooperation among the three parties in the implementation of a joint safety and health committee that would be responsible for implementing an effective occupational safety and health program (Staff, 1985b).

Swabacker and Ottoboni (1983) conducted a study of the first six participants in the program and reported that:

1. The program created a perception that safety was everyone's responsibility.
2. The participants reported satisfaction and success with the program.
3. The participants appeared to have had injury rates lower than the industry average.
4. The actual workers compensation insurance claims for the participants were lower than predicted.
5. Managers attributed the improved safety performance to an increase in safety awareness by employees and better communication between management and employees.

Rohrlich (1986) reported that participants in both the



Federal and California voluntary compliance programs have obtained positive results:

1. Mobil Chemical Company reduced the company's workers' compensation costs forty-eight percent.

2. Hensel Phelps Construction Company reported saving 1.5 million dollars in workers' compensation insurance on one large project.

3. Georgia Power Company reported an increase in morale and productivity.

4. International Light Metals reduced lost workdays by twenty-five percent and injuries requiring a doctor visit by forty-five percent.

#### Occupational Safety and Small Employers

Occupational safety and health regulations cover approximately four million workplaces in the United States. Over ninety percent of the firms employ twenty-five or fewer employees (Szasz, 1984). In 1982, nearly ninety-five percent of California's companies employed fewer than fifty employees (Ashford, 1976; U.S. Bureau of Census, 1984).

Company size appears to be a factor in occupational injuries, compliance with occupational safety standards, injuries, and the development and implementation of occupational safety programs (Szasz, 1984). In 1973, The National Commission on State Workmen's Compensation Laws reported that firms with 20 to 49 employees were slightly less hazardous than firms with 50 to 99 employees

(Berkowitz, 1973). Ashford (1976) presented the position that companies with less than 100 employees tended to be more hazardous than larger companies.

Research by the Wisconsin Department of Industry (1971), Zeckhauser and Nichols (1978), and Smith (1979) failed to provide support for Ashford's position. The Wisconsin Department of Industry reported that injury rates among small employers increased less than the rates among larger employers. Zeckhauser and Nichols noted that small companies had fewer compliance related violations and injuries. Smith stated that the largest reduction in inspection related injuries occurred in small plants.

Occupational safety and health agencies have been predisposed towards concentrating their efforts on medium and larger sized firms. Because of this strategy, compliance enforcement efforts have had limited impact on smaller firms (Ashford et al., 1976; Zeckhauser & Nichols, 1978; Mendeloff, 1979). Though safety agencies appear to have directed their efforts towards larger employers, Mendeloff stated, "General agreement seems to exist among safety professional that smaller firms are relatively more likely to ignore standards" (1976, p. 92).

Dunkelburg (1976) examined the impact of OSHA on small employers. The major findings of the study reported that the frequency of inspections, citations, and fines increased as the size of the firms surveyed increased. In addition, the study noted that requests for assistance

concerning OSHA compliance was related to firm size. Though, on the average, less than three percent of the firms requested assistance, six percent of the largest firms sought assistance.

Standards compliance has been more difficult for small employers due to a number of factors. First, the economic impact of meeting compliance standards is higher for small employers. Smaller firms do not have the flexibility to absorb the costs of standards compliance as do larger firms (Steiger, 1974; O.S.H.A., 1976; Ashford et al., 1976). Second, small employers lack the technical expertise to understand and comply with safety standards (Steiger, 1974; O.S.H.A., 1976). Third, small employers are less likely to be aware of compliance standards affecting the workplace. The final point has to do with the relationship between the employer and workers' compensation insurance carrier. Workers' compensation insurance companies provide safety services to employers through the insurers' Loss Control Department. Historically, insurance companies provide safety services based on the premium size of the employer, thus firms that pay higher premiums receive increased safety service from the insurance company (Ashford et al., 1976).

When compared to firms employing a large number of workers, small employers have been unable to afford the services of a full time safety professional and are more likely to have felt the financial impact of occupational

injuries. In some cases, the costs related to industrial accidents may have impacted on a small firm's profit and loss statement (Ashford, 1976; DeReamer, 1980).

Programs that provide occupational safety and health assistance are important for small employers. Ashford, Gorski, and Heaton (1976) recommended that programs designed to assisted small employers include education and training, consultation, technical assistance, and information services. Recognizing the need for safety and health education programs, twenty community colleges, in conjunction with the American Association of Community and Junior Colleges, developed a series of occupational safety and health courses. In 1976, thirty percent of the program's participants were from firms employing less than fifty-one employees. A second program was developed by the National Safety Council. The Council received a two year, thirty million dollar grant to provide safety seminars for small and medium sized employers. During the period of the grant, the program reached approximately 100,000 individuals through thirty-eight local council offices (O.S.H.A., 1976).

#### Accident Prevention Program Components

Critics of compliance enforcement have argued that the the strategy is misguided due to the belief that (1) worker behavior is a critical factor (Zeckhauser & Nichols, 1978); (2) standards compliance has impacted on only a small

percent of all industrial injuries (Mendeloff, 1979); (3) there are wide variations in the types of safety problems and programs that exist between companies (Levitt, 1975); and (4) safety programs developed by employers appear to have the potential for being more effective (Cooke & Gautschi, 1981).

Variations in the types of safety programs implemented by employers include differences in the levels of upper management commitment, employee participation, and workplace environment. Employers have the ability to develop more effective safety programs by implementing programs directed at improving worker behavior, developing better equipment safeguards, and more closely monitoring work conditions (Cooke & Gautschi, 1981).

Two factors relating to employee characteristics have been identified as important elements relating to occupational injuries, age and job experience (Gordon et al., 1971; Oi, 1973; Calif. Dept. Finance, 1976). Research by Cohen, Smith, and Cohen (1975) revealed that production employees in low injury companies were slightly older and more experienced than employees in higher injury companies. Samuelson's research relating to employee characteristics in the construction industry reported that new workers were vulnerable to injuries due to inexperience (1977). A Canadian study conducted by Surrey (1971) concluded that industrial injury rates were one and a half to two times higher for employees with less than six months of job

experience.

Smith (1972) identified a positive relationship between business cycles and injury rates, which increased during market booms and decreased during recessions. When companies increased overtime or recalled workers there were short term increases in injury rates due to employee fatigue, new employees inexperience, and the use of surplus equipment.

A number of studies have revealed differences in safety program components between high versus low injury companies. Three accident prevention components identified by Davis and Stahl (1964) included (1) a "sincere desire" by both management and employees to prevent injuries; (2) identification and elimination of safety hazards; and (3) a willingness to discuss safety with anyone who might assist in improving the company's safety effort.

Gausch (1973) reported that effective accident prevention programs required a "balanced involvement" approach. The key components of the program included requesting safety ideas, integrating safety rules into the job, rewarding employees for their effort, and the belief by management that the safety effort was in continued need of improvement. Cooke and Gautschi (1981) identified a relationship between the reduction in lost time injuries and cooperative safety programs involving the employer and employees.

Cohen, Smith, and Cohen (1975) concluded that there

was a significant difference in training programs between low and high injury firms. Low injury firms had implemented formal job specific training programs, whereas high injury firms only implemented job specific training for jobs that historically had high injury rates. In 1975, Levitt disclosed that companies which conducted formal safety orientation for new employees had an average twenty-five percent lower experience rate than companies that lacked formal orientation programs. In conjunction with the impact of new hire orientation programs on experience rates, Levitt stated that companies which conducted special training programs for newly hired or promoted foremen had experience rates twenty-nine percent lower.

Hinze (1976) and Samuelson (1977) concluded that job orientation was important in reducing occupational injuries. Orientation programs impacted on injuries by providing the new employee with an improved understanding of the employee's role and management's expectations.

Two additional accident prevention program components have been identified as having an impact on occupational injuries, safety inspections and accident investigations (Cohen et al., 1975; Hinze, 1976). Companies where top management reviewed safety inspection reports had workers' compensation experience rates twenty percent lower than companies that did not forward the inspection reports to top management (Levitt, 1975).

### Measurements in Occupational Safety Research

In 1964, Haddon, Suchman, and Klein observed that there were strong similarities between accidents and disease causation, yet accident research techniques suffered from the "primitive state of its methodology" (p. 5). Historically, individuals' responsible for developing occupational safety programs have designed and implemented programs based on "common sense", without adequately identifying possible alternatives through the application of recognized research methodologies.

Mendeloff (1979) noted that empirical evaluations concerning the impact of occupational safety and health programs were "certainly desirable" (p. 82). Research pertaining to measuring safety and accident prevention program effectiveness requires that the program objectives have been specified and a means for measuring the objectives can be devised. Two problems faced by researchers have been obtaining reliable data relating to occupational injuries (Calif. Dept. Finance, 1976; Bacow, 1980) and failing to utilize statistical techniques that control for confounding factors (Zeckhauser & Nichols, 1978; Pearson, 1982).

Currently, there is no universal safety measurement that meets the needs of all researchers. Prior to the implementation of the OSHAct, the American National Standards Institute's (ANSI) Z16.1 standard provided



guidelines for recording occupational injuries and illnesses. The OSHAct superseded the ANSI Z16.1 standard, changing the definitions and reporting procedures of occupational injuries and illnesses. The change invalidated the ability to compare pre- and post-OSHA injury rate data as a means for evaluating the effectiveness of compliance enforcement (Smith, 1975; DeReamer, 1980).

Since the implementation of the OSHAct, numerous occupational safety studies have used injury rates as the measure for examining program effectiveness. The reliability of injury rates as a measure of program effectiveness has been questioned by Sands (1968), Gordon, Akman, and Brooks (1971), Barth (1972), Smith (1975), Chelius (1977), and DeReamer (1980). Sands, Barth, and Gordon stated there has been substantial underreporting of occupational injuries by employers.

In 1961, the injury rate for the construction industry in Ohio was reported to be 16.04, yet upon closer examination of the injury history of twenty-five randomly selected companies, Sands documented an average injury rate of 41.03. Sands disclosed that a similar situation relating to underreporting also existed in Michigan. Gordon, Akman, and Brooks concluded that occupational injuries reported to the Bureau of Labor Statistics and California authorities were inaccurate. The study revealed that thirty-six percent of the companies that reported having no injuries actually had occupational injuries

during the report period.

The measurement accuracy of injury rates is influenced by company size (DeReamer, 1980; Viscusi, 1983). Injury rates are computed by dividing the employee-hours incurred over a given period of time into the number of injuries incurred over the same period of time. Because the employee-hour base is related to the firm size, injury rates among small firms can be skewed and of little value due to the employee-hour base figure (DeReamer, 1980). In addition, Smith (1975) and Chelius (1977) reported that injury rates fluctuate in response to a number of factors unrelated to safety program compliance, such as a firm's business cycle, employee age, and employee experience. After examining the increase in injury rates over the period 1964 to 1970, Chelius projected a decline in injury rates as the age composition and job experience of the "baby boom" cohort increases over time.

The conclusions of studies that have evaluated the effects of safety and accident prevention programs based upon an examination of the sample populations' annual injury rate are flawed if the study was based on a single year's injury rate. The evaluation of a program's impact on injury experience requires more than one year's injury data (Beyer, 1916; Mendeloff, 1979). Smith (1976, 1979) stated that there was a time lag between an inspection and the inspection's impact on injury rates, thus studies designed to evaluate inspection efficiency must examine more than

one or two years of injury experience.

Gordon, Akman, and Brooks (1971) and Smith (1976) consider state workers' compensation reports as offering a viable solution for obtaining reliable data concerning occupational injuries. Workers' compensation reports have been identified as being more reliable than occupational injury rates because the reports are not subject to changes in definition, gaps in data (Mendeloff, 1979), or underreporting errors (Barth, 1972).

However, a major drawback in using workers' compensation reports as a measure of program effectiveness is related to the availability of the records. Though copies of the reports are maintained by employers, insurance companies, physicians, and the State of California, access to the records is limited.

