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Yost, Edward Bruce

THE IMPACT OF LERS/OSHA TRAINING ON THE SAFETY AND HEALTH ACTIVITIES OF LOCAL UNIONS

The Ohio State University  Ph.D.  1987

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THE IMPACT OF LERS/OSHA TRAINING ON
THE SAFETY AND HEALTH ACTIVITIES OF LOCAL UNIONS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Edward B. Yost, B.S.I.M., M.B.A.

* * * * *

The Ohio State University
1987

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A.F. Campagna                                 Adviser
H.R. Blaine                                   Business Administration
To the working men and women that have suffered and died as a result of their employment and to their families;

And to my children Tom, Rick, Taryn and Tim.
ACKNOWLEDGMENTS

This dissertation represents the efforts of many individuals. I would like to express my deep appreciation to the members of the dissertation committee. Dr. R. C. Miljus provided guidance and support throughout the dissertation and the entire Ph.D. program. Dr. A. F. Campagna provided sorely needed support and encouragement on numerous occasions, both during my course work and the dissertation. Both Drs. Miljus and Campagna showed compassion and understanding throughout the process of writing this dissertation. Dr. H. R. Blaine also provided support during the writing of this dissertation and took on the added burden of joining the committee in the latter part of the writing process. All of these contributions are deeply appreciated. I would also like to thank my family for their undying support over the years. In particular, I owe a great debt to my wife, Chris, for her special support and faith in my abilities. Without her contributions to all phases of this project, closure would not have been possible.
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CHAPTER I

STATEMENT OF THE PROBLEM AND PURPOSE OF THE STUDY

Introduction

The 1960s and 1970s represent an era of Federal Regulation unmatched since the 1930s. Equal employment opportunity, age and sex discrimination and pension administration were all regulated. Yet, the most altruistic and potentially far reaching law was the Occupational Safety and Health Act (OSH Act) of 1970. This legislation sought to insure that working men and women in this country would be free from work related injuries and illnesses.

This legislation received much support from organized labor and other worker representatives and, for the most part, enjoyed popular support. This support was for good reason. In their report, the Senate Committee on Labor and Public Welfare estimated the economic costs of occupational injuries and illnesses to be over $1.5 billion in lost wages; a decrease in GNP of $8 billion, and the cause of more lost work days than strikes (Bureau of National Affairs, 1971:13). Further, the National Safety Council points out that at the time OSH Act was enacted more than 14,000 workers were killed in employment related accidents.
annually (Nichols and Zeckhauser, 1977). In fact, between 1969 and 1973 more people were killed at work in the United States than in the Vietnam War (Mason, 1976:21). What is more staggering is that these figures do not include identified disabilities and deaths caused by health hazards on the job.

The Act stipulates, in a general duty clause, that employers must provide "...employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to employees." The constitutional purpose of the law is "...to assure as far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources ..." This purpose was to be achieved by implementation of the following policies:

1) The development and promulgation of mandatory safety and health standards.

2) The enforcement of these standards in the work places of the nation.

3) The education and encouragement of employers and employees in occupational safety and health.

4) Federal cooperation with states in the administration of safety and health standards.

5) Provision of research with respect to the improvement of safety and health standards.

6) Provision of uniform record-keeping and reporting requirements by employers (Jensen, Mohr and Stern, 1973:38).

While most of the labor movement applauded this effort to provide safe and healthful work places in this country,
many in both labor and management had strong reservations as to the impact of this particular law (Berkowitz, 1972; Perkel, 1972; Jensen, et. al., 1973; Silberman, 1972; Wood, 1974). In fact, the effectiveness of the OSH Act was questioned soon after its enactment with little, if any, positive support in terms of hard measures, such as reductions in injury and illness rates.

The experience under the Act in the last three years as evidenced by a mounting workplace casualty list indicates that none of the benefits of the Act is self-generating. Labor will have to maintain continuous vigilance and demand continuous assertion of the effort inherent in the intent of the law. Above all, the bitter lesson to be learned from the past three years' assessment of the Occupational Safety and Health Act is that labor cannot trust its life to the good will of others (Wood, 1974:50-51).

The Standards and Enforcement Approach to OSHA

Of the six policies that were available to the Occupational Safety and Health Administration (OSHA) to achieve the ends of the Act, major emphasis was placed on standards promulgation and enforcement through inspection. The major criticisms dealt with the degree to which the government's concentration on standards promulgation and enforcement through inspection could achieve the desired outcomes. The fact that most employers did not ever experience inspections and when they did the average penalty was inconsequential led critics to assess OSHA as ineffective. In fact this portrayal was relatively accurate.

Over 4,000 standards were hastily gathered and enacted
in April of 1973 (Mendeloff, 1979). These standards were simply adopted from existing standards of:

...the American National Standards Institute and the National Fire Protection Association and consolidated existing federal safety standards, including regulations such as those administered by the Maritime Safety Amendments to the Longshoreman's and Harbor Workers' Compensation Act (Viscusi, 1983:10).

The result of this action was the promulgation and enforcement of many nuisance standards that were applied without much hope of affecting the safety or health of workers. This near total reliance on standards by OSHA was the basis for much of the criticism during the 1970s. Employers found to be in violation of the standards were to be fined at rates depending on the frequency and severity of the violations. In other words, it was assumed that the threat of fines for violating standards would result in "voluntary compliance." Unfortunately, this has simply not been the case.

It has been pointed out that even if the standards approach was to be 100% effective, a great deal of injuries and illnesses would still occur (Weidenbaum, 1979). Further, as Mendeloff (1979:95) has shown only about 18% of the injuries that workers suffer are covered by existing standards. Not only do standards fail to have a significant impact on reducing injuries and illnesses, there is also a considerable problem with enforcement. The intent is that
the threat of an inspection and potential fines would fos-
ter voluntary compliance. Yet this approach seemed to be
doomed to failure from the start as Smith (1976:62-63) has
enumerated:

First, the probability of being inspected is
small ... the typical establishment will see an
OSHA inspector [on a general schedule inspection]
once every seventy-seven years, about as often as
Halley's Comet. Second, there is substantial evi-
dence that inspectors do not discover or cite all
violations in the plants that they inspect.
Third, the penalties for violations are almost
trivial.

Nichols and Zeckhauser (1977:50) also point out in their
review of previous studies in California and Wisconsin the
futility that appears inherent in the standards approach.

Several state studies provide more direct evi-
dence on the potential efficacy of standards in
reducing accident rates. In one California study,
a panel of state safety engineers concluded from
a review of injury reports that only 18 percent
of the accidents involved could have been pre-
vented by a fully effective government-inspection
program. A report of the Wisconsin state agency
concerned with occupational safety and health es-
timated that only 25 percent of industrial acci-
dents were due to identifiable physical hazards
susceptible to inspection, and concluded that
worker training and education programs might be
more effective.

OSHA's almost total reliance on the standards approach
in its early years led to much criticism. With hindsight
it is now apparent that reliance on standards enforcement
was a natural reaction of legislators. The use of command
and control strategies tends to be the approach most favor-
ed in the U.S. as noted by Bacow (1980:14)
The command and control strategy is the dominant regulatory system in the United States... Rather than create incentives for regulatees to alter their behavior, either by stimulating market mechanisms or by other economic means, we consistently attempt to bureaucratically mandate solutions to complex problems.

The Training Approach to OSHA

Early in the history of OSHA, legislators felt significant pressure from constituents to change the entire focus of the law, particularly the reliance on standards. Indicative of this pressure is the fact that by the end of the first session of the 93rd Congress, eighty Bills had been introduced to amend the OSH Act (Job Safety and Health, 1973) and three of these called for the repeal of the law (Job Safety and Health, 1974).

While there have been no major changes to the law enacted to date, there have been major changes in the administration of OSHA as a result of such pressures. In 1974, changes were made to shift the focus from heavy reliance on standards enforcement to more emphasis on employer and employee training. In fiscal 1974, OSHA began to contract with institutions to provide training in the recognition, avoidance and prevention of hazards. The Labor Education and Research Service (LERS) of the Ohio State University was one of the first institutions to receive one of these grants (LERS was established in 1956 under a grant from the Ohio State University for the purpose of providing adult education for labor union
members and conducting research on labor unions). The basis of the contract between OSHA and the LERS was to:

Demonstrate the feasibility of encouraging voluntary compliance by using a statewide university extension program to develop, conduct and evaluate job safety and health training for employees and employee representatives in the state of Ohio and to develop training resources for universities within Region V to further accomplish this goal (Slanicka, 1975).

Between 1974 and 1976 further funding was provided for OSHA training programs through community colleges and other institutions of higher learning. During 1975 training either directed or approved by OSHA was provided to approximately 66,000 persons. This training was aimed at both employers and employees with a focus on hazard recognition, avoidance and prevention as well as rights and responsibilities under the Act.

This concern for training was not an ancillary matter. It is at the very center of the Act. In fact, the first section of the Act states:

Congress declares it to be its purpose and policy ... [to encourage] employers and employees in their efforts to reduce the number of occupational safety and health hazards at their places of employment, and to stimulate employers and employees to institute new, and perfect existing programs for providing safe and healthful working conditions; ... [to provide] that employers and employees have separate but dependent responsibilities and rights with respect to achieving safe and healthful working conditions; to reduce injuries and disease arising out of employment.

The emphasis on training as a method for achieving the
ends of the Act was inherent in the "Common Sense" priorities set under the Carter Administration (Bingham, 1978; Brown, 1978). Major changes in the administration of the Act took place in both the area of standards enforcement and training. Over 1,000 standards were either eliminated or revised under this program. Further, there was a significant change in the amount of emphasis on standards enforcement as reflected in funding of OSHA. Prior to 1978, between 70 and 80 percent of the budget was used for standards enforcement. Since that time the proportion has remained below 70 percent.

At the same time the Carter Administration announced its "New Directions" program that would significantly increase reliance on training. Under this program, institutions were funded to develop and conduct training programs for employers and employees. In 1979, the first program year, eighty-five programs were funded from a pool of $6.7 million. By the 1981 program year, the funding of the program had reached a high of $19.4 million with one hundred and fifty programs funded. The LERS was again at the forefront of the New Directions program in designing and teaching courses in hazard recognition aimed at reducing occupational injuries and illnesses.

The courses taught by the LERS were designed to allow
employee representatives to acquire broad in-depth competence in three areas. First, to develop increased involvement of the union in safety and health activities at the worksite. Second, to develop in-plant, self-education programs. Finally, to cooperate effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices.

The policy shifts that provided for the change in emphasis from standards to training was based on several assumptions. First, as Bacow (1980) points out in his model of "Hazard Abatement," the first step to safety at work is that of hazard recognition. An unrecognized hazard cannot be abated and the cost of maintaining a trained inspector in all work places is prohibitive. On the other hand, employees working with or being exposed to hazards, when properly trained, could provide the function of hazard recognition. Also, as pointed out by Kochan, Dyer, and Lipsky (1978:86) in considering the impact of these changes:

Overall, it would appear that the impact of OSHA could be extended by encouraging the development of joint safety and health committees in the plants by providing training and advisory services to make them more effective.