An alternative means for evaluating program effectiveness involves obtaining a company's workers' compensation experience rate. Workers' compensation experience rates are considered to be a valid indicator of a company's safety program effectiveness and performance by OSHA (1982b).

#### Workers' Compensation Experience Rating

Though economic motives have been identified as probably the most powerful motive for developing safety programs (Spengler, 1978; Bardach & Kagan, 1982), OSHA and Cal/OSHA fines are only one of many economic inducements

(Calif. Dept. Finance, 1976). A second, and probably more important economic incentive for implementing an effective safety program has been workers' compensation insurance (Levitt, 1975; Zeckhauser & Nichols, 1978; & Mendeloff, 1979). Research by Bardach and Kagan reported that "the annual increase in compensation costs that follow a bad safety record far exceed the average fines levied by OSHA" (1982, p. 61).

Approximately ninety percent of the American workforce is covered by federal or state workers' compensation laws. In 1970, American employers paid 4.9 billion dollars in workers' compensation premium (Darling-Hammond & Kniesner, 1980). Thirteen years later, workers' compensation premiums paid by California employers totaled 4.5 billion dollars (Pokaloff, 1986).

As the costs of injuries increase, employers have a greater incentive to develop and implement occupational safety programs (Smith, 1972). Workers' compensation costs provide an incentive to employers by linking the employer's premium rate to injury costs through the application of experience rating (Russell, 1974; Oi, 1974; Darling-Hammond & Kniesner, 1980). The report presented by the National Commission on State Workmen's Compensation Laws concluded that experience rating is probably "the primary contribution to safety provided by workmen's compensation" (Oi, 1973, p. 98). Burton (1973), Mendeloff (1979), Ruser (1985), and Zeckhauser and Nichols (1978) stated that the

incentive provided by workers' compensation increases when injury costs are more closely related to the firm's experience rate.

The procedures for determining experience rate are similar in most states. Though the majority of states rely on the National Council on Compensation Insurance, approximately ten states maintain their own rating bureaus (Levitt, 1975; Ruser, 1985). The Workers' Compensation Insurance Rating Bureau determines the annual workers' compensation experience rates for employers with California operations (see Appendix B) (Levitt, 1975; Workers' Comp. Ins. Rating Bureau, 1986a).

The major principal behind experience rating is to develop a workers' compensation premium that reflects three years of the firm's injury experience and, in all but the largest firms, the injury experience of the firm's industrial classification (Russell, 1974). Levitt (1975) identified three basic elements used to determine an employer's experience rate; (1) injury frequency; (2) injury severity; (3) the firm's size. In addition, payroll (industrial) classification should be considered a fourth element.

The formula used to determine an employer's experience rate is designed to give greater weight to injury frequency than to severity. Frequency is weighted more than severity "on the belief that a firm has greater control over whether an accident occurs than it does over the severity" once the

accident occurs (Russell, 1974, p. 364). A series of small injuries that add up to a single large loss have a greater impact on the experience rate than the single large loss (Levitt, 1975).

One drawback to utilizing experience rates as a measure of program effectiveness is based on the relationship between the the firm's loss history and the influence the losses have on the experience rate. The experience rates of small and medium sized firms are not as responsive to changes in the firms' injury losses as are large employers (Russell, 1974; Nichols & Zeckhauser, 1977; Ruser, 1985).

The difference in the responsiveness is a function of the stabilizing "W" value (see Appendix B). The "W" value varies between 0 and 1, depending on the firms expected loss value. The "W" value increases in relationship to an increase in the expected loss value as influenced by a firm's payroll classification and three years payroll total. The "W" value is a small percentage for small employers and increases as size increases (Workers' Comp. Ins. Rating Bureau, 1986b).

#### Telephone Survey Techniques

There are three alternative methods for conducting a questionnaire survey; personal interview, mail, or telephone. Reviewing the effectiveness of telephone survey techniques versus personal interviews, Blankenship (1977)

and Sudman and Bradburn (1982) noted few differences in responses between the two techniques. Research by Groves and Kahn (1979) reported that when compared to personal interviews there was a decrease in the respondent's willingness to provide personal information over the telephone, though in most cases the difference was not significant.

In Mail and telephone surveys, Dillman (1978) observed that the response rates for mail surveys were lower than personal or telephone interviews. Telephone surveys can consistently obtain response rates of eighty to ninety percent. The average response rate for thirty-one telephone surveys was ninety-one percent compared to an average rate of seventy-four percent for mail surveys. When dealing with a "specialized" population, Dillman reported a telephone responses rates of ninety-six percent compared to a seventy-seven percent rate for the mail survey.

Blankenship (1977) and Dillman (1978) have stated that telephone surveys offer a number of advantages:

1. Higher completion rates.
2. Individuals or populations difficult to reach though personal interviews are relatively easy to reach by telephone.
3. Allow for greater geographical dispersion of the sample population than personal interviews.
4. Quicker survey completion.

5. Higher success avoiding "non-response" replies when compared to mail surveys.

6. Potentially cost beneficial over mail surveys when limited to ten to fifteen minutes.

Researchers considering the telephone as a means to conduct a survey must be aware of the technique's limitation. Blankenship (1977) observed that there are subject matter, response, and interview limitations. Subject matter limitation include length of the survey, observational data can not be obtained, visual aids can not be used and questions requiring a behavior response can not be asked. Response limitations include shorter replies by respondents and probing is more difficult than when conducting personal interviews. Because of the limitations, telephone survey questions must be short and easy to comprehend (Blankenship, 1977; Dillman, 1978; Groves & Kahn, 1979).

### Summary

Chapter 2 has reviewed the literature related to the topics of regulatory strategies, Federal and California Occupational Safety and Health Administrations, compliance and voluntary compliance effectiveness, occupational safety and small employers, workers' compensation experience rating, and research measurements and strategies. Chapter 2 was directed towards answering three crucial questions related to a study examining occupational safety, small



employers, and government sponsored safety programs.

First, researchers have identified a relationship between accident prevention program components and a reduction in occupational injuries (Davis and Stahl, 1964; Gausch, 1973; Cohen, Smith, & Cohen 1975; Hinze, 1976; Samuelson, 1977). Second, the ability of safety standards to reduce occupational injuries has been challenged by Mendeloff (1976). In addition, the effectiveness of compliance enforcement programs' as a means to reduce occupational injuries has been questioned by a number of researchers, including Sands (1968), Smith (1979), and Currington (1980). Third, researchers have identified differences in standards compliance and occupational safety programs between small and large employers (Ashford et al., 1976; Steiger, 1974; Szasz, 1984).

## CHAPTER III

### METHODS AND PROCEDURES

This study was conducted to evaluate government intervention as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The study evaluated two government strategies, (1) compliance inspection and (2) voluntary compliance programs.

Chapter 3 will examine the methods and procedures used to investigate the impact of voluntary compliance and compliance inspection based safety programs on workers' compensation experience rates. The central issue was to determine if (1) participation in the California Occupational Safety and Health (Cal/OSHA) Small Employer Voluntary Compliance Program (SEVCP) or (2) compliance inspections conducted by the Division of Occupational Safety and Health (DOSH) influenced experience rates among small employers in California.

An examination of the methods and materials used for the study involved three crucial areas. The first section is an examination of the procedure used in obtaining the sample population. The second section discusses the sources of data used in the study. The final section examines the statistical technique used to test the hypotheses presented

in Chapter 1.

### Sample Population

The sample population in this study consisted of three randomly sampled groups of small employers in California. The reason for examining the impact of voluntary compliance and compliance inspection programs on experience rates among small employers is threefold.

First, small employers in California represent a large cohort and employ a large percent of the California workforce. Based on County Business Patterns: 1982, published by the U.S. Bureau of Census (1984), of the 526,168 companies located in California, 499,420 (94.9%) employed fewer than fifty employees. Forty-four percent of the California workforce was employed by "small" companies.

Second, researchers have stated that small employers lack the resources to develop effective occupational safety programs (U.S. House, 1974; Ashford et al., 1976; Szasz, 1984). One of the primary reasons for the development and sponsorship of consultation programs by the Federal Occupational Safety and Health Administration was to provide the small employer with a resource which would assist the employer in developing and implementing an accident prevention program (OSHA, 1984b).

Third, since 1979, federal and state occupational safety agencies have developed and implemented voluntary compliance programs. The agencies have moved away from a

singular reliance on compliance inspections by developing a program mix which includes consultation, voluntary compliance programs, standards development and compliance inspections. Though a number of researchers, including Smith (1975, 1979), Viscusi (1983), and Mendeloff (1976, 1979), have questioned the effectiveness of the compliance inspection program, few studies have attempted to evaluate the effectiveness of voluntary compliance programs.

Due to the large number of small employers in California, it would have been difficult, and inappropriate, to examine every employer. Because of the population size, a random sample of the three groups was obtained.

The first treatment group (participants) consisted of twenty-five companies that participated in the Small Employer Voluntary Compliance Program (SEVCP) in 1982. The second treatment group (compliance) consisted of twenty-five companies that were inspected for safety compliance by Division of Occupational Safety and Health (DOSH) officials during 1982. The control group consisted of twenty-five companies that did not participate in the SEVCP and were not inspected by DOSH.

To control for homogeneity between the three groups, the study was limited to companies with fixed locations as identified by each company's two digit Standard Industry Classification (SIC) code. Because participation in the SEVCP in 1982 was restricted to companies with fifty or

fewer employees, the compliance inspection and control groups were limited to companies employing fifty or fewer employees.

The SEVCP (participant) group was randomly selected from documents provided by the Cal/OSHA Consultation Service. To be considered for selection, the company had to have participated in the SEVCP during 1982. Though 1981 was the first year the program was offered, 1982 was selected as the base year because 1982 was the first full year the program was available to employers.

The DOSH (compliance) group was randomly selected from documents provided by the Division of Occupational Safety and Health. The Division provided a computer generated list of companies that were inspected by DOSH in 1982. The computer list was restricted to non-construction companies employing fifty or fewer individuals.

The control group was randomly selected from Dunn and Bradstreet's Market Indicators, a computerized database. The control group was limited to companies that were not listed on the documents provided by the Cal/OSHA Consultation Service or the Division of Industrial Safety and Health.

#### Source of Data

Research strength is based upon the ability to obtain reliable and accurate primary data. In terms of workers' compensation experience rates, the most reliable and

accurate source of data in California is the microfiche records maintained by the Workers' Compensation Insurance Rating Bureau of California (WCIRB). The WCIRB is responsible for determining and recording the workers' compensation experience rates of California employers.

For a company to qualify for consideration in the random sampling process, the 1983 and 1986 experience rate for the company had to have been recorded on the Workers' Compensation Insurance Rating Bureau of California (WCIRB) experience modification rate microfiche. In addition, if a company had undergone a material change in ownership between 1983 and 1986, the company was considered to be ineligible for inclusion in the random sampling process.

The second part of the study involved obtaining primary data from each of the companies regarding compliance with General Industry Safety Order (GISO) 3203. A telephone survey involving each company was conducted to obtain information concerning the company's compliance with GISO 3203. A questionnaire was constructed and utilized as a means of obtaining information relating to GISO 3203 compliance. The content validity of the survey instrument was measured by utilizing a modified delphi procedure.

The modified delphi procedure consisted of (a) committee selection and (b) two mailings. The selection of committee members was based on the individuals' knowledge and experience relating to occupational safety regulations and accident prevention programs. Individuals selected for

the committee represented (a) government safety agencies, (b) private industry, and (c) academia. Eight individuals were contacted by telephone. The purpose of the study and the delphi committee were explained to each individual. Five individuals completed the first delphi evaluation process. Four of the five individuals completed the second delphi evaluation process.

The purpose of the first mailing was to have the draft telephone survey reviewed by the committee members. The first mailing included a (1) cover letter reviewing the purpose of the study (see Appendix C), (2) copy of General Industry Safety Order 3203 (see Appendix A), (3) copy of the draft telephone survey (see Appendix C), and (4) self-addressed stamped return envelope. The committee members were requested to comment (agree or disagree) on the survey questions. In addition, the members were asked to write out any questions that they considered important, but were not included on the draft survey.