**Purpose of the Study**

Unfortunately, the support provided for the training efforts has decreased steadily since 1981 with funding for the 1985 program year approximately the same as it was in
1979. It appears that this reduction reflects a desire to reduce spending overall, rather than to condemn the training approach. It would seem more prudent to cut those programs that have not proved to have the desired effect, while increasing or at least maintaining the funding of more effective programs. As noted, studies of the standards promulgation and enforcement efforts have provided mixed results at best and no conclusive results as to the efficacy of this approach. As Viscusi (1983:35-36) points out in his review of these studies:

In short, there is good reason to be skeptical of any evidence showing that OSHA had had an impact on job risk levels. But even if there has been some minor influence on worker health and safety, one could not conclude that the agency's efforts have been socially beneficial. ... The failure of OSHA and of other risk regulation agencies suggests that direct regulatory controls are not well suited to the task of reducing risks.

Proponents of the training approach, however, have little solid data to support the results of their efforts and a return on investment. No comprehensive studies of the training approach have been forthcoming. Therefore, while training seems to have promise for accomplishing the goals of the Act more effectively than other approaches very little, if any, research exists to support this premise.

A major reason for this lack of documented support is the problem of establishing a causal relationship between training and the reduction of injuries and illnesses. This
problem is not unique to the training approach as many re-
searchers who studied the impact of standards faced the
same difficulty. Can changes in injury and illness rates be
correctly attributed to a specific intervention?

Injury and illness rates are the result of many vari-
ables not under the control of the researcher. For example,
in an Interim Report for the National Institute for Occupa-
tional Safety and Health, Cohen, Smith and Cohen (1975)
listed a total of fifteen variables that impact on the
overall safety and health experience of an organization.
Further, Shafai-Sharia (1973) provides an extensive list of
such variables classified as Management Related Factors,
Plant Related Factors and Employee Related Factors. Zohar
(1980) found that the safety climate in organizations was a
function of worker perceptions of management attitudes
about safety and their perceptions about the relevancy of
safety in general production processes. Given these threats
to the internal validity of any study of OSHA effective-
ness, it is easy to see why there are so many contradictory
results in the literature. However, this alone is not a
sufficient reason to ignore approaches that appear to have
merit in accomplishing the goals of the Act.

Perhaps the greatest problem faced by researchers is
the reliance on aggregate and anecdotal data. Overall
injury rates may be of minimal value to the policy making
process because the number of variables that can impact
injuries and illnesses are not under the control of the researcher. Anecdotal data (the major approach utilized by OSHA in evaluating the training funded under the New Directions Grants) provide little scientific control, and thus lead to spurious results. An alternative is to look at behaviors that imply an attempt to reduce hazards at the worksite.

To determine whether the LERS training has had the intended impact, it is essential to systematically gather and assess data concerning the degree to which the training has impacted behaviors at the worksite. This process will provide necessary information for policy decisions concerning the role of training in attaining the mandated goals of the OSH Act and the training goals originally set down by LERS. These goals are as follows:

1) Developing increased involvement of the union in safety and health activities at the worksite,
2) Developing in-plant, self education programs and
3) Cooperating effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices.

Therefore, the intent of this investigation was two-fold. First, to assess the training already undertaken by LERS in terms of the goals stated above and to provide future directions in the design and dissemination of such training. Second, to develop a methodology to evaluate the impact of training as a method for realizing the goals of
the OSH Act. The way in which these objectives were realized is discussed in the Methodology section below.

Methodology of the Study

Another major problem that presents itself in determining the effectiveness of any OSHA program is that of outcome measurement. For the most part previous researchers who have undertaken the study of OSHA program effectiveness have used injury rates as the dependent variable. It was assumed that if the policies and subsequent activities of OSHA were effective, then a decrease in the number of reported injuries and illnesses would be observed following the passage of the Act. This approach simply did not work. The fact that reporting requirements and formats changed after the Act was passed precluded simple before and after measures. Also, as noted, the observed rates are dependent on the combination of many variables that cannot be controlled or measured by the researcher.

This study sought to measure the effects of the LERS training efforts in terms of impact on the behaviors of workers, unions and management. It was assumed here that if specific behaviors indicate increased efforts to recognize, avoid and prevent hazards following LERS training, then at least the program was working. As such, this study focused on the project level of activity in lieu of the policy or strategic level (Soumelis, 1977). Such an approach allowed
conclusions to be drawn as to the effectiveness of the LERS training in reaching the goals stated above.

Also, this approach allowed some conclusions as to the effect that the training and subsequent activities have had on the recognition, avoidance and prevention of hazards at work as mandated in the original statute.

In this study, as with any study of the effects of training, there were several views that could be taken of the evaluation process. As Goldstein (1975) points out, one can look at training evaluation as a negativist with the view that evaluation of training is either impossible or unnecessary. This appears to be the view that OSHA has taken. On the other extreme, one can take the view of the positivist believing that scientific evaluation of training is the only worthwhile approach. However, given the inability to control extraneous variables, as in this case, this view was unattainable. The middle ground is that of the frustrates who believe that training evaluation is essential to effective training but recognize the limitations in most cases. In this study the decision was not whether to evaluate or not but one of finding the best design given the constraints inherent in the situation. Thus the approach of the frustrate is the one taken in this study.
The Sample

The focus of this study was a comparison of the activities of workers in unions who had been exposed to the LERS training versus a matched group of workers who had not been exposed to such training. The level of analysis was that of the union rather than the individual, since the training was aimed at worker representatives with the intent that these representatives, once trained, would impact on the activities of the workers in their respective worksites. The treatment group was composed of local unions that had at least one representative exposed to the LERS training between October 1, 1978 and June 30, 1980. To be included in the treatment group, the representative(s) must have been exposed to at least six hours of training. To be included in the control group no representative(s) of the union would have been exposed to the LERS training during the time period specified. The criterion of six or more hours of training is the independent variable. This criterion is somewhat arbitrary but it was felt that any less than six hours would be, at best, only a cursory exposure. Also, since the typical training session was three hours in length the criterion of six hours assured that individuals representing these unions had been exposed to at least two separate training sessions. Further, it is easier to assess
differences between groups with no training and six or more hours than would be the case of comparing no training to simply any level of exposure.

The local unions used in this study were limited to those located in the State of Ohio which provided control over the effects that different state OSHA programs (as well as any other programs concerned with safety and health) might have had on the dependent variables. In addition, the national affiliation of the locals was limited to five unions which included: The United Rubber, Cork, Linoleum and Plastic Workers of America (URW); the United Steel Workers of America (USWA); the United Automobile, Aerospace and Agricultural Implement Workers of America (UAW); the International Brotherhood of Electrical Workers (IBEW), and the International Union of Electrical, Radio and Machine Workers (IUE). The choice of affiliation as a control variable was critical since the activities that were measured here could be significantly impacted on by the policies of the National or International Union.

These particular unions were selected because of their high levels of concern for safety and health activities at the local level. Daniel Berman (1978) cites all of these unions as leaders in concerted safety and health activities at the local level. In addition, they have placed a high priority on bargaining for safety and health issues
prior to and since the passage of OSH Act (Shafai-Sahria, 1973). They have a history of being safety and health conscious and for providing for safety and health activities in their National By-Laws (Bureau of National Affairs, 1973:2-3). Thus, the sample was limited to one that is aggressive overall in safety and health matters. Any difference in local activities that were attributed to LERS training will have more credence than if they were selected without attention to affiliation. In other words, the sample was selected according to affiliation in an attempt to control for the alternative hypothesis that differences observed are a function of the National or International policies. Further, the fact that the local unions in the sample were already strongly involved in safety and health related activities limits the amount of improvement that could be made. Therefore, if the trained unionist are found to be more involved in these activities, the impact of the training would be more pronounced.

Data Collection

The data collection was accomplished through the use of a questionnaire (presented in Appendix A) mailed to the local union official with the most control over the safety and health activities of the local. A cover letter (presented in Appendix B) accompanied the instrument to
explain the project and the importance of complete responses. In most cases the individual that completed the form was the local safety and health representative or the president/business agent of the local. Information with respect to the degree to which the trained and untrained locals used their resources to accomplish the three goals of the LERS training was solicited. In addition, data on the degree to which workers are able to recognize, avoid and prevent hazards at the worksite was gathered. The questionnaire was sent to both trained and untrained locals.

Fifty-nine trained locals were selected from LERS records of locals that were affiliated with one of the five National or International unions discussed above and had at least one member receiving six or more hours of LERS training. Sixty untrained locals were selected randomly from lists of affiliated locals provided by the State body of the five Nationals or Internationals. These locals did not appear on LERS records as having any members exposed to the training. Thus the minimum difference in training exposure between the trained and untrained groups was six hours. The questionnaires were mailed at the end of December, 1982. Trained unions returned 33 usable questionnaires and the untrained unions returned 24 usable questionnaires.
Data Analysis

The first step accomplished in the data analysis stage was that of establishing the integrity or homogeneity of the sample. Since data are used for trained and untrained locals from five different National or International unions, it was established that the dependent variables did not vary across affiliation. A simple one-way analysis of variance was conducted to determine if any of the differences in the dependent variables could be attributed to affiliation. No significant differences appeared and the data were aggregated for further analysis. If, on the other hand, significant differences had appeared, it would have been necessary to carry out further analysis on the sub-samples by affiliation.

A second variable that had potential for contaminating the results of the study was that of local union size in terms of membership. It is likely that the safety and health activities of local unions are to some extent a function of the size of the union. Therefore, a second one-way analysis of variance was conducted to determine the impact of the local union size on the dependent variables. A few significant differences appeared in this analysis causing some independent variables to be eliminated from further analysis. These variables are discussed in detail in Chapter 4.
Analysis of the questionnaire results took two forms. The majority of the data was of an ordinal nature and required the use of non-parametric statistical tests. The remaining data in the study involved nominal data and, thus, required the use of descriptive statistics and simple cross tabulations. While the descriptive approach may be less scientific than the ideal, it is simply a function of the type of study being conducted. It should be noted however that such an approach is more stringent than the anecdotal approaches currently employed by OSHA and consistent with previous studies in this general area (Kochan et. al., 1977; Cohen et. al., 1975).

One problem that presents itself in such an approach to data analysis springs from the fact that several variables that tap the same construct are used. Several questionnaire items tapped the degree to which each local union engaged in activities that imply behaviors toward or away from the LERS training goals. As might have been expected the results for some items supported rejection of the null for a particular construct while others failed to support rejection. When this happened it was necessary to utilize some judgment as to whether the observed effect was strong enough to accept or refute a hypothesis. This judgmental approach has been supported as of late by the research community (McGrath, Martin and Kulka, 1982).
Methodological Considerations

When one attempts to develop a methodology for evaluating public policy issues on a post-hoc basis, the researcher is faced with the choice of two alternatives. First, one can develop several methodologies and then determine the most effective methodology by the analysis of the results. Conversely, one could simply propose a strategy, apply it, and then discuss the effectiveness in terms of overall assessment of policy and/or the ability to answer specific questions posed by the agency (Cain and Hollister, 1969). In this study the latter strategy was chosen. Evaluation of the methodology was based on how well the questions of training effectiveness, that were the basis of the LERS training attempt to impact on the safety and health activities of workers, were measured.

The use of a post-hoc quasi-experimental technique of non-equivalent groups is far from ideal but does provide for some control of internal validity. In terms of external validity, the design was probably weakest. In this study the concentration was on a specific set of subjects (i.e. unions of selected nationals or internationals) and on a specific training program. This to some extent limited the ability to generalize any findings of the study to the larger population. However, it should be realized that the design was far more controlled than any study as yet reported and for this reason alone should have some value. If the
methodology was effective, then future studies can utilize it and improve on any faults that may be inherent in this study.

**Objectives of the Study**

The principal objective of this study is one of providing information that can be used in policy making at both the macro and micro level. At the macro level, the controversy over the best method for accomplishing the goals of the OSH Act has been brewing for a decade and a half with little progress.

The authors of the Occupational Safety and Health Act of 1970 mistakenly selected industrial hazard abatement as the primary method to reduce the frequency and severity of industrial accidents. At that time, they placed insupportable emphasis on this approach as the main means of improving worker safety. This unfortunate decision to emphasize hazard abatement at the expense of other approaches has continually proven to be without justification in the 11 years since the Act became law (RaVelle, 1981:42).

Presently, the approach seems to be one of reducing the overall effort rather than an effective reallocation of funds to the most fruitful approaches. It appears that the current approach of across-the-board cuts in funding may be shortsighted. If training does have the positive effects that it is believed to have, then the prudent policy would be to reallocate the funds to training and to continue to pursue this avenue toward providing the working environment mandated by the OSH Act. If not, then other avenues should be investigated.
The micro level of policy making focuses on program design and resource allocation for LERS. The results of this study provide feedback as to what the trained unions are in fact doing, or not doing, in comparison to the goals stated above. Further, the training results of this study should help determine whether the intent of the OSH Act is being achieved. This information will be invaluable to LERS administrators, as well as other trainers in terms of program design and dissemination. Even if no action is taken at the macro policy level to increase or maintain funding, the information gained from this study will allow LERS and others to be more efficient in the use of current and future resources.

To achieve these objectives, a brief review of the literature is provided in Chapter 2. The methodology is developed further in Chapter 3, while findings are presented in Chapter 4. Conclusions and recommendations are developed in the final chapter.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

This chapter traces the history of occupational safety and health activities in the United States. For many years public policy has focused on the plight of the working man and woman in terms of their right to a job free from safety and health hazards. Many laws and regulations have been designed and administered to provide for the safety and health of workers in the U.S.. However, few positive results have been substantiated in the reported research.

One major intervention is represented by the Occupational Safety and Health Act of 1970. Despite its lofty goals, the Act has not been spared criticism for its apparent inability to provide for the safety and health of the workers of this nation. Several administrative changes have been implemented since its enactment. This chapter traces several of these approaches, discusses the underlying philosophies and the reported results of these approaches.

Occupational Safety and Health: Historical Background

The passage of the OSH Act in 1970 reflected a new attitude toward the rights of management to operate their
business as they saw fit and the right of workers to a work place free from hazards. The basis of this legislation was to: "...assure as far as possible every working man and wo­
man in the nation safe and healthful working conditions and to preserve our human resources...." Even the casual obser­
ver should see the monumental nature of this charge. In the process of drafting this legislation its framers were faced with the task of designing policies that would facilitate these ends.

Prior to the OSH Act workers in the U. S. depended mainly on the compensation-safety apparatus or Workers Compensation administered, for the most part, at the state level. In 1908 Congress passed a limited workers compensa­tion law for Federal employees. The first such state law was established in Wisconsin in 1911 with most states following suit by 1921 (Mintz, 1984).

These programs were set up to compensate injured workers and their dependents after the fact. In return for guaranteed payments for work related injuries (for the most part, illnesses were not covered) employees gave up their right to sue the employer. The cost to the employer was to be tied to their experience rate of compensated injuries and was to serve as an incentive to pro­vide of safe working conditions. As Nichols and Zeckhauser (1977:45) point out:

Workmen's compensation was originally viewed in part as a way of giving employers incentives to
provide greater safety. In fact, however, only the largest firms are fully experienced rated (or equivalently, self insured). For small and medium sized firms, most of the cost of workmen's compensation is unrelated to the firm's own safety record. Few cases of illness result in any payment of workman's compensation.

The result of this workman's compensation legislation, for the most part, has not been as expected. Employers did not see the penalties imposed for injuring workers as sufficient enough to warrant expenditures to prevent the injuries.

State factory safety and health laws also significantly pre-date the OSH Act.

In 1877 Massachusetts passed the nation's first factory inspection law... Its passage prompted a flurry of State factory acts. By 1890, nine States provided for factory inspectors, 13 required machine guarding, and 21 made limited provisions for health hazards. The labyrinth of State job safety and health legislation covered a wide range of workplace hazards but was badly flawed. There were too many holes in the piece-meal system and numerous hazards were left uncontrolled. The laws had to be amended often to cover new hazards. Many legislatures failed to provide adequate funds for enforcement. Inspectors, who were often political appointees, were not always given the right to enter workplaces. States with strong safety and health laws tended to lose industry to those with less stringent ones, which made States competitive and limited their legislative efforts (Mintz,1984:2).

These state laws were, at best, cosmetic and were poorly enforced. Also, the covered industries tended to be those that had a history of being extremely hazardous, such as mining and agriculture (Nothstein,1981:3). Thus, as with the case of the workmen's compensation laws, the state
safety and health laws had little discernible effect on the safety and health of workers.

Federal regulation of safety and health at work was even more fragmented than the states prior to the OSH Act. In 1890, the federal government passed limited legislation dealing with safety and health in the mining and railroad industries. In 1910 the Federal Bureau of Mines was established to oversee safety and health in the nation's mines but held very limited powers (Ashford, 1976). In 1934 the federal government became more involved in worker safety and health when Secretary of Labor Francis Perkins established the Bureau of Labor Standards. This agency was established:

[t]o help assure that workplaces would be as safe as science and law can make them... [and]...
[W]as the first permanent Federal agency established primarily to promote safety and health for the entire work force (Mintz, 1984:3).

During the New Deal era of the 1930s the federal government became involved with worker safety and health in a rather indirect manner. The Social Security Act of 1935 made provisions for the U.S. Public Health Service to provide funding to the states for industrial health programs. In 1936 the Walsh Healy Public Contracts Act required employers with government contracts exceeding $10,000 to comply with certain limited safety and health standards and allowed the Department of Labor to ban work done under hazardous conditions. This Act was seen by some as a major
intervention on the part of government. However, it pro-
vided little real enforcement power to the Department of
Labor until 1960 when the Department issued its own set of
mandatory safety and health standards under the Act. The
Fair Labor Standards Act of 1938 set limits on employers
utilizing child labor in hazardous occupations but did
nothing to limit the hazards faced by adult workers.

The 1940s and 1950s saw little concern and activity
for occupational safety and health at the federal level. In
section 502 of the Labor Management Relations Act of 1947,
workers were provided the right to walk off a job if it was
perceived to be abnormally dangerous. Also,

[ln 1948 President Truman initiated the first
presidential conference on industrial safety,
which continued through the Eisenhower admini-
stration (Nothstein, 1986:3).

and:

In 1951 Senator Hubert Humphrey of Minnesota pro-
posed an Accident Prevention Act which would have
established a bureau in the Department of Labor
to develop safety (but not health) standards,
along with an independent board to enforce them;
but like several other job safety bills intro-
duced over the next dozen years, it failed to
attract enough support and was forgotten

On August 23, 1958 Congress passed an amendment to the
Harbor Worker's Compensation Act of 1927 that gave the De-
partment of Labor limited authority to set safety and
health standards for workers covered under this legisla-
tion.
The Secretary of Labor was authorized to seek penalties against willful violators, but not against those who only carelessly broke the rules (emphasis added) (Mintz, 1984:4).

During the 1960s a flurry of legislation was passed to improve the general employment relationship in the United States. A large portion of this legislation was aimed at providing safety and health on the job.

In the 1960s Congress enacted the Contract Work Hours and Safety Standards Act, the Construction Safety Act, the Service Contract Act, and the National Foundation on the Arts and Humanities Act, all of which contained certain health and safety provisions but which were applicable only to a limited number of employees and industries. The Federal Metal and Nonmetallic Mine Safety Act and the Federal Coal Mine Health and Safety Act provided a further framework for dealing with safety and health problems in the mining industry. This legislation, however, was sporadic, covered only a very limited portion of the occupational safety and health field, and was not applicable to the majority of employees or employers (Nothstein, 1981:3).

As more and more legislation was added to cover small areas of occupational safety and health, it became obvious to some in the public service that a more comprehensive approach was necessary. Thus, on January 23, 1968 President Johnson proposed "the Nation's first comprehensive Occupational Health and Safety Program." For the next two years the Senate, House and Joint Committees wrestled with language for the Act. Much of the debate during this period centered on policies that would be implemented for reaching
the goals of the Act. The Occupational Safety and Health Act was signed by President Nixon on December 29, 1970 and became effective April 28, 1971.

The criticisms and controversy that surrounded this Act during the two years of debate was destined to continue and escalate during enforcement. During the first five years of its existence, OSHA depended almost exclusively on standards enforcement through inspections to achieve the Act's goals. The major thrust of the enforcement efforts was aimed at safety to the exclusion of health issues. Many of the standards were irrelevant and viewed as nuisances by management. Other standards were extremely technical and unintelligible. Unions complained because inspections were rare and fines for violations were small.

By the end of 1975 criticisms were being listened to by members of Congress and the Administration.

[T]he House and Senate Appropriations Conference Committee directed OSHA ... to upgrade the skills of inspectors, eliminate the "nuisance" standards and simplify the others, emphasize health enforcement, focus inspections on industries with poor safety records, and develop a consultation program to help employers achieve compliance. Echoing much of this criticism, an early draft of the 1976 report of the Council of Economic Advisers (CEA) went on to observe that OSHA had not perceptibly reduced injury rates in the industries in which inspections had been targeted but that paradoxically, while ineffective, OSHA has been extremely costly to industry (Mendeloff, 1979:4).