During the second mailing the committee members were (1) informed of the questions that were accepted for inclusion in the survey by a minimum of seventy-five percent of the members (Veltri, 1985); (2) requested to comment on the questions suggested for inclusion in the survey by individual committee members; and (3) requested to identify the five most important questions and five least important questions.

After receiving the results of the second mailing, the

questions that failed to receive a minimum seventy-five percent agreement rate were rejected for inclusion in the study. Six companies were randomly selected to serve as the telephone survey pre-test sample group. The six companies were drawn from a list of companies which had not been selected for the study. Based on the telephone survey pre-test, the average length of the survey was determined to be five minutes. One question was deleted from the survey after the pre-test because of comprehension difficulties.

### Statistical Technique

Due to the design of the study, three types of statistical analyses were used to test the hypotheses. Hypothesis I was tested by using the analysis of covariance F-statistic. Hypotheses II through VIII were tested by using chi-square. Hypotheses IX through XIX were tested by using analysis of variance F-statistic.

Analysis of covariance was selected to analyze Hypothesis I because:

1. Pre- and post-test measures were used.
2. The test adjusted for uncontrolled variables in the study.
3. The test evaluated the post-test scores for a significant difference by using the pre-test measures as a means to adjust the data for initial differences.
4. The regression slopes for all three treatment groups were equal.



5. The scale type of the dependent variable data was interval (Courtney, 1984).

Chi-square was selected to analyze Hypotheses II through VIII because:

1. The scale type of the data was nominal.

2. The data were discrete because the data were in whole unit values (Courtney, 1984).

Analysis of variance was selected to analyze Hypotheses IX through XIX because:

1. The data were obtained from normally distributed populations.

2. The data were collected from sample groups that were randomly selected.

3. The scale type of the data was interval.

4. The test was used to contrast two or more means (Courtney, 1984).

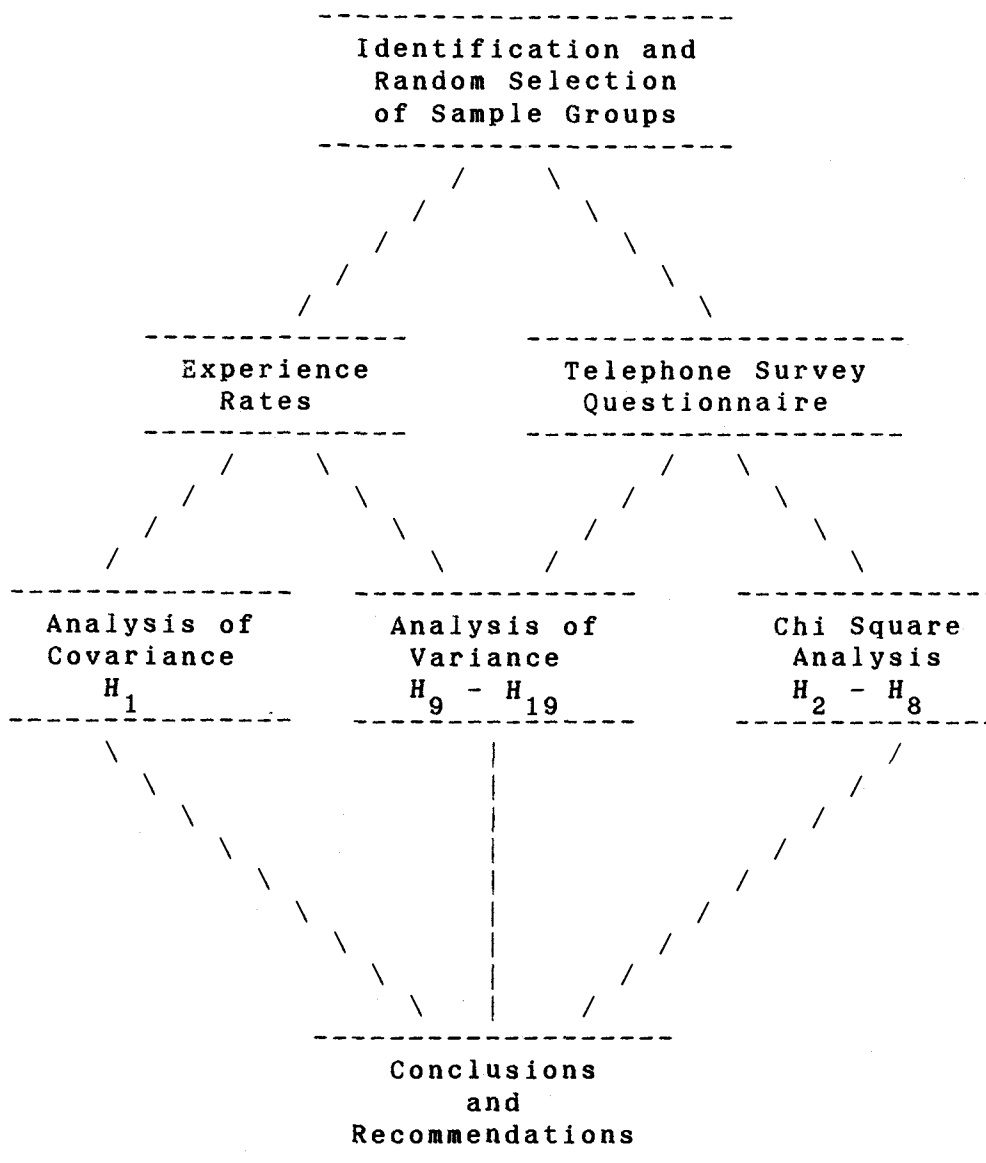
The probability levels of the three statistical analyses used to test the hypotheses were conducted at the 0.05 ( $p = 0.05$ ) level. All chi-square tests were conducted using 2 x 3 contingency tables.

Nineteen hypotheses were tested. The statistical technique was designed to contrast experience rates, government intervention in occupational safety, and accident prevention program components.

Hypothesis I was designed to determine if there was a significant difference in the experience rates of the three sample groups. Hypotheses II through VIII were designed to

determine if there was a significant difference in accident prevention program components between the three sample groups as identified in General Industry Safety Order (GISO) 3203. Hypotheses IX through XIX were designed to determine if there was a significant difference in experience rates between companies in compliance and companies in non-compliance with GISO 3203 accident prevention program components (see Table 1).

Table 1  
Graphic Study Design



Hypothesis I

$H_0$ : There is no significant difference in experience rates between the three study groups.

$H_a$ : There is a significant difference in experience rates between the three study groups.

Hypothesis II

$H_0$ : There is no significant difference in maintaining an accident prevention program between the three groups.

$H_a$ : There is a significant difference in maintaining an accident prevention program between the three groups.

Hypothesis III

$H_0$ : There is no significant difference in providing new employee general safe work practice training between the three groups.

$H_a$ : There is a significant difference in providing new employee general safe work practice training between the three groups.

Hypothesis IV

$H_0$ : There is no significant difference in providing new employee job specific safe work practice training between the three groups.

$H_a$ : There is a significant difference in providing new employee job specific safe work practice training between

the three groups.

#### Hypothesis V

$H_0$ : There is no significant difference in conducting workplace safety inspections between the three groups.

$H_a$ : There is a significant difference in conducting workplace safety inspections between the three groups.

#### Hypothesis VI

$H_0$ : There is no significant difference in conducting regularly scheduled workplace safety inspections between the three groups.

$H_a$ : There is a significant difference in conducting regularly scheduled workplace safety inspections between the three groups.

#### Hypothesis VII

$H_0$ : There is no significant difference in conducting safety meetings between the three groups.

$H_a$ : There is a significant difference in conducting safety meetings between the three groups.

#### Hypothesis VIII

$H_0$ : There is no significant difference in conducting regularly scheduled safety meetings between the three groups.

$H_a$ : There is a significant difference in conducting

regularly scheduled safety meetings between the three groups.

#### Hypothesis IX

$H_0$ : There is no significant relationship between experience rates and maintaining an accident prevention program.

$H_a$ : There is a significant relationship between experience rates and maintaining an accident prevention program.

#### Hypothesis X

$H_0$ : There is no significant relationship between experience rates and maintaining an informal new employee orientation or training program.

$H_a$ : There is a significant relationship between experience rates and maintaining an informal new employee orientation or training program.

#### Hypothesis XI

$H_0$ : There is no significant relationship between experience rates and maintaining a formal new employee orientation or training program.

$H_a$ : There is a significant relationship between experience rates and maintaining a formal new employee orientation or training program.

Hypothesis XII

$H_0$ : There is no significant relationship between experience rates and providing new employee general safe work practice training.

$H_a$ : There is no significant relationship between experience rates and providing new employee general safe work practice training.

Hypothesis XIII

$H_0$ : There is no significant relationship between experience rates and providing new employee job specific safe work practice training.

$H_a$ : There is a significant relationship between experience rates and providing new employee job specific safe work practice training.

Hypothesis XIV

$H_0$ : There is no significant relationship between experience rates and conducting workplace safety inspections.

$H_a$ : There is a significant relationship between experience rates and conducting workplace safety inspections.

Hypothesis XV

$H_0$ : There is no significant relationship between experience rates and conducting regularly scheduled workplace safety inspections.

$H_a$ : There is a significant relationship between experience rates and conducting regularly scheduled workplace safety inspections.

Hypothesis XVI

$H_0$ : There is no significant relationship between experience rates and conducting safety meetings.

$H_a$ : There is a significant relationship between experience rates and conducting safety meetings.

Hypothesis XVII

$H_0$ : There is no significant relationship between experience rates and conducting regularly scheduled safety meetings.

$H_a$ : There is a significant relationship between experience rates and conducting regularly scheduled safety meetings.

Hypothesis XVIII

$H_0$ : There is no significant relationship between experience rates and conducting accident investigations.

$H_a$ : There is a significant relationship between



experience rates and conducting accident investigations.

#### Hypothesis XIX

$H_0$ : There is no significant relationship between experience rates and management's perception of safety program effectiveness.

$H_a$ : There is a significant relationship between experience rates and management's perception of safety program effectiveness.

#### Summary

Chapter 3 provided the methodology used to investigate the relationship between experience rates, accident prevention programs, compliance inspections, and participation in the Small Employer Voluntary Compliance Program. The sample population, source of data, and statistical technique were designed to test the hypotheses proposed in Chapter 1. The results of the data gathering and compilation will be presented in Chapter 4.

## CHAPTER IV

### ANALYSIS OF DATA

This study was conducted to evaluate government intervention as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The study evaluated two government strategies, (1) compliance inspection and (2) voluntary compliance programs.

Chapter 4 will examine the analysis of data used to investigate voluntary compliance and compliance inspection based safety programs' influence on workers' compensation experience rates. The central issue was to determine if (1) participation in the California Occupational Safety and Health (Cal/OSHA) Small Employer Voluntary Compliance Program (SEVCP) or (2) compliance inspections conducted by the Division of Occupational Safety and Health (DOSH) influenced experience rates among small employers in California.

#### Demography of Study

The sample populations were restricted to seventy-five randomly selected California companies. The SEVCP group consisted of twenty-five companies that had participated in

the Cal/OSHA Consultation Service's Small Employer Voluntary Compliance Program during 1982. The DOSH group consisted of twenty-five companies that had been inspected by the Division of Occupational Safety and Health during 1982. The control group consisted of twenty-five companies that did not participate in the SEVCP and were not inspected by DOSH during 1982. The 1983 and 1986 workers' compensation experience rates for the seventy-five randomly selected companies were obtained from the Workers' Compensation Insurance Rating Bureau of California (WCIRB) experience rating microfiche.