Under the Carter administration several major changes were instituted by the Under Secretary for OSHA, Dr. Eula
Bingham. After her appointment in 1977, Bingham instituted the "Common Sense Priorities" program. These changes included the following:

1) Focusing resources on high-risk industries and workplace hazards likely to cause death, serious injury, or irreversible bodily harm.

2) Increasing the availability of on-site consultation assistance to employers through state agencies.

3) Establishing the New Directions program for channeling money into training and education.

4) Revoking standards which are not needed, simplifying standards which are unnecessarily complex, and setting performance standards wherever possible (Nothstein, 1981:13).

While all of these changes were implemented during the Carter administration, the one of interest here is the New Directions Program. This program represented a change in the amount and type of training as well as a method of delivery. Prior to the New Directions program OSHA contracted for training on a limited basis. The majority of the funds that were earmarked for training in the budget went for the training of health and safety professionals and OSHA Compliance Officer training.

Funding for the training grants came from both OSHA and the National Cancer Institute. The overall funding increased during the early years as did the number of programs. Funding for fiscal year 1979 was $6.4 million with 85 programs funded. Funding for New Directions reached a high in fiscal year 1981 at $19.4 million.
the Reagan administration the funds available for support of New Directions training were seriously cut. For fiscal years 1982 through 1985, funding remained at approximately $6.8 million. For fiscal year 1987 funding will reach a new low of $3.6 million. While over the life of the program 185 distinct organizations had received grants, this number was cut to 23 at the end of July, 1986. The remaining grantees are all labor unions with only specialized training being contracted to universities and industry associations. It should be noted that 95% of the original programs are still operating after five years as self-sufficient organizations (Cronan, 1986).

The Effectiveness of the OSH Act

OSHA has attempted to meet the mandate of the Act through four main activities:

setting standards, inspecting and enforcing regulations, providing public education and services, and monitoring the performance of State programs (Office of Technology Assessment, 1985:219).

Almost since the day of its inception, OSHA has been criticized for the methods utilized and the apparent lack of impact on the level of work related injuries and illnesses. The greatest amount of activity has been in the areas of inspection and enforcement.

Inspections and enforcement are the heart of the regulatory scheme in the OSH Act. Congress created an agency that is predominantly an enforcement agency conducting unannounced inspections and levying penalties for the "first instances"
of violations, as well as for repeated violations (Office of Technology Assessment, 1985:232).

In summary, the result of OSHA's reliance on standards and enforcement seems to have received bad marks from all camps.

Industry views it as another unjustified and costly intrusion. Workers, organized labor, and other proponents of strong regulation of occupational safety and health have been disappointed by OSHA's failure to secure noticeable, much less notable, reductions in the toll taken by work-related injuries and illness (Nichols and Zeckhauser, 1978:169).

The reasons for what is seen by many as a failure of OSHA to carry out its charge in a reasonable, efficient, and effective manner are legion. The two that seem to predominate are the use of standards and enforcement through inspection.

Standards and Enforcement Activities

First, the Act directs the Secretary of Labor to set standards dealing with working conditions that employers must meet. Standard setting is a function of two sections of the OSH Act. Section 5(a)(1), known as the "general duty clause," requires that employers provide a place of employment that is free of recognized hazards. The purpose of this clause is to protect workers from hazards not covered by specific standards. Section 5(a)(2), known as the "specific duty clause," requires that employers comply with detailed standards issued by OSHA that deal with specific
hazards (Office of Technology Assessment, 1985). These standards are often either confusing, trivial or both. Others are simply too costly to allow the employer to both comply and remain in business.

Second, the enforcement of the Act was to be based on inspections and fines for violation of standards. However, as pointed out in the introduction, the chances that a particular business will be inspected is nil, and the economic hardship imposed by fines is negligible. Further, the inspectors themselves have been highly criticized for their lack of knowledge and training in the occupational safety and health area (Committee on Government Operations, 1977).

The small probabilities of inspection, the likelihood that many violations may never be detected even if an inspection is made, and the low fines combine to provide extraordinarily weak incentives for compliance with OSHA standards in advance of inspection (Smith, 1976:64-65).

The framers of the Act and OSHA administrators never believed that it would be possible to inspect all businesses or to detect all hazards existing in the workplaces of this country. Rather, it was hoped that employers would take the initiative and voluntarily comply with the standards; this has simply not been the case. In reality voluntary compliance appears to be unattainable under the current system.

The goals of enforcement are both to correct identified hazardous conditions in inspected plants and to provide an incentive for uninspected plants to eliminate or reduce hazards. The second goal has often been called
"voluntary compliance," although it is misleading to label as "voluntary" actions taken by employers in the face of mandatory standards with the potential threat of inspection and civil penalties. "Preinspection compliance" is perhaps a better term. In practice, the incentive for preinspection compliance is actually quite small, because of both the low probability of inspection and the low level of penalties (Office of Technology Assessment, 1985:232).

In addition to the problems stated above, the nature of the hazards that can be detected and eliminated through standards enforcement precludes total safety and health at work. It is estimated that only 10-15 percent of the injuries and illnesses experienced by workers are due to detectable hazards (Cicchetti, 1980). Also, there are a great number of hazards that are transitory in nature and thus would escape detection through random inspections (Smith, 1976). As Bacow (1980:40) observes:

OSHA has yet to affect the rate of job-related accidents, because many of these accidents are structurally immune to OSHA-type regulation; OSHA is incapable of defining regulations that identify workplace-specific hazards, hazards created by workers themselves, and momentary unsafe conditions; and some hazards cannot be detected by infrequent outside inspections. Even with perfect compliance, OSHA may be capable of preventing no more than a quarter of all occupational accidents.

Public Education and Service Activities

Hazards that cannot be detected or eliminated using the standards enforcement approach cannot be avoided or prevented. The public education and service activities of OSHA are designed to solve this problem by increasing
worker awareness of hazards. Included within these activi­
ties are the projects assisted by the New Directions pro-
gram. The framers of the OSH Act recognized the need to
provide training to employers and employees. They provided
explicitly for this need in section 21(c)(1) of the OSH Act
as follows:

The Secretary, in consultation with the Secretary
of Health, Education, and Welfare shall provide
for the establishment and supervision of programs
for the education and training of employers and
employees in the recognition, avoidance, and pre-
vention of unsafe or unhealthful working condi-
tions in employments covered by this Act
(emphasis added).

As pointed out above, the concern for this charge was
not great during the early years of OSHA. While some train-
ing was provided through specific contracts, it was not un-
til the New Directions program that OSHA made a concerted
effort to utilize training for the purpose of the Act. One
reason for this was that the majority of the training re-
sources available to OSHA in the early 1970s was used to
train compliance officers and other safety and health pro-
essionals. Under the Carter administration larger sums of
money were made available specifically for the purpose of
training. Grants were given to labor unions, industry as-
sociations, and universities to develop and provide train-
ing in the areas of hazard identification and control,
workplace risk assessment, medical screening and record-
keeping.
To fulfill this mandate, OSHA embarked on its New Directions program. The program was first described in the Federal Register on April 14, 1978. It is designed to increase the number of nonprofit organizations involved in delivering safety and health services to target populations with special needs. Labor organizations and employer associations (as well as educational and other nonprofit organizations) are offered the opportunity to participate. They may apply for grants to fund programs to develop centers of competency providing a wide range of workplace safety and health education and related services. With initial support from OSHA, grantees can educate the workers and employers they serve, hire technical staff who can recognize potential hazards, and disseminate safety and health knowledge throughout workplaces in a way OSHA alone could never achieve. The assumption is that within three to five years grantee organizations will be able to develop comprehensive and effective programs to address the major safety and health problems of their target populations, and to obtain the financial support necessary from these groups to continue safety and health activities after Federal funding ends (U.S. Department of Labor, 1986:2).

This change in policy of greater emphasis on training was partially based on the criticisms of standards and enforcement activities of OSHA. It was also a direct result of different attitudes on the part of OSHA administrators. OSHA Training Director, Earl Heath, noted:

OSHA's training activity in the past consisted mainly of "ad hoc" efforts in which individual contracts were signed for the development of training materials and courses. We got a lot for our dollars, but the contracts had no lasting effects (Occupational Safety and Health Reporter, 1978:1699).

As Assistant Secretary Bingham pointed out in announcing the New Directions grants:

I have long known that the best way to make significant advances in improving safety and health
conditions is through a well-informed workforce. So, I am delighted to announce unprecedented OSHA funding for programs to train and educate employers and employees alike about job safety and health... the awards inaugurate what will be an expanding training grant program that is a vital part of OSHA's "New Directions" effort to increase awareness and abatement of workplace hazards (Job Safety and Health, 1978:2).

This new emphasis on training was partially a reaction to the apparent ineffectiveness of standards enforcement in reaching OSHA's goals. Given the fact that OSHA had limited ability to inspect and enforce the standards and that a majority of injuries and illnesses were caused by factors not controlled by standards, it is no wonder that OSHA's efforts brought few results. The attitude that the threat of inspections and fines would promote "voluntary compliance" on the part of management had simply not occurred. Echoing this concern Bingham (1978:135) states:

It is time for all of us at OSHA to turn outward to the workers. I am aware that OSHA cannot eliminate workplace hazards alone. We need a workforce that is sensitive to its rights, aware of dangers, and confident that it is protected under the law... OSHA must serve as the catalyst in instilling a heightened awareness of workplace danger throughout the country; this means educating employers as much as workers. Education and training will increase voluntary compliance, since many workplace problems arise from a lack of knowledge concerning the harmful effects or dangers of many products or processes... I believe that education is the key to our success, since it is the one tool we have which will enlist in our cause the millions of workers and employers without whom we will be spinning our wheels. Education will encourage these people to act in their own self-interest: in the interest of health and safety.
This new emphasis on training was not seen as a replacement for standards and enforcement but as a supplement with promise. Workers trained in hazard recognition, avoidance and prevention would be much better able to provide safety and health at the worksite than an inspector who occasionally came by with a list of standards. Trained workers would be able to set up mechanisms to train other workers and to constantly monitor the worksite. Further, these trained workers would be able to set up safety and health committees that could interact with management in a non-adversarial environment for the purpose of providing improved safety and health at the worksite. As Kaufman (1980:107) points out in his discussion of these programs:

Implicit in these educational and informational programs is more than the packaging and transfer of knowledge. The inspiration is activist, and the spirit in which it is conveyed is as important as the information itself. One underlying theme of these activities is the effort to make the worker more self sufficient in recognizing hazards and taking action to overcome them.

The Impact of OSHA: Standards and Enforcement Activities

Given the fact that OSHA has concentrated its efforts on standards and enforcement through inspection, most studies reported to date look for the impact of these interventions. While several major studies have been conducted and reported since the passage of the OSH Act, some have chosen not to address the impact on injury and illness rates. In most cases these studies have examined the number of completed inspections or the amount of penalties assessed
for violations. An example of this approach is Perkel's (1972) work which was conducted immediately following the Act. His results indicate that a great majority of the covered establishments (79%) were in violation of the law. Further, the average penalty assessed by the fledgling agency was a mere $23 per violation. While this type of review may make "good copy" in the mass media or provide politicians with campaign ammunition, it does little to evaluate the critical issues involved.

The Act was not passed for the purpose of constant harassment through inspection or for the purpose of filling government coffers. Rather, the intent of the law was to provide safe and healthful working conditions. Therefore, studies of this type are of little value in assessing the impact of OSHA. The focus of this review will be studies that attempt to measure the impact of the activities of OSHA on the health and safety of people at work.

The task of analyzing the impact of OSHA has not been easy for researchers. Most studies reported in the literature leave much to be desired. In their report to the United States Senate, Zeckhauser and Nichols (1978:171) point out:

The published literature on OSHA is surprisingly brief. No reasonably broad, much less definitive studies of OSHA's performance have been conducted. Moreover, gaps and inconsistencies in the data base make even the most careful of studies somewhat inconclusive. Thus recommendations of necessity rely heavily on logic, theory, and
indicative data. There are no controlled experiments to offer guidance, no substantial data sets from which unambiguous inferences can be drawn.

The problem is not that unqualified researchers have examined the question of OSHA's impact on injuries and illnesses, but rather it is a function of the available data. The most logical variable to measure would be the rates of injury and illness experienced by workers. However, these data are not very reliable. One difficulty is the method by which injury and illness rates are reported.

...the annual safety survey conducted by the Department of Labor's Bureau of Labor Statistics (BLS) until 1970 used the American National Standards Institute's (ANSI) Z16.1 method of computing accident- and illness-incidence rates. Since 1971, the newly devised BLS rate has been used. Because of significant differences in the definition of a reportable accident, it is impossible to convert from one rate to another. Therefore, although one of the main objectives of OSHA was to arrest a rising accident-incident rate, the new statistical procedures adopted by the Department of Labor made it impossible to compare pre- and post-OSHA experiences (Northrup et. al., 1978:145).

Any attempt by researchers, no matter how sophisticated their methodology, cannot overcome the problem created by this statistical change in measurement. Because of this change it is not possible to attribute the observed changes in the injury and illness rates to any specific intervention.

This new method yields estimates which are different from, and cannot be made comparable to, the old estimates of injury rates. The result is that any attempt to measure the overall effects of the Act cannot distinguish between those
changes which are the result of enforcement and those which are merely statistical in nature (Smith, 1976:67).

Another problem faced by researchers in analyzing the impact of OSHA is the fact that there is no measure of what the injury and illness rates would have been in the absence of OSHA. Also, since only a minority of injuries and illnesses can be prevented by standards and enforcement, it is necessary to ignore the majority that cannot be prevented.

In order to examine the overall impact of OSHA, one would like to be able to predict what injury rates would have been in the absence of OSHA and to compare those figures with the actual rates. More precisely, those comparisons should be made only for the types of accidents that compliance with standards could prevent (Mendeloff, 1979:94).

Another problem with injury and illness data currently gathered by OSHA is a lack of specificity. That is, the data currently gathered lack severity and causality measures. For instance, it is impossible to distinguish from OSHA records if injuries were the result of violated standards or some other, non-regulated origin. As Ginnold (1979:355) points out in his review of OSHA's impact:

To measure the impact and direct resources, OSHA needs a data system on injuries, illnesses, and fatalities that is complete, is establishment based, has causal information, and distinguishes injuries by severity. The existing BLS injury and illness survey does not meet most of the above requirements.

Finally, there is a problem with aggregating data across workplaces. Differences of frequency of inspection, number and size of penalties assessed, technology involved,
top management commitment to safety and health, and numerous individual differences on the part of employees all have some impact on injury and illness rates. Furthermore, if single workplaces are used as a basis of study there is a chance that real changes may be either too small to measure or simply due to measurement error (Mitchell, 1982).

All of the studies on the impact of standards and enforcement were able to cope with some of the problems discussed above, but no single study has been able to handle adequately all of them (Ettkin and Chapman, 1975; Currington, 1979; Mendeloff, 1979; Northrup, Rowan, and Perry, 1978; Smith, 1976; Smith, 1979). Therefore, the reported results must be viewed with caution.

Ettkin and Chapman (1975) assessed changes in the injury rates in the Meat Packing industry before and after OSHA. Accident statistics for this study were taken from Nebraska's Workman's Compensation Court records for the years 1969 through 1972. Testing for differences in the uncorrelated means of the proportion of accidents per worker for these years they found a significant lowering of accidents (p = .0001) following the passage of OSHA.

Smith (1976) studied the injury rates for high risk industries. Reasoning that the impact of OSHA would be stronger in inspected industries he compared the pre- and post- OSHA injury rates for industries that had been "targeted" for inspection because of their traditionally
high injury rates with industries that had traditionally lower reported injury rates. He also used an autoregressive model to predict what the injury rates should have been in the absence of OSHA inspections. In summarizing his findings Smith (1976:69-70) reports:

The most credible results are that over the 1970-72 period injury rates in the target industries fell by nearly three percent more than they would have fallen otherwise, but that over the 1970-73 period, they fell by less than 1 percent more than they would have in the absence of the program. The most important aspect of these results is that neither estimate is statistically distinguishable from zero. Putting it differently, we cannot reject the hypothesis that the Target Industry program has had no effect on injury rates in its first year or two of operation... A more ominous, but still speculative, implication of the results is that OSHA, whether because of its standards or because of its failure to discover violations, may not be affecting the conditions which cause injury. Given the limited potential of a perfectly enforced set of standards and the likelihood that inspectors discover only the most obvious violations, it is perhaps not surprising that the estimated effects on injuries are so small that they cannot be distinguished from zero.

In a later study Smith (1979) restricted his sample to only inspected firms and compared those inspected early in the year with those inspected late in the year. He reasoned that if inspection did have an effect on injury rates, then the early inspected plants would have lower injury rates for the year than plants inspected later. He found a significant decline for 1973 and an insignificant decline for 1974.
The results imply a statistically significant injury rate decrease associated with 1973 inspections and an insignificant decline associated with 1974 inspections. The point estimates of these effects imply a steady-state reduction of about 16 percent associated with inspections early in 1973, around a 5 percent reduction for 1974 inspections, and a lag of about three and one-half months in effective hazard abatement (Smith, 1979:168).

Northrup et. al. (1978), in their study of the Aerospace industry, were unable to find any convincing evidence that OSHA had any real benefit for employees. This was a case study of a particular industry utilizing questionnaires, interviews and OSHA data. The researchers sought to identify the impact of OSHA activities on injuries and illnesses suffered by aerospace workers. In summarizing their findings they conclude:

Where increased worker safety and health are concerned, there is no convincing evidence that any real benefits for aerospace industry employees have been derived from OSHA. The aerospace industry continues to be, as it always has been, a safe one according to published statistics, and changes in frequency and severity rates which have been recorded cannot be attributed with any acceptable degree of certainty to any one cause, such as OSHA (Northrup, et. al., 1978:166).

Mendeloff (1979) was able to identify significant declines in the injury rates after OSHA. Using California data he developed a regression model of injury incidence by accident type, in order to isolate those injuries that could reasonably be prevented by standards and enforcement. He found that "caught in or between" injuries were 4 to 6 percent below the level predicted by the model. From this
result he reasoned that OSHA had had an impact for injuries that were caused by detectable violations of standards. However, when he used aggregated injury types for the the overall U.S. manufacturing injury rate no significant differences were found between predicted and reported injuries. These results led him to conclude:

...despite its small impact the OSHA program may be approaching the limit of its potential. But regardless of whether that inference is correct, the critical point is that significant increases in OSHA's effectiveness will require redesigning its enforcement strategy to apply to a broader set of injuries (Mendeloff,1979:119).

Currington (1979) looking only at injury frequency rates, devised a regression model to predict what injury rates would have been in the absence of OSHA. Using pooled cross section, time series data from New York, Texas and Florida, he found only small differences in a few industries. Overall he detected no decline in the average injury frequency rate after OSHA.

The results indicate that OSHA regulation did not lower the average injury frequency rate in manufacturing. The results do indicate that in a very few individual industries the injury rate is lower than it would have been in the absence of regulation. However, the size of the impacts in these industries is small and approaches statistical insignificance (Currington,1979:333).

Perhaps the findings of OSHA's ineffectiveness are best expressed by Paul McAvoy, President Ford's Economic Adviser:

There has been an inability to demonstrate the impact of OSHA on the basis of reduced accident
rates. My only concern is whether OSHA can be made effective and at less cost (Business Week, 1976).

This inability is a direct function of using injury and illness rates as a measure of effectiveness. The quantitative nature of injury and illness rates makes it an attractive dependent variable to measure results. However, this results oriented measure is not appropriate because of its tendency toward contamination by other variables. Instead, it would seem more prudent to concentrate on the activities and behaviors exhibited by employers and employees at the worksite that result from the interventions of OSHA. This approach would involve measuring variables such as the amount of resources dedicated to safety and health at the worksite or the number of hazards actually abated.

The Impact of OSHA: Public Education and Service Activities

In terms of the studies on the impact of OSHA's public education and service activities, very few have been reported in the literature. Under the New Directions program OSHA has evaluated its own efforts in somewhat superficial terms. When the New Directions program was launched in 1978, OSHA set down three criteria for evaluating the grantees' activities. The first criterion is that of "institutional competency" to be measured by the number and qualifications of trained safety and health professionals on the staff of the grantees. Second, OSHA
sought to measure the degree to which the grantee was able to develop "self-sufficiency". This is a measure of the extent to which the grantee was able to continue training activities after the initial five years of funding was terminated.

Finally, OSHA attempted to measure the degree to which trained workers were able to "abate hazards". This was measured anecdotally by the grantees. For purposes of this measure trainees were asked to relate their experiences after training in terms of hazard abatement at the worksite (Cronan, 1986). The measures of "institutional competency" and "self-sufficiency" were used to assess the process of providing the training. The information generated in terms of hazard abatement was used to assess the impact of the training. None of these measures were scientifically based.