A telephone survey was conducted to obtain data relating to safety and accident prevention program components. Table 2 examines the participation rates of the companies involved in the survey. A total of 58 companies (77.3 %) participated in the telephone survey. The SEVCP group had the highest participation rate (92.0 %). The DOSH group had the lowest participation rate (64.0 %). Of the 13 companies that declined to participate in the survey, 7 companies were in the DOSH group, 5 companies were in the control group, and 1 company was in the SEVCP group.

Age and experience have been identified as important variable in safety and accident prevention research (Gordon et al., 1971; Oi, 1973; Calif. Dept. Finance, 1976). Table 3 examines the distribution of employees under the age of twenty-five. Of the fifty-eight companies participating in the survey, nineteen companies (32.8 %) estimated that 10

Table 2

## Telephone Survey Response Rates

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	25	100.0	25	100.0	25	100.0	75	100.0
Participated in survey	23	92.0	16	64.0	19	76.0	58	77.3
Declined to participate	1	4.0	7	28.0	5	20.0	13	17.3
Telephone number unlisted	1	4.0	2	8.0	1	4.0	4	5.3

Table 3

**Company Distribution: Percent of Employee Workforce Under the Age  
of Twenty-Five**

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Less than 10%	6	26.1	3	18.8	3	15.8	12	20.7
10 to 25%	7	30.4	6	37.5	6	31.6	19	32.8
26 to 50%	4	17.4	4	25.0	4	21.1	12	20.7
Over 50%	6	26.1	3	18.8	6	31.6	15	25.9

to 25 percent of their workforce consisted of employees under the age of twenty-five. Table 4 examines the distribution of employees with less than one year of job experience between 1982 and 1984. Twenty-two companies (37.9 %) estimated that less than 10 percent of their employees had less than one year of job experience.

Safety and accident prevention program rates are presented in Table 5. Forty-seven companies (81.0 %) have maintained an accident prevention program since 1982. Twenty-eight companies (48.3 %) had formal accident prevention programs based on written guidelines. Nineteen companies (32.8 %) had informal accident prevention programs based on verbal guidelines. Fifty companies (86.2 %) perceived their safety program as having been effective in reducing workers' compensation costs. Two companies (3.4 %) perceived their safety program as having been ineffectve in reducing workers' compensation costs. Both companies were in the SEVCP group and had experience rates (70 % and 87 %) that were better than their industries' average.

Table 6 examines the new employee, general safety, and job specific safety training rates of the companies involved in the survey. Fifty-one companies (87.9 %) provided new employee orientation since 1982. Fifty companies (86.2 %) provided new employees with general safety instruction. Forty-five companies (77.6 %) provided new employees with job specific safety instruction. On a

Table 4

Company Distribution: Percent of Employee Workforce with less than  
One Year of Job Experience

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Less than 10%	8	34.8	6	37.5	8	42.1	22	37.9
10 to 25%	10	43.5	5	31.3	6	31.6	21	36.2
26 to 50%	3	13.0	3	18.8	5	26.3	11	19.0
Over 50%	2	8.7	2	12.5	0	0.0	4	6.9

Table 5  
Safety Program Rates

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Maintained accident prevention program since 1982	18	78.3	13	81.3	16	84.2	47	81.0
Program based on:								
Written guidelines	9	39.1	7	43.8	12	63.2	28	48.3
Verbal guidelines	9	39.1	6	37.5	4	21.1	19	32.8
Safety program has changed	9	39.1	7	43.8	9	47.4	25	43.1
Perceived safety program as having been effective	19	82.6	15	93.8	16	84.2	50	86.2
Neither effective nor ineffective	2	8.7	1	5.3	3	15.8	6	10.3
Ineffective	2	8.7	0	0.0	0	0.0	2	3.4



Table 6

**New Employee Orientation, General Safety, and  
Job Specific Safety Training Rates**

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Provided new employee orientation since 1982	22	95.7	13	81.3	16	84.2	51	87.9
Orientation based on:								
Written guidelines	9	39.1	6	37.5	9	47.4	24	41.4
Verbal guidelines	13	56.5	7	43.8	7	36.8	27	46.6
Orientation included:								
General safety instruction	22	95.7	13	81.3	15	78.950	50	86.2
Job specific safety instruction	22	95.7	11	68.8	12	63.2	45	77.6

group basis, twenty-two SEVCP companies (95.7 %) provided job specific safety training. Twelve control companies (63.2 %) and eleven DOSH companies (68.8 %) provided new employees with job specific safety instruction.

Safety committee and employee participation rates are presented in Table 7. Twenty-five companies (43.1 %) maintained safety committees which included active employee participation. Twelve companies (20.7 %) reported an increase in employee reports of unsafe conditions since 1982. Whereas seven SEVCP group companies (30.4 %) and five control group companies (26.3 %) reported an increase in employee reports of unsafe conditions, the sixteen DOSH group companies reported that there had not been an increase in employee reports.

Table 8 examines employee safety meetings. Forty-one companies (70.7 %) conducted safety meetings. Thirty companies (51.7 %) conducted regularly scheduled safety meetings. Sixteen companies (27.6 %) conducted safety meetings on a monthly basis.

Information pertaining to accident investigation is presented in Table 9. Forty-four companies (75.9 %) conducted accident investigations. Twenty-six companies (44.8 %) used a standard form to conduct the accident investigation.

Table 10 examines safety inspections. Fifty companies (86.2 %) conducted self inspections of the workplace. Thirty-one companies (53.4 %) conducted regulary scheduled

Table 7

## Safety Committee and Employee Participation Rates

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Maintained safety committee	11	47.8	5	31.3	9	47.4	25	43.1
Safety committee included active employee participation	11	47.8	5	31.3	9	47.4	25	43.1
Increase in employee reports of unsafe conditions	7	30.4	0	0.0	5	26.3	12	20.7

Table 8

## Employee Safety Meetings

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Conducted safety meetings	17	73.9	12	75.0	12	63.2	41	70.7
Conducted regularly scheduled safety meetings	12	52.1	8	50.0	9	47.4	29	50.0
Safety meetings scheduled:								
Annually	0	0.0	0	0.0	0	0.0	0	0.0
Semi-annually	1	4.3	0	0.0	0	0.0	1	1.7
Quarterly	1	4.3	4	25.0	3	15.8	8	13.8
Monthly	8	34.8	4	25.0	3	15.8	15	25.9
Weekly	2	8.7	0	0.0	3	15.8	5	8.6

Table 9

## Accident Investigations

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Conducted accident investigations	17	73.9	15	93.4	12	63.2	44	75.9
Used a standard form	8	34.8	9	56.3	9	47.4	26	44.8

Table 10  
Safety Inspections

	SEVCP		DOSH		Control		Total	
	Number	%	Number	%	Number	%	Number	%
Sample size	23		16		19		58	
Conducted safety inspections	22	95.5	16	100.0	17	89.5	55	94.8
Self inspections	21	91.3	15	93.8	14	73.7	50	86.2
Conducted regularly scheduled safety inspections	12	52.2	8	50.0	11	57.9	31	53.4
Safety inspections scheduled:								
Annually	2	8.7	0	0.0	0	0.0	2	3.4
Semi-annually	1	4.3	1	6.3	4	21.1	6	10.3
Quarterly	1	4.3	4	25.0	2	10.5	7	12.1
Monthly	6	26.1	2	12.5	4	21.1	12	20.7
Weekly	2	8.7	1	6.3	1	5.3	4	6.9

safety inspections.

### Statistical Analysis

An analysis of covariance was used to test hypotheses I. Chi-square was used to test hypotheses II through VIII. A one-way analysis of variance was used to test hypotheses IX through XIX. The 0.05 level of significance ( $p = 0.05$ ) was used to determine whether to retain or reject the null hypotheses. If a hypothesis' computed value was greater than the value obtained from the appropriate statistical table (Tabular Value), the null hypothesis was rejected.

#### Hypothesis I

$H_0$ : There is no significant difference in experience rates between the three study groups (see Table 11).

Table 11. Analysis of Covariance- Hypothesis I

Group	N	Group Mean	Adj. Group Mean	Std. Error
SEVCP	25	89.880	89.488	4.914
DOSH	25	109.480	107.083	4.934
Control	25	98.840	101.629	4.941

N	D.F.	F Value	F Prob.	Tab. Value
75	2, 71	3.358	0.04	3.056

In contrasting the adjusted mean scores for the three groups, the computed F value was significantly greater than the tabular F value at the 0.05 level. The null hypothesis

was rejected. The results of this test indicated that there was a significant difference in the experience rates between two, or more of the groups.

A t-test matrix for the adjusted group means was conducted to determine which groups were significantly different (see Table 12).

Table 12. T-test Matrix

	SEVCP	DOSH	Control
SEVCP	1.000		
DOSH	0.014 <sup>^</sup>	1.000	
Control	0.086 <sup>^^</sup>	0.439	1.000
-----			
<sup>^</sup> Significant difference $p = 0.05$			
<sup>^^</sup> Significant difference $p = 0.1$			

In contrasting the adjusted mean scores of the three groups, the computed t value was significantly greater than the tabular value at the 0.05 level between the SEVCP and DOSH groups. The results of this test indicated that there was a significant difference in experience rates between the SEVCP and DOSH groups.



Hypothesis II

$H_0$ : There is no significant difference in maintaining an accident prevention program between the three groups (see Table 13).

Table 13. Evaluation of Accident Prevention Programs

	SEVCP	DOSH	Control	Total
Maintained accident prevention program	18 (19)	13 (13)	16 (15)	47
Did not maintain accident prevention program	5 (4)	3 (3)	3 (4)	11
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	0.240	0.887	5.991

In contrasting, by group, the number of companies that had maintained an accident prevention program since 1982, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had maintained an accident prevention program since 1982.

Hypothesis III

$H_0$ : There is no significant difference in providing new employee general safe work practice training between the three groups (see Table 14).

Table 14. Evaluation of General Safe Work Practice Training

	SEVCP	DOSH	Control	Total
Provided general safe work practice training	22 (20)	13 (14)	15 (16)	50
Did not provide general safe work practice training	1 (3)	3 (2)	4 (3)	8
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob. Value	Tab. Value
58	2	2.898	0.235	5.991

In contrasting, by group, the number of companies that had provided new employees with general safe work practice training, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had provided new employees with general safe work practice training since 1982.

Hypothesis IV

$H_0$ : There is no significant difference in providing new employee job specific safe work practice training between the three groups (see Table 15).

Table 15. Evaluation of Job Specific Safe Work Practice Training

	SEVCP	DOSH	Control	Total
Provided job specific safe work practice training	22 (18)	11 (12)	12 (15)	45
Did not provide job specific safe work practice training	1 (5)	5 (4)	7 (4)	13
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	7.310	0.026	5.991

In contrasting, by group, the number of companies that had provided new employees with job specific safe work practice training, the computed chi-square value was significantly greater than the tabular chi-square value at the 0.05 level. The null hypothesis was rejected. The results of this test indicated that between the three groups, there was a significant difference in the number of companies that had provided new employees with job specific safe work practice training since 1982.

Hypothesis V

$H_0$ : There is no significant difference in conducting workplace safety inspections between the three groups (see Table 16).

Table 16. Evaluation of Conducting Workplace Safety Inspections

	SEVCP	DOSH	Control	Total
Conducted workplace safety inspections	21 (20)	15 (14)	14 (16)	50
Did not conduct workplace safety inspections	2 (3)	1 (2)	5 (3)	8
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	3.774	0.152	5.991

In contrasting, by group, the number of companies that had conducted workplace safety inspections, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had conducted workplace safety inspections since 1982.

Hypothesis VI

$H_0$ : There is no significant difference in conducting regularly scheduled workplace safety inspections between the three groups (see Table 17).

Table 17. Evaluation of Conducting Regularly Scheduled Workplace Safety Inspections

	SEVCP	DOSH	Control	Total
Conducted regularly scheduled workplace safety inspections	12 (12)	8 (9)	11 (10)	31
Did not conduct regularly scheduled workplace safety inspections	11 (11)	8 (7)	8 (9)	27
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	0.242	0.886	5.991

In contrasting, by group, the number of companies that had conducted regularly scheduled workplace safety inspections, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had conducted regularly scheduled workplace safety inspections since 1982.