In its attempt to analyze the impact of OSHA training activities, the Office of Technology Assessment (1985) found no "comprehensive analysis of worker training and education programs, their effectiveness and the resources devoted to them..." To remedy this they contracted a study of 40 worker training and education programs. This study (INFORM, 1983) classified the programs studied into four categories according to the program's objectives (see Figures 1 through 4). Fundamentals programs instruct workers about known hazards in order to prevent work-related illness and injury. Recognition programs prepare
<table>
<thead>
<tr>
<th>Program Objective:</th>
<th>Reduction of costs resulting from work-related injuries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics Covered:</td>
<td>Prevention of work-related injury and illness through proper use and maintenance of potentially hazardous tools, equipment, and materials.</td>
</tr>
<tr>
<td></td>
<td>Emergency procedures.</td>
</tr>
<tr>
<td></td>
<td>The use of protective equipment such as masks, respirators, safety goggles, or gloves.</td>
</tr>
<tr>
<td>Typical Suppliers:</td>
<td>Businesses and Trade Associations.</td>
</tr>
</tbody>
</table>

Figure 1

Fundamentals Training Programs

<table>
<thead>
<tr>
<th>Program Objective:</th>
<th>To teach workers how to recognize hazards at the worksite.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics Covered:</td>
<td>Methods for observing and monitoring worksite hazards.</td>
</tr>
<tr>
<td></td>
<td>Methods for collecting information about worksite hazards.</td>
</tr>
<tr>
<td></td>
<td>Methods for hazard elimination and control.</td>
</tr>
<tr>
<td>Typical Suppliers:</td>
<td>Unions, Universities and Hospitals.</td>
</tr>
</tbody>
</table>

Figure 2

Recognition Training Programs
Program Objective: To teach workers how to utilize certain mechanisms to ensure safety and health at the worksite and to provide workers the skills necessary to participate in hazard recognition and control.

Topics Covered: Legal and contractual rights of workers.

Joint Labor/Management Safety and Health Committees.

Problem-solving mechanisms for safety and health at work.

Typical Suppliers: Unions, Universities and Hospitals.

Figure 3

Problem-Solving Training Programs

Program Objective: To educate workers to play a broad social and political role in seeking safe and healthful working conditions.

Topics Covered: Preparing testimony for legislative and regulatory hearings.

Establishing area Occupational Safety and Health Committees.

Writing and winning good contractual provisions for worksite safety and health.

Typical Suppliers: Committees or Coalitions for Occupational Safety and Health.

Figure 4

Empowerment Training Programs
One interesting result of this study and the particular classification scheme used is that different institutions tend to provide different types of training. All five of the programs that were classified as fundamentals were conducted by businesses or trade associations. On the other hand, six of the seven empowerment programs were conducted by committees or coalitions for occupational safety and health. The bulk of the recognition and problem solving training is offered by unions, hospital-based programs, and university-based programs (INFORM, 1983). While these results may be interpreted to indicate that the type of program chosen is a function of political and economic pressure, it is also likely that no one seems to know what really works best.

This is a critical point in the analysis of the impact of the New Directions efforts. The institutions appear to be addressing different audiences and providing different content but using the same global measures of effectiveness. Namely, the institutional competency and self-sufficiency measures as required by the conditions of the grants. What is not being measured is the impact of the training being offered. This is critical since it is quite possible that the organization may be doing well in terms of institutional competency and self-sufficiency measures, but have no impact on the injuries and illnesses suffered at the worksite.
Measuring the Impact of Training

In this study the concern is not for institutional competency or self-sufficiency because these measures have already been taken by OSHA. Also, as pointed out above, these measures may have little to do with the real impact of the training. The concern here is the impact of the training on the safety and health experience of the worker.

As with any study of the impact of training, measures can be taken at four levels.

Measures of training success fall into four categories: (1) Reaction - how do the trainees feel about the program they attended? (2) Learning - to what extent have the trainees absorbed the knowledge and skills that have been taught? (3) Behavior - to what extent do trainees apply what they have learned in the training to their job settings? and (4) Results - to what extent have cost related behavioral outcomes been affected by the training (Wexley and Latham, 1981:89)?

OSHA has selected the reaction level of analysis for evaluating the training efforts of the grantees under the New Directions program. The reason for selecting this level is unknown for sure, but it is probably safe to assume that the simplicity of the method plays a major role. Unfortunately, while these types of measures are the easiest to obtain and analyze with simple descriptive statistics, they provide little usable information.

Simple reaction measures are taken at the end of the training sessions. These measures are usually gathered through the use of a questionnaire given to trainees at the completion of the training. Items on these questionnaires
typically deal with the participant's reaction to the materials, trainers and the general content of the program. The problem with these measures is that they simply do not measure the impact that training had on the behaviors of the individual following the training. While the measures used to evaluate the New Directions efforts have obvious inherent problems, evaluators of training efforts that attempt to measure results face the same problems as those who attempt to measure the impact of standards and enforcement. The only valid measure of training are the injury and illness rates experienced by trained and untrained workers.

Ideally, effectiveness of worker education and training programs would be measured by reduced job-related injuries and illnesses. However, the data currently available are often limited, especially for illnesses. In addition, even with the appropriate data, attribution of improvements to one factor requires knowledge of all other factors that might have an effect. In practice, effectiveness measures are generally indirect and include counting the number of workers trained or educated and surveying workers' and management's perceptions of the programs (Office of Technology Assessment, 1985:194).

Since the measures of injury and illness rates fail to provide interpretable results, another measure should be used. Measures of learning are generally gathered during and immediately after the training. These measures resemble course examinations used in formal educational settings. The purpose of these measures is to determine what the trainee has actually learned from the training. The application of these types of measures is best suited for
the evaluation of program content and androgogy. While these measures may provide valuable information for designers of specific training programs, they provide little, if any, information concerning the impact of training.

The critical issue then is one of transfer of training to the worksite. Behavioral criteria provide information on the activities of trainees after they have been trained and return to the worksite. These types of measures are typically gathered through the use of behaviorally-oriented questionnaires that can be subjected to at least rudimentary statistical analysis. While measures of behaviors may not be as rigorous as results measures, there is no reliable measure of results available to assess the impact of the training done under the New Directions program. Therefore, this study utilizes a behavioral level of measurement.
CHAPTER III
METHODOLOGY

Introduction

This chapter will first discuss the methodologies and techniques of project evaluation. This section briefly focuses on how the inherent problems of evaluation research are handled in this study. The remainder of the chapter discusses the particular methodology and research design employed. There is a discussion of sample selection techniques, questionnaire design and testing procedures utilized, and the methods of analysis.

Methodology and Techniques of Project Evaluation

In this study the aim is to evaluate OSHA policy with respect to the efforts of the LERS training under its New Directions Grant. The purpose of this evaluation is to provide information for policy making. In short, this study is an evaluation of the public policy embodied in LERS/OSHA training activities what is the impact of the LERS/OSHA training on the behaviors of local unions that have been trained? The specific behaviors that evidence the
impact of interest here are described in the four hypotheses that form the basis of this study. This study may then be classified as "evaluation research."

There is no commonly accepted definition of evaluation research. In its broadest context, evaluation research can be seen as a force for social change, as a set of actions in which social-science trained researchers participate in order to improve the human condition (Freeman and Bernstein, 1975:9).

This study differed markedly from earlier studies of OSHA. First, most of the reported studies of OSHA to date have taken the approach of measuring the overall impact of the Act on injury and illness rates. In the majority of these studies the concentration was on standards and enforcement as an independent variable. Further, the studies of particular interventions of OSHA, such as the New Directions program, have chosen to take a process evaluation approach of determining whether a particular program was implemented according to stated guidelines. The present study measured the impact of training on specific behaviors and thus can be classified as an impact evaluation study. In impact evaluation the concern is with the degree to which a particular intervention affects changes on a set of pre-specified criteria. This fact dictated the choice of experimental design.

In terms of impact evaluation, a design is required that allows the investigator, in a persuasive way, to demonstrate that the changes that occur are a function of the particular
program intervention and treatment and not accountable for in other ways. Ofentimes (sic) a variant of the classical experimental design, in which there are control and experimental groups that receive different treatments, is utilized... In general, most evaluation researchers take the position that experimental designs, or when not feasible, quasiexperimental designs, are the most appropriate way of measuring impact since they provide known means of controlling external biases (Freeman and Bernstein, 1975:13).

Given the fact that measures were not collected before the training intervention in this study the design had to be based on post-hoc data. While this fact caused some methodological problems they were neither uncommon or insurmountable. As indicated above this study can be classified as evaluation research and as such had some inherent problems.

Program evaluation starts with a program -- with an ongoing activity already shaped by forces and events which cannot be reshaped to suit the investigator's convenience. The research question comes second; the research design third. Necessarily, the quality of the design suffers (Nachmias and Henry, 1980:466).

However, the field of evaluation research has matured in the past decade and the methods utilized by researchers are becoming more acceptable (Van Madden, 1979). This study attempted to utilize as much rigor as possible and to apply the principles of quantitative research where possible. Where this was not possible qualitative measures were utilized.
Questions to be Addressed and Research Hypotheses

This study had as its major focus the effectiveness of the training efforts of the LERS in allowing employee representatives to acquire broad in-depth knowledge in three areas:

1) Developing increased involvement of the local union in safety and health activities at the worksite,

2) Developing in-plant self education programs, and

3) Cooperating effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices.

In addition, the question of how much impact the training had had on the recognition, avoidance and prevention of hazards at the worksite was investigated. The first three of these questions spring directly from the goals of the LERS in designing and conducting the training and the last evolves from the basic mandate of the OSH Act.

These questions lead to the statement of the following null hypotheses:

Ho 1: There is no difference in the amount of involvement of the local union in safety and health activities at the worksite between the local unions that have been exposed to the LERS training and those that have not been exposed.

Ho 2: There is no difference in the development of in-plant, self-education programs between local unions that have been exposed to the LERS training and those that have not been exposed.
Ho 3: There is no difference in the degree to which local unions cooperate effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices between the local unions that have been exposed to the LERS training and those that have not been exposed.

Ho 4: There is no difference in the degree to which hazards are recognized, avoided and prevented between the local unions that have been exposed to the LERS training and those that have not been exposed.

Here the attempt was made to evaluate training at the effectiveness level (Wexley and Latham, 1981) by focusing on behaviors. This was a higher level of analysis than had previously been assimilated by the OSH Administration and should prove to be of more value in policy making decisions. Previous attempts at evaluation have been at the reaction level which constitute the results of participant reactions to the training. These measures, taken at the conclusion of the training, are helpful in fine tuning the programs, but provide little in terms of the actual impact of the training. Thus, the results of testing the hypotheses stated above should provide information sorely needed for policy making.

Research Design

The research accomplished here focused on the impact of the LERS training efforts with two goals. First, to determine if the stated goals of the training have been met
and the extent to which they have been met. Second, to rule out rival hypotheses that may offer plausible explanations of the results through the use of statistical methods.

As noted in the introduction, the methodological problems that one faces in a post-hoc analysis of public policy issues are legion. Yet one needs to make an attempt to analyze the effect of the training activities to provide support for future funding. In order to accomplish this end, a post-hoc quasi-experimental technique of non-equivalent groups can be employed. In this study the luxury of a pre-training measure of the variables of interest was simply not available. Therefore, it was necessary to depend on a comparison of trained and untrained subjects on a post hoc basis. Further, the luxury of a rigorous Natural Science model (Behling, 1980; Kerlinger, 1973) was not available because a number of potentially confounding variables are beyond control. For example, it was not possible to randomly assign subjects to the treatment conditions because the treatments had already taken place. Also, since the treatment had already occurred one could not control the level of treatment other than by the number of hours of training received. Thus, some degree of internal validity was lost due to the inability to use strictly defined treatment groups, to control the treatment, and to randomly assign subjects.
In this study the concern was not specifically internal validity but external validity. As its major concern, external validity recognizes the extent that the observed results are generalizable to and representative of other situations (Campbell and Stanley, 1963; Cook and Campbell, 1979). While it is necessary to have as much internal validity as possible to attain external validity, Goldstein (1979) challenges the traditional view of internal and external validity when evaluating training programs. He states that "training designers and evaluators in the pursuit of internal and external validity need to broaden the scope of their investigations" (p. 200).

Goldstein adds that rather than the traditional approaches, training evaluation should focus on four distinct types of validity. First, training validity focuses on the performance of trainees in the training situation. That is, did the trainees learn what the program set out to teach? Secondly, performance validity is necessary to training evaluation in that it is a measure of the degree that the training transferred to the job setting. In other words, does the training have the intended effects in terms of the on-the-job behaviors? Third, intra-organizational validity is concerned with the extent to which the training will have the same effect on others within the same organization that the original training took place. Here the concern is that the training and performance validity may be specific
to the particular group from which it was obtained and that it would not have the same effect for other groups in the same organization. The final category is that of inter-organizational validity which is concerned with the extent that training validated in one organization will produce the same result in other organizations. While the utopian training evaluation design would make allowances for all of these types of validity, this is rarely possible in reality.

In this study the concern for training validity was blocked by the fact that the measures taken were post-hoc and, therefore, could not be utilized to establish the level or degree of training validity. Also, the concern for intra-organizational validity was of little importance or concern here since, by design, the training was done across organizations. Thus, intra-organizational validity was assumed to exist by design. By the same token, this format for training supports the need to establish the inter-organizational validity of the training, yet such an analysis was beyond the scope of this study. Therefore, this study focused on performance validity. Specifically, the evaluation of the LERS training was based on reported behaviors and levels of activity at the worksite between trained and untrained local unions.
The research design employed was a non-equivalent group design (Campbell and Stanley, 1963; Cook and Campbell, 1979). By necessity, the treatment and control groups were not matched on all variables. However, several variables were controlled.

**Independent Variable**

The independent variable used in this study was simply the exposure to the LERS training. The pool for experimental subjects were individuals representing local unions that were exposed to six or more hours of training between October 1, 1978 and June 30, 1980. There were 1,567 individuals in the pool to serve as subjects. The criterion of six or more hours of training exposure was used to insure a difference between the trained and untrained subjects. It was felt that less than six hours of training is cursory at best. Further, it was much easier to determine any significant differences that might exist between trained and untrained subjects using two groups rather than multiple groups. It was assumed that the training is cumulative in its effect on the dependent variables. Thus by using the criterion of six hours as the distinction between trained and untrained groups, it was easier to ferret out the effects of the training on the dependent variables.
Dependent Variables

In order to test the effects of the training on safety and health activities at the worksite, a group of behaviors or activities for each hypothesis was measured. The dependent variables measured were:

1. The degree to which safety and health activities are engaged by the union at the worksite.

2. The extent to which the union (with or without the aid of management) has promoted or developed self-education programs on safety and health.

3. The degree to which the union and management cooperate on safety and health matters at the worksite.

4. The degree to which workers are aware of hazards at the worksite and the degree to which they are avoided or prevented.

These measures allowed a test of the specific hypotheses stated above and also a control for the moderating variables that other researchers have encountered by using more global measures such as overall injury rates (Chelius, 1982; Cooke and Gautschi, 1981; Mendeloff, 1979; Northrup et al., 1978; Shafai-Sahrai, 1973; Smith, 1976; Viscusi, 1979). The focus here was on specific behaviors and activities on the part of the workers and their representatives that can be linked to the training provided by the LERS. These measures were designed to control for the effects of union local size and affiliation to the greatest extent possible, and to focus on the goals of the training.
Sample Selection

The sample used in this study was limited to five specific unions in the state of Ohio. The unions are all local affiliates of National or International unions that have a history of concern for providing safe and healthful working conditions for their members. These unions were selected for several reasons.

The most overriding reason was simply one of control. The activities of central interest to this study are to a great extent a function of National or International policy passed down to the Locals. Therefore, any differences that might be observed in the activities of the local union and its members could be simply a function of the policies of the National or International body. By selecting organizations with this history of concern, added confidence could be placed in any differences that were observed as a function of the LERS training. This is simply because even without the training a strong program at the local level aimed at activities similar to those that the LERS is trying to encourage could be expected.

The National or International bodies represented in this sample were: the United Automobile, Aerospace and Agricultural Implement Workers of America (UAW), the United Rubber, Cork, Linoleum and Plastic Workers of America (URW), the United Steel Workers of America (USWA), the
International Brotherhood of Electrical Workers (IBEW), and the International Union of Electrical, Radio and Machine Workers (IUE).

These particular organizations were selected because of their traditional commitment to occupational safety and health. Berman (1978) discusses the involvement of these unions in safety and health at work. The UAW in its 1973 negotiations with the employers in the auto industry created joint safety committees at the National and Local levels. Also, the UAW won the right to appoint full-time health and safety representatives in plants of one thousand workers or more with wages paid by the employer. The URW has signed agreements with management (even before the passage of the OSH Act) requiring an hourly contribution to a fund set up to study occupational diseases in the rubber industry. The USWA lobbied more than any other union for the passage of the OSH Act with members testifying and pressuring legislators. The IUE has a history of stressing the importance of educating its members in the area of occupational safety and health.

A second, more pragmatic reason for the selection of these particular organizations was the fact that they represented the majority of organizations that had participated in the training offered. This is quite likely the result of their concern for safety and health at the worksite.
Finally, there is a distinct possibility that the National or International affiliation might explain differences in the dependent variables of this study. Therefore, it was desirous to limit, as much as possible, the number of National and International organizations represented in the sample.

The treatment group was selected from LERS records of individuals receiving LERS/OSHA training between October 1, 1978 and June 30, 1980 according to two criteria. First, the National or International affiliation of the trainee must have been one of the five listed above. Secondly, at least one of the local members had to be exposed to six or more hours of LERS/OSHA training. The criterion of six or more hours as a basis for selecting the treatment group is explained above.

In order to maintain the integrity of the study, it was necessary to select a group to perform the methodological function of a control (or perhaps more precisely comparison) group (Cain and Hollister, 1969). Here, as with the treatment group it was not possible to utilize a true random assignment for the comparison group. The locals that make up the comparison group were selected from lists of local affiliates provided by the State bodies of the five National and International unions. If no representative
from a local appeared on the LERS list of individuals receiving training during the time period above, that local was selected as a comparison group.

This process resulted in 59 treatment locals and 60 comparison locals distributed across the five Nationals and Internationals as shown in Table 1. The questionnaires were sent by mail during the end of December, 1982. The overall response rates were 33 (56%) for the treatment group and 24 (40%) for the comparison group for a total of 57 (48%) overall.

TABLE 1

TREATMENT AND COMPARISON LOCALS SELECTED BY NATIONAL/INTERNATIONAL AFFILIATION

<table>
<thead>
<tr>
<th>AFFILIATION</th>
<th>TREATMENT (Trained)</th>
<th>COMPARISON (Untrained)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sent</td>
<td>Returned</td>
</tr>
<tr>
<td>UAW</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>URW</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>USWA</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>IBEW</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>IUE</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>59</td>
<td>33</td>
</tr>
</tbody>
</table>

* One questionnaire in each of these categories was undeliverable but included in the total.
Questionnaire Design and Testing

The data gathering instrument (presented in Appendix A) used in this study was a questionnaire consisting of ninety-two items with responses that can be subjected to statistical testing. In addition, there were several items that requested general information and provided a basis for descriptive statistics to augment the data generated by the testable items. All items were designed to tap relevant information on the worksite behaviors and activities of the local unions. The instrument consisted of four sections each aimed at one of the hypotheses listed above.

Section A of the instrument was designed to tap information depicting the safety and health activities of the local union at the worksite and consisted of thirty-six testable items. Section B, consisting of eight testable items, was aimed at the extent to which the union (with or without the aid of management) promoted or developed self-education programs on safety and health. The twenty-eight testable items of Section C were designed to measure the degree to which the union and management cooperate on safety and health matters at the worksite. The final twenty testable items in Section D were designed to measure the degree to which workers are aware of hazards at the worksite and the degree to which they are avoided or prevented. See Appendix C for a list of these items and the associated level of significance for each.
The use of multiple measures of the constructs served two purposes. First, it provided for a more comprehensive measure of the construct. That is, several behaviors or activities that are indicative of the impact of the training were collected simultaneously in an attempt to support or refute the hypothesis. If a particular item was flawed, then the others could be utilized to draw conclusions from the data. Second, the use of several measures of the same construct allowed a "within-methods" strategy for testing the reliability of the instrument (Jic, 1979).

The items were drawn from three sources. The first source was a questionnaire utilized by Kochan, et. al. (1977) in their study of the effectiveness of union-management safety and health committees. The second source was a questionnaire utilized by Northrup, et. al. (1978) in their study of the impact of OSHA in the aerospace industry. Finally, a number of items were specifically designed for the purpose of this study.

The questionnaire was pretested and revised twice prior to the study. On both occasions local union representatives attending a LERS/OSHA training session were used to pretest the instrument. These individuals were selected because they were representative of the sample to be used in the study but were not part of the sample. This precaution was taken to avoid any premeasure biases that might result. The first pretest involved subjects attending a
summer workshop sponsored by the LERS. Individuals were asked to complete the questionnaire and to provide comments as to any item they found to be unclear. Nineteen usable responses were obtained and analyzed. This process resulted in wording changes both in the instructions and several items. The process also resulted in several format changes designed to clarify the information being sought and to simplify the coding of the returned instruments.

The second pretest was accomplished using local representatives of the URW, also attending a LERS/OSHA seminar. These subjects were again screened to avoid any individual who was slated for the study sample. Participants were again asked to respond to the questionnaire and to provide any comments they wished to the content of the form. The only change that resulted from this analysis was to update the years for which information was requested to the three most previous for which the locals would have records (1978-1980 to 1979-1981).

**Methods of Analysis**

The fact that a choice was made to avoid the use of injury rates in this study imposes the need to utilize nominal and ordinal data. That is, the items on the questionnaire were designed to be answered in either a yes/no format or a simple ranking. The reason for this choice is
one of seeking less contaminated data than has been the case with other research in the arena of occupational safety and health.