Hypothesis VII

$H_0$ : There is no significant difference in conducting safety meetings between the three groups (see Table 18).

Table 18. Evaluation of Conducting  
Safety Meetings

	SEVCP	DOSH	Control	Total
Conducted safety meetings	17 (16)	12 (11)	12 (13)	41
Did not conduct safety meetings	6 (7)	4 (5)	7 (6)	17
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	0.779	0.677	5.991

In contrasting, by group, the number of companies that had conducted safety meetings, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had conducted safety meetings since 1982.

Hypothesis VIII

$H_0$ : There is no significant difference in conducting regularly scheduled safety meetings between the three groups (see Table 19).

Table 19. Evaluation of Conducting Regularly Scheduled Safety Meetings

	SEVCP	DOSH	Control	Total
Conducted regularly scheduled safety meetings	12 (12)	8 (8)	10 (10)	30
Did not conduct regularly scheduled safety meetings	11 (11)	8 (8)	9 (9)	28
Totals	23	16	19	58

N	D.F.	$\chi^2$ Value	Prob.	Tab. Value
58	2	0.027	0.987	5.991

In contrasting, by group, the number of companies that had conducted regularly scheduled safety meetings, the computed chi-square value was less than the tabular chi-square value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that between the three groups, there was no significant difference in the number of companies that had conducted regularly scheduled safety meetings since 1982.

Hypothesis IX

$H_0$ : There is no significant relationship between experience rates and maintaining an accident prevention program (see Table 20).

Table 20. Experience Rates and Accident Prevention Programs

=====				
Experience Rate				
Maintained		Did not maintain		
-----				
$\bar{X}$ = 95.38		$\bar{X}$ = 109.64		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	1.99	0.164	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that maintained an accident prevention program and companies that did not maintain an accident prevention program since 1982.



Hypothesis X

$H_0$ : There is no significant difference between experience rates and maintaining an informal new employee orientation or training program (see Table 21).

Table 21. Experience Rates and Informal Safety Training

=====				
Experience Rate				
Maintained		Did not maintain		
-----				
$\bar{X}$ = 100.26		$\bar{X}$ = 95.59		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.34	0.565	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that maintained an informal new employee orientation or training program and companies that did not maintain an informal new employee orientation or training program since 1982.

Hypothesis XI

$H_0$ : There is no significant relationship between experience rates and maintaining a formal new employee orientation or training program (see Table 22).

Table 22. Experience Rates and Formal Safety Training

=====				
Experience Rate				
Maintained		Did not maintain		
-----				
$\bar{X} = 97.04$		$\bar{X} = 98.82$		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.05	0.828	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that maintained a formal new employee orientation or training program and companies that did not maintain a formal new employee orientation or training program since 1982.

Hypothesis XII

$H_0$ : There is no significant relationship between experience rates and providing new employee general safe work practice training (see Table 23).

Table 23. Experience Rates and General Safe Work Practice Training

=====				
Experience Rate				
Provided		Did not provide		
-----				
$\bar{X}= 96.96$		$\bar{X}= 105.13$		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.49	0.486	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that provided new employee general safe work practice training and companies that did not provide new employee general safe work practice training.

Hypothesis XIII

$H_0$ : There is no significant relationship between experience rates and providing new employee job specific safe work practice training (see Table 24).

Table 24. Experience Rates and Job Specific Safe Work Practice Training

=====				
Experience Rate				
Provided		Did not provide		
-----				
$\bar{X}$ = 95.64		$\bar{X}$ = 106.54		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	1.30	0.259	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that provided new employee job specific safe work practice training and companies that did not provide new employee job specific safe work practice training.

Hypothesis XIV

$H_0$ : There is no significant relationship between experience rates and conducting workplace safety inspections (see Table 25).

Table 25. Experience Rates and Workplace Safety Inspections

=====				
Experience Rate				
Conducted		Did not conduct		
-----				
$\bar{X}$ = 96.92		$\bar{X}$ = 105.38		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.53	0.471	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that conducted safety inspections and companies that did not conducted safety inspections.

Hypothesis XV

$H_0$ : There is no significant relationship between experience rates and conducting regularly scheduled workplace safety inspections (see Table 26).

Table 26. Experience Rates and Regularly Scheduled Workplace Safety Inspections

=====				
Experience Rate				
Conducted		Did not conduct		
-----				
$\bar{X} = 90.48$		$\bar{X} = 106.81$		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	4.40	0.040	4.016

In contrasting the experience rates for the two groups, the computed F value was greater than the tabular F value at the 0.05 level. The null hypothesis was rejected. The results of this test indicated that there was a significant difference in the experience rates between companies that conducted regularly scheduled safety inspections and companies that did not conduct regularly scheduled safety inspections.

Hypothesis XVI

$H_0$ : There is no significant relationship between experience rates and conducting safety meetings (see Table 27).

Table 27. Experience Rates and Safety Meetings

=====				
Experience Rate				
Conducted		Did not conduct		
-----				
$\bar{X}$ = 97.00		$\bar{X}$ = 100.71		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.18	0.677	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that conducted safety meetings and companies that did not conducted safety meetings.

Hypothesis XVII

$H_0$ : There is no significant relationship between experience rates and conducting regularly scheduled safety meetings (see Table 28).

Table 28. Experience Rates and Regularly Scheduled Safety Meetings

=====				
Experience Rate				
Conducted		Did not conduct		
-----				
$\bar{X}$ = 95.28		$\bar{X}$ = 100.90		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	0.49	0.487	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that conducted regularly scheduled safety meetings and companies that did not conducted regularly scheduled safety meetings.



Hypothesis XVIII

$H_0$ : There is no significant relationship between experience rates and conducting accident investigations (see Table 29).

Table 29. Experience Rates and Accident Investigation

=====				
Experience Rate				
Conducted		Did not conduct		
-----				
$\bar{X}$ = 93.93		$\bar{X}$ = 111.14		
-----				
=====				
N	D.F.	F Value	F Prob.	Tab. Value
-----				
58	1, 56	3.55	0.065	4.016

In contrasting the experience rates for the two groups, the computed F value was less than the tabular F value at the 0.05 level. The null hypothesis was retained. The results of this test indicated that there was no significant difference in the experience rates between companies that conducted accident investigations and companies that did not conduct accident investigations.

### Hypothesis XIX

$H_0$ : There is no significant relationship between experience rates and management's perception of safety program effectiveness.

Fifty companies perceived their safety programs as having been effective. Six companies perceived their safety programs as having been neither effective nor ineffective. Two companies perceived their safety programs as having been ineffective. Due to the small sample size of the companies that perceived their safety programs as ineffective, the one-way analysis of variance test for significance was not conducted. The hypothesis was not accepted for statistical analysis.

### Summary

The purpose of Chapter 4 was twofold. The chapter was designed to examine (1) the demography of the study, and (2) the results of the statistical analysis.

Statistical analysis determined that three of the hypotheses were significantly different (see Table 30). The three alternative hypotheses are:

1. Hypothesis I: There is a significant difference in experience rates between the three study groups.

2. Hypothesis IV: There is a significant difference in providing new employee job specific safe work practice training between the three groups.

Table 30

## Results of Statistical Analysis

	Calculated value	Tabular value	Results of statistical analysis
Hypothesis I	3.358	3.058	Reject null hypothesis
Hypothesis II	0.240	5.991	Retain null hypothesis
Hypothesis III	2.898	5.991	Retain null hypothesis
Hypothesis IV	7.310	5.991	Reject null hypothesis
Hypothesis V	3.774	5.991	Retain null hypothesis
Hypothesis VI	0.242	5.991	Retain null hypothesis
Hypothesis VII	0.779	5.991	Retain null hypothesis
Hypothesis VIII	0.169	5.991	Retain null hypothesis
Hypothesis IX	1.99	4.016	Retain null hypothesis
Hypothesis X	0.34	4.016	Retain null hypothesis
Hypothesis XI	0.05	4.016	Retain null hypothesis
Hypothesis XII	0.49	4.016	Retain null hypothesis
Hypothesis XIII	1.30	4.016	Retain null hypothesis
Hypothesis XIV	0.53	4.016	Retain null hypothesis

Table 30 (cont.)

## Results of Statistical Analysis

	Calculated value	Tabular value	Results of statistical analysis
Hypothesis XV	4.40	4.016	Reject null hypothesis
Hypothesis XVI	0.18	4.016	Retain null hypothesis
Hypothesis XVII	0.49	4.016	Retain null hypothesis
Hypothesis XVIII	3.55	4.016	Retain null hypothesis
Hypothesis XIX	--	--	--

3. Hypothesis XV: There is a significant relationship between experience rates and conducting regularly scheduled workplace safety inspections.

Hypothesis XIX, an examination of experience rates and management's perception of safety program effectiveness, was not accepted for statistical analysis due to the small sample size of ineffective response group.

Conclusions and recommendations of this study will be discussed in Chapter 5.

## Chapter V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was designed to evaluate government intervention in occupational safety programs as an effective strategy for implementing accident prevention programs and reducing occupational injuries in the workplace. The study evaluated two government strategies, (1) compliance inspection and (2) voluntary compliance programs. The evaluation of the problem required examining (1) the programs' effect on experience rates; (2) compliance with accident prevention program components between the three groups; and (3) accident prevention program components' effect on experience rates.

Analysis of the problem required collecting data pertaining to workers' compensation experience rates and accident prevention program components. Experience rates were obtained for the companies' 1983 and 1986 workers' compensation policy years from the California Workers' Compensation Insurance Rating Bureau's microfiche records. Data involving accident prevention program components were obtained by means of a telephone survey.

Chapter 5 will present: (1) a discussion of data analysis; (2) conclusions of data analysis; (3)

implications for future planning in the area of government intervention, accident prevention program components, and experience rates; and (4) recommendations for future studies.

### Discussion of Data Analysis

The purpose of this section is to review the study in relation to other studies conducted in the fields of occupational safety compliance and voluntary compliance programs' effectiveness; accident prevention program components; and occupational safety and small employers.

Objective 1: This study was designed to measure the difference in workers' compensation experience rates between companies that participated in the SEVCP in 1982, companies inspected for safety compliance by DOSH in 1982, and a control group. The 1982 experience rate, based on a company's 1979, 1980, and 1981 payroll and loss history, was the pre-test measure. The 1982 SEVCP group mean was 102.4. The 1982 DOSH group mean was 105.4. The 1982 control group mean was 97.64. The 1986 experience rate, based on a company's 1982, 1983, and 1984 payroll and loss history, was the post-test measure. The 1986 SEVCP group mean was 89.88. The 1986 DOSH group mean was 109.48. The 1986 control group mean was 98.84.

1. Analysis of the data revealed a significant difference in 1986 experience rates between the SEVCP and DOSH groups at the 0.05 level of significance. The

probability that the 1986 DOSH group mean was similar to the control group was 0.439. The probability that the 1986 SEVCP group mean was similar to the control group was 0.086.

The significant difference in experience rates between the SEVCP and DOSH groups supports Swabacker and Ottoboni's (1983) position that voluntary compliance programs are capable of reducing occupational injuries. The failure of DOSH compliance inspections to reduce experience rates supports the position of prior researchers (Mendeloff, 1976; Smith, 1976; Viscusi, 1979) concerning the inability of compliance inspections to significantly reduce occupational injuries.

Objective 2: This study was designed to analyze implementation of seven accident prevention program components associated with General Industry Safety Order (GISO) 3203. The hypotheses were designed to evaluate the dependent, or independent relationship between the accident prevention program components and the three sample groups.

1. New employee job specific safe work practice training was dependent on sample group association (Hypothesis IV). Of the twenty-three SEVCP companies that participated in the telephone survey, twenty-two companies provided new employee job specific safe work practice training. The observed frequency of job specific safe work practice training exceeded the expected frequency for the SEVCP group by approximately twenty-six percent. A larger



proportion of SEVCP companies had implemented new employee job specific safe work practice training compared to companies in the DOSH or control groups.

2. Six accident prevention program components were determined to be independent of sample group association.

The components were:

A. Maintained an accident prevention program (Hypothesis II).

B. Provided new employee general safe work practice training (Hypothesis III).

C. Conducted safety inspections (Hypothesis V).

D. Conducted regularly scheduled work place safety inspections (Hypothesis VI).

E. Conducted safety meetings (Hypothesis VII).

F. Conducted regularly scheduled safety meetings (Hypothesis XIII).

Objective 3: This study was designed to evaluate the effect of accident prevention program components on workers' compensation experience rates. When compared to standards compliance, Cooke and Gautschi (1981) stated that safety programs developed by employers appeared to have a higher potential for reducing occupational injuries. Cohen, Smith, and Cohen (1975) reported that low injury firms had implemented formal job specific training programs. Two additional accident prevention program components have been identified by researchers as having an impact on occupational injuries; safety inspections and accident

investigations (Cohen et al., 1975; Hinze, 1976).

1. Companies that conducted regularly scheduled workplace safety inspection had significantly lower experience rates compared to companies that did not conduct regularly scheduled safety inspections (Hypothesis XV). The mean experience rate for companies that conducted regularly scheduled safety inspections was sixteen points lower than the mean experience rate for companies that did not conduct regularly scheduled safety inspections.

2. Nine hypotheses pertaining to experience rates and accident prevention programs were retained. There was no significant difference in experience rates between companies that have or have not:

A. Maintained an accident prevention program (Hypothesis IX).

B. Maintained an informal new employee orientation or training program (Hypothesis X).

C. Maintained a formal new employee orientation or training program (Hypothesis XI).

D. Provided new employee general safe work practice training (Hypothesis XII).

E. New employee job specific safe work practice training (Hypothesis XIII).

F. Conducted workplace safety inspections (Hypothesis XIV).

G. Conducted safety meetings (Hypothesis XVI).

H. Conducted regularly scheduled safety meetings

(Hypothesis XVII).

I. Conducted accident investigations (Hypothesis XVIII).

Hypothesis XIX was designed to evaluate managements' perception of the effectiveness of the company's accident prevention program. Gausch (1973) reported that managers in companies with effective accident prevention programs believed that the companies' accident prevention program needed improvement. Due to the small sample size, the data were not analyzed.

#### Conclusions of Data Analysis

1. This study indicates that there was a significant difference in the workers' compensation experience rates between companies that participated in the Small Employer Voluntary Compliance Program and companies that were inspected for safety standards compliance by the Division of Industrial Safety and Health during 1982. Three years after the companies' initial participation in the SEVCP, the SEVCP companies had significantly reduced their experience rates relative to the experience rates of companies inspected by DOSH in 1982. This study supports the conclusions of prior researchers concerning (1) the ability of voluntary compliance programs to significantly reduce occupational injuries and (2) compliance enforcement inspections' failure to significantly reduce occupational injuries.

2. A significantly higher proportion of SEVCP companies provided new employees with job specific safe work practice training when compared to the DOSH and control group companies. Even though new employee job specific safe work practice training was dependent on group association, based on statistical analysis, job specific safe work practice training did not significantly reduce experience rates.

3. Companies that conducted regularly scheduled safety inspections had significantly lower experience rates. Although statistical analysis revealed a significant reduction in the experience rates of companies that conducted regularly scheduled inspections, implementation of a regularly scheduled inspection program was not dependent on sample group association.

4. The results of the statistical analysis related to the evaluation of (1) the groups' compliance with accident prevention program components and (2) accident prevention program components' effect on experience rates require conservative interpretation. The participation rates and size of the samples analyzed in Hypotheses II through XVIII may have influenced the statistical analysis.

The participation rates obtained during the telephone survey varied from a high of ninety-two percent for the SEVCP group to a low of sixty-four percent for the DOSH group. The inability to obtain a higher rate of participation among the DOSH group may have created a

situation where errors were made in the retention or rejection of the null hypotheses.

The initial sample size (seventy-five) used to analyze Hypothesis I exceeded the minimum sample size recommended by Cohen (1969) and Courtney (1984). The issue of sample size was reflected in the seven chi-square and ten one-way analysis of variance statistical tests. The maximum total sample size used to analyze Hypotheses II through XVIII was fifty-eight. Of the seven chi-square analyses, five of the tests had one or more cells with an observed frequency value less than five. Although the size of the samples evaluated through the use of one-way analysis of variance exceeded the minimum sample size recommended by Courtney, the sample sizes failed to exceed the minimum recommended by Cohen. Based on review of the standard error values for Hypotheses IX through XVIII, sample size might have influenced the results of the statistical analyses in six of the hypotheses (see Appendix G).

#### Recommendations for Action

This study indicates a need to reevaluate reliance on compliance enforcement inspection programs as the primary government strategy for implementing accident prevention programs and reducing occupational injuries. The following items should be considered for future planning in the area of government intervention and accident prevention programs:

1. There is a need to develop programs that will increase participation rates in voluntary compliance programs. The significant difference in workers' compensation experience rates between the SEVCP and DOSH groups supports the need for continued development, implementation, and evaluation of voluntary compliance programs as an effective means for reducing occupational injuries. Even though this study failed to identify accident prevention program components as the primary factor in the SEVCP group's significantly lower experience rate, government sponsored voluntary compliance programs based on consultation, education, and training have the ability to significantly reduce occupational injuries.

Whereas DOSH compliance enforcement inspections did not significantly reduce experience rates, the analysis of data does not support a conclusion that compliance enforcement inspections were ineffective in reducing occupational injuries. In 1976, Mendeloff reported that DOSH compliance inspections reduced accident types related to standard enforcement, but failed to reduce accidents that were not related to standards compliance. Because experience rates do not provide a means to differentiate between standards related and non-standards related injuries, changes in standards related accidents versus non-standards related accidents were not evaluated in this study.

Although companies that participated in the SEVCP

successfully reduced their experience rates, a singular reliance upon voluntary compliance programs as the sole means for obtaining reductions in occupational injuries may not be an appropriate government response. First, companies that participated in the SEVCP did so voluntarily. The participating companies were not coerced into developing an accident prevention program by Cal/OSHA Consultation or DOSH. Second, this study did not evaluate the companies' motivation for participating in the SEVCP. Participation in the SEVCP could be due to a variety of motivating factors, including managements' commitment to reduce occupational injuries, reduce insurance costs, increase productivity, or desire to avoid a DOSH compliance enforcement inspection. Third, this study did not evaluate the reasons why the control or DOSH group companies did not participate in the SEVCP.

2. There is a need to develop education and training programs directed at increasing the implementation of new employee job specific safe work practice training. In addition to having been identified by prior researchers as an important factor in reducing occupational injuries, job specific safety training is a key element of GISO 3203. Implementation of job specific safety training was significantly lower in the DOSH and control groups.

3. There is a need to develop education and training programs designed to promote the implementation of regularly scheduled safety inspection programs. Based on

statistical analysis of the impact of accident prevention program components on experience rates, companies that conducted regularly scheduled safety inspections had significantly lower experience rates.

### Recommendations for Further Study

As a result of data obtained through this study and the conclusions reached, the following recommendations are offered for future studies in the area of government intervention and accident prevention programs:

1. Replication of the study using 1984 as the base year. In 1984, over two hundred and fifty companies participated in the SEVCP. The increase in the number of companies that participated in the SEVCP in 1984 would allow the researcher to increase the survey sample size.

2. Replication of the study using medium or large sized companies. Evaluation of the effect of voluntary compliance programs on various sized firms will provide valuable information on the occupational safety training, education, and service needs of a wide range of companies.

3. Replication of the study using cooperative self inspection program participants. Whereas participation in the SEVCP was based on an agreement between company management and a state agency, cooperative self inspection programs are based on an agreement between company management, a government agency, and an appropriate employee representative. The role of the employee as an



active participant in the cooperative self inspection program may be an important factor in further reducing occupational injuries.

4. Replication of the study using a longitudinal survey design methodology. Although this study determined that participation in the SEVCP reduced experience rates relative to compliance inspections, it is important to determine if the reduction continues over an extended period of time.

5. A study should be conducted to assess the effect of management participation in accident prevention programs on occupational injuries and experience rate. Because compliance with GISO 3203 was not identified as the primary factor relating to the significant reduction in the experience rates of the companies that participated in the SEVCP, the role of management in the company's safety program should be evaluated.

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## APPENDICES

APPENDIX A

GENERAL INDUSTRY SAFETY ORDER (GISO) 3203

## TITLE 8- GENERAL INDUSTRY SAFETY ORDERS

## 3203. Accident Prevention Program.

(a) Effective October 1, 1977, every employer shall inaugurate and maintain an accident prevention program which shall include, but not be limited to the following:

(1) A training program designed to instruct employees in general safe work practices and specific instruction with respect to hazards unique to the employee's job assignment.

(2) Schedule periodic inspections to identify and correct unsafe conditions and work practices which may be found.

APPENDIX B  
WORKERS' COMPENSATION EXPERIENCE RATING  
WORKSHEET

**WORKERS' COMPENSATION INSURANCE RATING BUREAU**  
**OF CALIFORNIA**  
**EXPERIENCE RATING FORM**

COMPANY A

	BUREAU NUMBER
	EFFECTIVE
	CARRIER
ISSUING OFFICE	
POLICY NUMBER	

[illegible]

<p><b>EXPECTED EXCESS</b> (7) - (6) - (8)</p> <p>9</p>	<p><b>EXPECTED LOSSES</b> (6)</p> <p>7</p>	<p><b>PRIMARY EXPECTED LOSSES</b> (8)</p> <p>8</p>
--	--	--

EXPECTED LOSSES	1967					1968						
	CLAIM NUMBER	TYPE INJ	OR F	POLICY YEAR	ACTUAL INCURRED LOSSES	PRIMARY ACTUAL LOSSES	CLAIM NUMBER	TYPE INJ	OR F	POLICY YEAR	ACTUAL INCURRED LOSSES	PRIMARY ACTUAL LOSSES
	10			11	12	13	10			11	12	13
	Total by Policy Year						Total by Policy Year					
	of all cases \$2,000 or under						of all cases \$2,000 or under					

ACTUAL EXCESS (c) o (a) - (b)	ACTUAL INCURRED LOSSES (a)	PRIMARY ACTUAL LOSSES (c)
16	14	15

### **- RATING PROCEDURE**

TOTAL PRIMARY ACTUAL (B)	"B" VALUE	"W" VALUE	RATABLE EXCESS LOSSES O W X (C)	(1-W) X F	TOTAL
17	18	19	20	21	22

23 TOTAL EXPECTED LOSSES (d)	24 " VALUE
------------------------------------	---------------

- \* \* INDEMNITY AND MEDICAL COMBINED
- \* \* ENTER TABLE 12 WITH EXPECTED LOSSES (4)

25  
TOTAL (2)

26  
EXPERIENCE 2  
MODIFICATION 1/2



## How to Read the Experience Rating Worksheet

1. Class Code- Classification code number(s) assigned to employer based on WCIRB Workers' Compensation Manual.
2. Payroll- Payroll by classification for the first three years of the preceding four years.
3. Expected Loss Rate- Projected ratio(s) of losses per \$100 annual payroll in each classification, found in Table II of the California Experience Rating Plan Manual.
4. Expected Losses- The product generated by multiplying the sum of the three year payroll for each classification by the corresponding "expected loss rate" value.
5. "D" Ratio- Ratio representing that portion of the industry's state wide losses for each payroll classification which is considered to be controllable. This data is found in Table II of the California Experience Rating Plan Manual.
6. Primary Expected Losses- The projected cost of claims by classification that can be controlled through effective safety practices. Primary Expected Loss values are computed by multiplying the Expected Loss value by the D ratio.
7. Expected Losses- The sum of all Expected Loss values for all included Class Codes.
8. Primary Expected Losses- The sum of all Primary Expected Loss values for all included Class Codes.
9. Expected Excess- The difference between Expected Losses and Primary Expected Losses.
10. Claim Number- Claim number for each claim where over \$2,000 has been paid or is expected to be paid.
11. Policy Year- Policy year of the claim occurrence.
12. Actual Incurred Losses- Total of all paid and reserved (expected) losses, at full value, incurred during the three year policy period.
13. Primary Actual Losses- Paid and reserved losses under \$2,000 for the policy period shown at full value. Losses over \$2,000 are mitigated to lower values by

application of factors contained in the Experience Rating Manual.

14. Actual Incurred Losses- The sum of all Actual Incurred Losses (column 12).
15. Primary Actual Incurred Losses- The sum of all Primary Actual Incurred Losses (column 13).
16. Actual Excess- The difference between the Actual Incurred Losses (box 14) and Primary Actual Losses (box 15).
17. Total Primary Actual- The Primary Actual Losses (box 15).
18. "B" Value- Element used to limit the effect of a single severe loss on the experience rate of a small risk. It is added to both the Total Primary Actual and Total Expected Losses. The value is obtained from Table III of the Experience Rating Manual.
19. "W" Value- Value designed to modify excess losses based on the size of the risk (company). As the size of the risk increases, the "W" value is reduced. The value is obtained from Table III of the Experience Rating Manual.
20. Ratable Excess Losses- The product resulting from multiplying the W value (box 19) by Expected Excess (box 9).
21.  $(1-W) * F$ - The product resulting from multiplying the Expected Excess (box 9) by the value obtained by subtracting the W value from 1.
22. Total- The sum of the totals shown in boxes 17, 18, 20, and 21.
24. Total Expected Losses- The Expected Losses total (box 7).
25. "B" Value- The B value shown in box 18.
26. Total- The sum of the totals shown in boxes 23 and 24.
27. Experience Modification Rate- The percentage that is produced by dividing the figure in box 22 by the figure in box 25.

APPENDIX C  
DELPHI COMMITTEE LETTER AND  
DRAFT TELEPHONE SURVEY

November 25, 1986

Mr. David Valoff  
\*\*\*\* Ila Avenue  
Fresno, CA 93705

Dear Mr. Valoff:

Thank you for agreeing to serve as a member of the Delphi committee evaluating the enclosed telephone survey questionnaire. The survey will be used to measure the level of compliance with General Industry Safety Order 3203 by a random sample of small employers in California.

As we discussed during our telephone conversation, your role will be to assist in the review and refinement of the tentative questionnaire. Your review of the questionnaire will assist me in developing a useful survey instrument.

It is hoped that the time required to complete your review of the questionnaire will be no longer than thirty minutes. Please use the enclosed pre-addressed stamped envelope to return your completed questionnaire review.

The following information is contained in the enclosed packet to assist you in your review of the safety program questionnaire:

- 1) purpose of the survey
- 2) basic assumptions of the study
- 3) General Industry Safety Order 3203

Again, thank you for consenting to participate in this review. Please return the completed review by Monday, December 15, 1986.

Sincerely,

Michael E. Nave

Proposed Title of Research: Impact of voluntary compliance and compliance inspection programs on experience rates among small employers in California.

Purpose of the Survey: The purpose of the survey is threefold:

(1) To provide a means to evaluate the level of compliance with General Industry Safety Order (GISO) 3203 within each of the three sample groups.

(2) To provide a means to evaluate the potential for statistically significant relationships between workers' compensation experience rates and GISO 3203 safety program components within each of the three sample groups.

(3) To provide a means to evaluate the potential for statistically significant relationships between workers' compensation experience rates and demographic information provided by the survey.

Basic Assumptions: For the purpose of this study the investigator will consider the following to be important assumptions:

(1) That California Division of Occupational Safety and Health (DOSH) standards and enforcement are at least as effective as the Federal Occupational Safety and Health Administration standards and enforcement.

(2) That Division of Occupational Safety and Health (DOSH) compliance inspections represent the traditional safety compliance model based on regulatory control.

(3) That California Occupational Safety and Health (Cal/OSHA) Consultation Service's Small Employer Voluntary Compliance Program is a significant departure from the traditional safety compliance model.

TELEPHONE SURVEY  
(Draft)

1. Has your company had an occupational accident prevention program since 1982:

NO 1 (If NO skip to question 3)  
YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Is the safety program based on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Since 1982, has your company provided new employees with job training or orientation:

YES 2  
NO 1 (If NO skip to question 7)

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Is the new employee orientation or training based on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Does the new employee orientation or training include  
general safety instruction:

NO 1  
YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Does the new employee orientation or training include  
job specific safety instruction:

NO 1  
YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Since 1982, has your company conducted safety meetings for the employees:

YES 2  
NO 1 (If NO skip to question 10)

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Were the safety meetings regularly scheduled:

YES 2  
NO 1 (If NO skip to question 10)

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Were the safety meetings held on an:

ANNUAL BASIS 1  
SEMI-ANNUAL BASIS 2  
QUARTERLY BASIS 3  
MONTHLY BASIS 4  
WEEKLY BASIS 5

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



10. Since 1982, does your company conduct accident investigations:

YES 2

NO 1 (If NO skip to question 12)

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. Was a standard form used to conduct the accident investigation:

NO 1

YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. Since 1982, has your company conducted periodic safety inspections of the workplace:

NO 1 (If NO skip to question 16)

YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. The inspections were conducted by a:

COMPANY MANAGER, SUPERVISOR, OR EMPLOYEE	1
INSURANCE COMPANY REPRESENTATIVE	2
OTHER _____	3

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

14. Were the safety inspections conducted on a regularly scheduled basis:

NO	1	(If NO skip to question 16)
YES	2	

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

15. Were the safety inspections scheduled to be conducted on an:

ANNUAL BASIS	1
SEMI-ANNUAL BASIS	2
QUARTERLY BASIS	3
MONTHLY BASIS	4
WEEKLY BASIS	5

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

16. Based on your description of your company's safety program, did you have the same type of program prior to 1982:

NO 1  
YES 2

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

17. Since 1982, do you believe that your company's safety efforts have been \_\_\_\_\_ in reducing your company's workers' compensation costs:

EFFECTIVE 1  
NEITHER EFFECTIVE NOR INEFFECTIVE 2  
INEFFECTIVE 3

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. From 1982 to 1984, on an annual basis, what percent of your employees were under the age of 25:

LESS THAN 10% 1  
10 TO 25% 2  
26 TO 50% 3  
OVER 50% 4

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

19. From 1982 to 1984, on an annual basis, approximately what percent of your employees had less than one year of job experience:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

Delphi committee member comments-

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPENDIX D  
SECOND DELPHI COMMITTEE LETTER AND  
TELEPHONE SURVEY

January 12, 1987

Mr. Emmett Jones, Chief  
Cal/OSHA Consultation Service  
525 Golden Gate Ave., 2nd Floor  
San Francisco, CA 94102

Dear Mr. Jones:

Thank you for your initial response to my telephone survey questionnaire involving accident prevention program components. Five experts in occupational safety contributed during this initial stage of the survey construction. A minimum of eighty percent agreement was reached on the nineteen initial questions.

My second communication is intended to gain your response to those questions that were recommended for inclusion in the survey by individual committee members. In addition, the final section requests your response in ranking the five most important questions and five least important questions that should be asked during the telephone survey.

Thank you for your willingness to be a participant in reviewing the telephone survey questionnaire. It is my hope that your responses can be returned to me by February 5, 1987.

Respectfully yours,

Michael E. Nave

TELEPHONE SURVEY  
(Second Draft)

1. From 1982 to 1984, on an annual basis, what percent of your employees were under the age of 25:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

AGREED- 4      DISAGREED- 1

2. From 1982 to 1984, on an annual basis, approximately what percent of your employees had less than one year of job experience:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

AGREED - 4      DISAGREED- 1

3. Has your company had an occupational accident prevention program since 1982:

NO	1 (If NO skip to question 5)
YES	2

AGREED- 5      DISAGREED- 0

4. Is the safety program based on:

WRITTEN GUIDELINES	1
VERBAL GUIDELINES	2

AGREED- 5      DISAGREED- 0

5. Since 1982, has your company provided new employees with job training or orientation:

YES	2
NO	1 (If NO skip to question 9)

AGREED- 4      DISAGREED- 1

6. Is the new employee orientation or training based on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

AGREED- 4      DISAGREED- 1

7. Does the new employee orientation or training include general safety instruction:

NO 1  
YES 2

AGREED- 5      DISAGREED- 0

8. Does the new employee orientation or training include job specific safety instruction:

NO 1  
YES 2

AGREED- 5      DISAGREED- 0

9. Since 1982, has your company conducted safety meetings for the employees:

YES 2  
NO 1 (If NO skip to question 12)

AGREED- 5      DISAGREED- 0

10. Were the safety meetings regularly scheduled:

YES 2  
NO 1 (If NO skip to question 12)

AGREED- 5      DISAGREED- 0

11. Were the safety meetings held on an:

ANNUAL BASIS 1  
SEMI-ANNUAL BASIS 2  
QUARTERLY BASIS 3  
MONTHLY BASIS 4  
WEEKLY BASIS 5

AGREED- 5      DISAGREED- 0



12. Since 1982, does your company conduct accident investigations:

YES 2

NO 1 (If NO skip to question 14)

AGREED- 4 DISAGREED- 1

13. Was a standard form used to conduct the accident investigation:

NO 1

YES 2

AGREED- 5 DISAGREED- 0

14. Since 1982, has your company conducted periodic safety inspections of the workplace:

NO 1 (If NO skip to question 18)

YES 2

AGREED- 5 DISAGREED- 0

15. The inspections were conducted by a:

COMPANY MANAGER, SUPERVISOR, OR EMPLOYEE 1

INSURANCE COMPANY REPRESENTATIVE 2

OTHER ----- 3

AGREED- 5 DISAGREED- 0

16. Were the safety inspections conducted on a regularly scheduled basis:

NO 1 (If NO skip to question 18)

YES 2

AGREED- 5 DISAGREED- 0

17. Were the safety inspections scheduled to be conducted on an:

ANNUAL BASIS 1

SEMI-ANNUAL BASIS 2

QUARTERLY BASIS 3

MONTHLY BASIS 4

WEEKLY BASIS 5

AGREED- 5 DISAGREED- 1

18. Based on your description of your company's safety program, did you have the same type of program prior to 1982:

NO 1  
YES 2

AGREED- 5      DISAGREED- 0

19. Since 1982, do you believe that your company's safety efforts have been \_\_\_\_\_ in reducing your company's workers' compensation costs:

EFFECTIVE 1  
NEITHER EFFECTIVE NOR INEFFECTIVE 2  
INEFFECTIVE 3

AGREED- 5      DISAGREED- 0

QUESTIONS RECOMMENDED FOR INCLUSION IN THE SURVEY  
BY COMMITTEE MEMBERS

20. What is the principal content of your company's job specific safety instruction:

WORK-TASK ANALYSIS	1
HAZARD CONTROL INFORMATION	2
PROTECTIVE CLOTHING INFORMATION	3
EXPECTATION OF SUPERVISION	4
TRAINING NEEDS AND IMPLICATIONS	5

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

21. What is the principle emphasis of your company's safety program:

SAFETY BELIEFS AND CONVICTIONS	1
WORK-TASK IMPROVEMENT	2
HAZARD ABATEMENT AND CONTROL	3
INJURY CARE AND TREATMENT	4

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. What is the principle emphasis of your company's safety inspections:

DETERMINE NATURE OR EXTENT OF HAZARDS	1
DETERMINE POSSIBILITY OF INJURY OR LOSS	2
DETERMINE CORRECTIONS OR REMEDIATION NEEDED	3

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

23. What is the principle component of your company's accident investigations:

DETERMINE CAUSAL FACTORS- SUBSTANDARD PERFORMANCE OR DEFICIENT SUPERVISION	1
DETERMINE CONTACT FACTORS- EXISTENT HAZARDS OR DETRIMENTAL ADVERSITIES	2
EFFECTUAL FACTORS- INJURIES SUSTAINED OR REMEDIATION NEEDED	3

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

24. Since 1982, has your company maintained a safety committee:

YES 2  
 NO 1 (If No skip to question 26)

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

25. Does your safety committee include active employee participation:

NO 1  
 YES 2

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

26. Since 1982, has there been an increase in employee reports of work practice hazards:

NO 1  
 YES 2

I AGREE or DISAGREE with this question (circle one).

Suggested refinement \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## ORDER RANK WORKSHEET

Research on telephone survey questionnaire length has concluded that the accuracy of the respondent's answers begins to decrease after approximately fifteen minutes. To maintain a reasonable level of accuracy, I will limit the telephone survey to a maximum length of fifteen minutes.

Based on the twenty-six draft questions, I would appreciate your participation in identifying the five most important survey questions and the five least important survey questions.

The questionnaire will be pre-tested. If the average length of the questionnaire exceeds fifteen minutes, the committee's input will be used to adjust the questionnaire length.

QUESTION NUMBER

Most important question	_____	+5
Second most important question	_____	+4
Third most important question	_____	+3
Fourth most important question	_____	+2
Fifth most important question	_____	+1
Fifth least important question	_____	-1
Fourth least important question	_____	-2
Third least important question	_____	-3
Second least important question	_____	-4
Least important question	_____	-5

APPENDIX E  
FINAL DRAFT TELEPHONE SURVEY

TELEPHONE SURVEY  
(Final Draft)

1. From 1982 to 1984, on an annual basis, what percent of your employees were under the age of 25:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

AGREED- 4      DISAGREED- 1

2. From 1982 to 1984, on an annual basis, approximately what percent of your employees had less than one year of job experience:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

AGREED - 4      DISAGREED- 1

3. Has your company had an occupational accident prevention program since 1982:

NO	1 (If NO skip to question 5)
YES	2

AGREED- 5      DISAGREED- 0

4. Is the safety program based on:

WRITTEN GUIDELINES	1
VERBAL GUIDELINES	2

AGREED- 5      DISAGREED- 0

5. Since 1982, has your company provided new employees with job training or orientation:

YES	2
NO	1 (If NO skip to question 9)

AGREED- 4      DISAGREED- 1

6. Is the new employee orientation or training based on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

AGREED- 4      DISAGREED- 1

7. Does the new employee orientation or training include general safety instruction:

NO 1  
YES 2

AGREED- 5      DISAGREED- 0

8. Does the new employee orientation or training include job specific safety instruction:

NO 1  
YES 2

AGREED- 5      DISAGREED- 0

9. Since 1982, has your company conducted safety meetings for the employees:

YES 2  
NO 1 (If NO skip to question 12)

AGREED- 5      DISAGREED- 0

10. Were the safety meetings regularly scheduled:

YES 2  
NO 1 (If NO skip to question 12)

AGREED- 5      DISAGREED- 0

11. Were the safety meetings held on an:

ANNUAL BASIS 1  
SEMI-ANNUAL BASIS 2  
QUARTERLY BASIS 3  
MONTHLY BASIS 4  
WEEKLY BASIS 5

AGREED- 5      DISAGREED- 0



12. Since 1982, does your company conduct accident investigations:

YES 2

NO 1 (If NO skip to question 14)

AGREED- 4 DISAGREED- 1

13. Was a standard form used to conduct the accident investigation:

NO 1

YES 2

AGREED- 5 DISAGREED- 0

14. Since 1982, has your company conducted periodic safety inspections of the workplace:

NO 1 (If NO skip to question 18)

YES 2

AGREED- 5 DISAGREED- 0

15. The inspections were conducted by a:

COMPANY MANAGER, SUPERVISOR, OR EMPLOYEE 1

INSURANCE COMPANY REPRESENTATIVE 2

OTHER ----- 3

AGREED- 5 DISAGREED- 0

16. Were the safety inspections conducted on a regularly scheduled basis:

NO 1 (If NO skip to question 18)

YES 2

AGREED- 5 DISAGREED- 0

17. Were the safety inspections scheduled to be conducted on an:

ANNUAL BASIS 1

SEMI-ANNUAL BASIS 2

QUARTERLY BASIS 3

MONTHLY BASIS 4

WEEKLY BASIS 5

AGREED- 5 DISAGREED- 1

18. Based on your description of your company's safety program, did you have the same type of program prior to 1982:

NO 1  
YES 2

AGREED- 5 DISAGREED- 0

19. Since 1982, do you believe that your company's safety efforts have been \_\_\_\_\_ in reducing your company's workers' compensation costs:

EFFECTIVE 1  
NEITHER EFFECTIVE NOR INEFFECTIVE 2  
INEFFECTIVE 3

AGREED- 5 DISAGREED- 0

20. What is the principal content of your company's job specific safety instruction:

WORK-TASK ANALYSIS 1  
HAZARD CONTROL INFORMATION 2  
PROTECTIVE CLOTHING INFORMATION 3  
EXPECTATION OF SUPERVISION 4  
TRAINING NEEDS AND IMPLICATIONS 5

AGREED- 2 DISAGREED- 2

21. What is the principle emphasis of your company's safety program:

SAFETY BELIEFS AND CONVICTIONS 1  
WORK-TASK IMPROVEMENT 2  
HAZARD ABATEMENT AND CONTROL 3  
INJURY CARE AND TREATMENT 4

AGREED- 2 DISAGREED- 2

22. What is the principle emphasis of your company's safety inspections:

DETERMINE NATURE OR EXTENT OF HAZARDS 1  
DETERMINE POSSIBILITY OF INJURY OR LOSS 2  
DETERMINE CORRECTIONS OR REMEDIATION NEEDED 3

AGREED- 4 DISAGREED- 0

23. What is the principle component of your company's accident investigations:

DETERMINE CAUSAL FACTORS- SUBSTANDARD PERFORMANCE  
OR DEFICIENT SUPERVISION 1  
DETERMINE CONTACT FACTORS- EXISTENT HAZARDS OR  
DETRIMENTAL ADVERSITIES 2  
EFFECTUAL FACTORS- INJURIES SUSTAINED OR REMEDIATION  
NEEDED 3

AGREED- 2 DISAGREED- 2

24. Since 1982, has your company maintained a safety committee:

YES 2  
NO 1 (If No skip to question 26)

AGREED- 4 DISAGREED- 0

25. Does your safety committee include active employee participation:

NO 1  
YES 2

AGREED- 4 DISAGREED- 0

26. Since 1982, has there been an increase in employee reports of work practice hazards:

NO 1  
YES 2

AGREED- 4 DISAGREED- 0

APPENDIX F  
TELEPHONE SURVEY

### Telephone Survey Introduction

(Front Desk)

Hello, I'm Mike Nave, with Oregon State University, and we are conducting a survey of businesses regarding safety programs. I would like to speak to whomever is responsible for the safety program for your company.

(Plant/General Manager)

Hello, Mr./Ms....., I'm Mike Nave, with Oregon State University. We are conducting a study of 75 randomly selected California companies. Your participation in this study would help provide us with accurate information regarding the importance, or lack of importance, of maintaining an accident prevention program. The survey takes approximately 5 minutes to complete.

If this is an inappropriate time for you, may I schedule a time to call you back which may be more convenient?

## TELEPHONE SURVEY

Company \_\_\_\_\_

Phone (     ) \_\_\_\_\_

1. Has your company had an occupational accident prevention program since 1982:

NO 1 (If NO skip to question 3)  
YES 2

2. Is the safety program based primarily on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

3. Since 1982, has your company provided new employees with job training or orientation:

YES 2  
NO 1 (If NO skip to question 7)

4. Is the new employee orientation or training based primarily on:

WRITTEN GUIDELINES 1  
VERBAL GUIDELINES 2

5. Does the new employee orientation or training include general safety instruction:

NO 1  
YES 2

6. Does the new employee orientation or training include job specific safety instruction:

NO 1  
YES 2

7. Since 1982, has your company maintained a safety committee:

YES 2  
NO 1 (If No skip to question 9)

8. Does your safety committee include active employee participation:

NO 1  
YES 2

9. Since 1982, has your company conducted safety meetings for the employees:

YES 2  
NO 1 (If NO skip to question 12)

10. Were the safety meetings regularly scheduled:

YES 2  
NO 1 (If NO skip to question 12)

11. Were the safety meetings held on an:

ANNUAL BASIS 1  
SEMI-ANNUAL BASIS 2  
QUARTERLY BASIS 3  
MONTHLY BASIS 4  
WEEKLY BASIS 5

12. Since 1982, does your company conduct accident investigations:

YES 2  
NO 1 (If NO skip to question 14)

13. Was a standard form used to conduct the accident investigation:

NO 1  
YES 2

14. Since 1982, has your company conducted periodic safety inspections of the workplace:

NO 1 (If NO skip to question 18)  
YES 2

15. Were the inspections conducted by a company employee:

YES 2  
NO 1

16. Were the safety inspections conducted on a regularly scheduled basis:

NO 1 (If NO skip to question 18)  
YES 2

17. Were the safety inspections scheduled to be conducted on an:

ANNUAL BASIS	1
SEMI-ANNUAL BASIS	2
QUARTERLY BASIS	3
MONTHLY BASIS	4
WEEKLY BASIS	5

18. Since 1982, has there been an increase in employee reports of workplace safety hazards:

NO	1
YES	2

19. Based on your company's current safety program, did you have the same type of program prior to 1982:

NO	1
YES	2

20. Since 1982, do you believe that your company's safety efforts have been \_\_\_\_\_ in reducing your company's workers' compensation costs:

EFFECTIVE	1
NEITHER EFFECTIVE NOR INEFFECTIVE	2
INEFFECTIVE	3

21. From 1982 to 1984, annually, approximately what percent of your employees were under the age of 25:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4

22. From 1982 to 1984, annually, approximately what percent of your employees had less than one year of job experience:

LESS THAN 10%	1
10 TO 25%	2
26 TO 50%	3
OVER 50%	4



APPENDIX G  
STANDARD ERROR SUMMARY

## Hypothesis IX- Maintained an Accident Prevention Program

	Mean	Standard Error
Maintained	95.38	4.401
Did not maintain	109.64	9.098

## Hypothesis X- Maintained an Informal New Employee Orientation or Training Program

	Mean	Standard Error
Maintained	100.26	5.892
Did not maintain	95.59	5.498

## Hypothesis XI- Maintained a Formal New Employee Orientation or Training Program

	Mean	Standard Error
Maintained	97.04	6.265
Did not maintain	98.82	5.264

## Hypothesis XII- Provided New Employee General Safe Work Practice Training

	Mean	Standard Error
Provided	96.96	4.323
Did not provide	105.13	10.808

Hypothesis XIII- Provided New Employee Job Specific  
Safe Work Practice Training

	Mean	Standard Error
Provided	95.64	4.525
Did not provide	106.54	8.419

Hypothesis XIV- Conducted Workplace Safety Inspections

	Mean	Standard Error
Conducted	96.92	4.322
Did not conduct	105.38	10.805

Hypothesis XV- Conducted Regularly Scheduled Workplace  
Safety Inspections

	Mean	Standard Error
Conducted	90.48	5.310
Did not conduct	106.81	5.690

Hypothesis XVI- Conducted Safety Meetings

	Mean	Standard Error
Conducted	97.00	4.788
Did not conduct	100.71	7.435

Hypothesis XVII- Conducted Regularly Scheduled Safety Meetings

=====		
	Mean	Standard Error
-----		
Conducted	95.28	5.677
Did not conduct	100.90	5.677
-----		

Hypothesis XVIII- Conducted Accident Investigation

=====		
	Mean	Standard Error
-----		
Conducted	93.93	4.489
Did not conduct	111.14	7.958
-----		