There is a tendency to seek higher levels of measurement which has typically led researchers to depend on ratio data, such as injury rates. However, such a dependence on injury rates has led to inconclusive results (Mendeloff, 1979; Smith, 1976). Record-keeping requirements have changed since the enactment of the OSH Act making pre/post comparisons tenuous at best. Further, injury rates experienced by workers appear to be a function of many different factors. A 1975 Interim Report by NIOSH (Cohen, Smith and Cohen, 1975) listed some fifteen factors that potentially have an impact on the overall safety and health experience of employees. An extensive list of such variables is offered by Shafai-Sharia (1973) including management related factors, plant related factors, and employee related factors. Given this, one would be hard pressed to design an experiment that would control for all moderators and rival hypotheses.

These same researchers (Shafai-Sharia, 1973; Cohen et al., 1975) chose to dichotomize measures in their studies into high versus low injury rates in order to control for the confounding variables. However, both of these studies tend to focus on the ends rather than the means of safety and health interventions. In this study, as in the studies
reported by Kochan et. al. (1977) and Northrup et. al. (1978), the focus of analysis is on the behaviors of the employees and their representatives on the job at the plant level, rather than on end measures at the industry level.

A portion of the analysis in this study is descriptive in nature. Every attempt was made to utilize statistical techniques to support the descriptive statistics. The first step in the data analysis was to establish the degree of homogeneity among the Nationals and Internationals represented in the sample. A simple one way non-parametric analysis of variance was done to assess the degree to which the data can be aggregated across National or International affiliation of the local unions in the sample. This was done for both the trained and the untrained groups. The reason for this analysis was simply to rule out the possibility that the observed differences were more likely a function of affiliation than treatment. A similar test was performed for the effects of the size in membership of the responding local unions. Results of these analyses are discussed in detail in Chapter IV on Data Analysis.

To ascertain the impact of the LERS training efforts on the safety and health activities of local unions the Mann-Whitney U test was utilized to assess the significance of the observed differences. As Siegel (1956:116) explains:

When at least ordinal measurement has been achieved, the Mann-Whitney U test may be used to test whether two independent groups have been drawn from the same population. This is one of
the most powerful of the non-parametric tests, and is the most useful alternative to the parametric t test when the researcher wishes to avoid the t test's assumptions, or when the measurement in the research is weaker than interval scaling.

Since this test provides a measure of the significance of any observed differences, conclusions as to the impact of the LERS/OSHA training on the behaviors at the worksite were drawn.

A portion of the data in the study fit into a simple yes/no category. Here differences between the two groups, or within the treatment group were assessed based on the frequencies observed. Frequencies were calculated for yes and no responses and the observed differences interpreted. This is the same format employed by Kochan et. al. (1977), Cohen et. al. (1975), and Shafai-Sahria (1973) in their analyses.

For each of the hypotheses several items were used to tap the same construct. This led to a situation in which several of the items supported the hypothesis while others were inconclusive or even refuted the hypothesis to which they were related. Based on the research design employed here this was expected. Given this fact the analysis at times becomes judgmental in nature. This situation appears to place the researcher in the role of the measuring instrument and thus is subject to the biases of the individual. However, as McGrath, Martin and Kulka (1982:14) point out
...one loses a great deal when one attempts to fashion sound research entirely on the basis of general decision rules routinely applied. Rather, we believe one should retain a very important place for the judgments of the skilled researcher who, at best, will be sensitive to the nuances of both the substantive setting and the research impedimenta; and who, at least, can observe when something stunningly unexpected occurs, and can perhaps stop the churning of the research machine long enough to take a look at it.

When judgment calls are made in the interpretation of the data, explanations of the underlying rationale are provided so as to allow the reader to accept or reject the conclusions posited.
CHAPTER IV
DATA ANALYSIS

Introduction

This chapter covers the process of the data analysis and the conclusions drawn from the analysis. The analysis was accomplished in two steps. First, it was necessary to establish the homogeniety of the sample by determining the extent to which variables not controlled might have affected the results. Two variables, union local size in membership and the national or international affiliation of the local, were examined to ascertain the degree to which they would explain the observed results. Variables that were found to be significant for either size or affiliation, and at the same time reached significance for the comparison versus treatment groups are briefly discussed in this analysis. Variables that reached significance for affiliation or size but not for the comparison and treatment groups, were dropped from the analysis. Likewise, variables that failed to reach significance for the training effects were eliminated from the analysis.
The statistical test used in this part of the analysis was the Kruskal-Wallis one way analysis of variance test. This statistic is a distribution free test used for more than two random samples and designed to determine whether the samples can be thought of as a single combined sample from one population (Hollander and Wolfe, 1973:114). Because the concern focused on deviation between groups in the tests involving affiliation and size, a two-tailed model was used with the significance level for rejection set at \( p < .05 \).

The second and major portion of this analysis centered on the four hypotheses. The statistical test used in this part of the analysis was the Mann-Whitney \( U \) test. This statistic is a distribution-free rank sum test for the hypothesis of no treatment effect. This test was used because there are two random samples with one drawn from a control population and the other from an independent treatment population. The intent was to investigate the presence of a treatment effect that results in a shift of location (Hollander and Wolfe, 1973:67). For this test the null hypothesis was that trained unions do not do more than untrained unions in terms of the variables measured and, thus required a one-tailed analysis. Therefore, the significance level for rejection of the null is set at \( p < .025 \).

In summary, three tests of significance were undertaken on the data collected in this study. A one-way
analysis of variance was done for the effects of both local union affiliation and local union size. The Mann-Whitney U rank sum test was done to establish the effects of the training for the entire sample. All levels of significance for each testable variable and each test are reported in Appendix C.

A portion of the data collected could not be analyzed through the use of statistical tests of significance because of the nominal nature of the data. These data are discussed in descriptive terms in this analysis.

The Impact of Local Union Affiliation

The affiliation of the local unions in this study was limited to five in the sample selection process. This step was taken to provide some control for any effects that national or international policy might have on the variables measured in this study. For example, if a National required its locals to have a specific safety and health mechanism or specific contractual language concerning safety and health, the differences observed in the analysis could be a result of policy rather than the LERS training. Further, there is a possibility that the observed differences could be the result of informal policies of the National or International. As noted, there are five sub-samples consisting of locals from the United Rubber Workers, the United Steelworkers, the United Automobile Workers, the
International Brotherhood of Electrical Workers, and the International Union of Electrical Workers. The number of affiliates of each of these unions and their status as trained or untrained is depicted in Table 2.

**TABLE 2**

RESPONDING LOCAL UNIONS BY NATIONAL/INTERNATIONAL AFFILIATION

<table>
<thead>
<tr>
<th>LOCAL UNION AFFILIATION</th>
<th>USWA</th>
<th>URW</th>
<th>UAW</th>
<th>IBEW</th>
<th>IUE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT (Trained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>19.3</td>
<td>10.5</td>
<td>12.3</td>
<td>10.5</td>
<td>5.3</td>
<td>57.9</td>
</tr>
<tr>
<td>COMPARISON (Untrained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>9</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>10.5</td>
<td>8.8</td>
<td>0.0</td>
<td>15.8</td>
<td>7.0</td>
<td>42.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>11</td>
<td>7</td>
<td>15</td>
<td>7</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>29.8</td>
<td>19.3</td>
<td>12.3</td>
<td>26.3</td>
<td>12.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In total thirteen variables were found to exhibit a significant difference based on the National/International affiliation of the local. Of these only two variables were found to exhibit a significant difference for both the effect of affiliation and comparison versus treatment groups at or beyond the .05 level. Item number 5.1 on the questionnaire, "Does your union have an established safety and
health procedure?", reached a .000 level of significance for affiliation and a .002 level of significance for the treatment effect. This high level of significance was, to some extent, expected. All of the responding USWA and UAW locals and all but one of the URW locals indicated that they had an established procedure. Less than half of the IBEW locals and slightly more than half of the IUE locals reported an established procedure. As pointed out above this may simply be the result of National/International policy. Given the fact that the level of significance is so great for the effect of affiliation, grounds exist for rejection from further analysis. However, as will be discussed in the section on hypothesis one below there is additional evidence that supports retention of this variable for further interpretation.

The second variable to reach significance for both affiliation and training effects was item 20.0 which inquired as to the frequency of Joint Labor/Management meetings. The results indicated that the UAW reported more frequent meetings of the Joint Labor/Management Committee with more than 57 percent reporting that meetings are held at least weekly. Again this is likely a result of International policy. For this reason the variable was rejected from further analysis.

Overall, it appears that the affiliation of the local union has little to do with the safety and health activi-
ties measured in this study. However, there is some
evidence that on selected measures, National/International
policy may explain the observed differences in the re-
sponses.

The Impact of Local Union Size

Another variable that has the potential for affecting
responses of the unions is local union size. Locals with
larger memberships, and therefore greater resources, could
be engaging in more safety and health activities in the
local union, supporting safety and health officers at the
local level or exercising greater power in dealing with
management. Any of these activities, if in fact they ex-
isted, would bias the results of this study. This is es-
pecially true in this study since the treatment group
tended to have larger local unions than the comparison
unions. Therefore, observed differences between trained and
untrained unions may well have been the result of local
union size rather than the training. In fact, this dif-
ference in size is significant at the .005 level using the
Mann-Whitney test.

For the purpose of this analysis the unions were split
into three groups. Local unions with 100 or less members
were classified as small, local unions reporting 101 to
1,000 members were classified as medium, and local unions
reporting more than 1,000 members were classified as large.
This particular classification scheme resulted in 18 unions classified as small, 23 unions classified as medium and 16 unions classified as large. The distribution of locals by size across the treatment and comparison groups is depicted in Table 3.

**TABLE 3**

NUMBER AND PERCENTAGE OF RESPONDING LOCAL UNIONS BY REPORTED MEMBERSHIP SIZE

<table>
<thead>
<tr>
<th>LOCAL UNION SIZE</th>
<th>Treatment (Trained)</th>
<th>Comparison (Untrained)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>Small 0 to 100</td>
<td>6</td>
<td>10.5</td>
<td>12</td>
</tr>
<tr>
<td>Medium 100 to 1,000</td>
<td>15</td>
<td>26.3</td>
<td>8</td>
</tr>
<tr>
<td>Large 1,001 to 10,000</td>
<td>12</td>
<td>21.1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>57.9</td>
<td>24</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .005

Four variables reached significance on both size of membership and the training treatment. Item 8.0(C) which asked whether the Secretary of the local was directly involved in safety and health matters at the worksite was significant at the .028 level for local union size. Here
smaller unions used the local Secretary for safety and health matters significantly more often. At the same time, this variable reached significance for the treatment effect at the .035 level. However, the direction of the effect is the opposite of what was expected. The untrained unions were significantly more likely to involve the local Secretary in safety and health matters at the worksite than were the trained unions. The interpretation made here is that smaller unions assign this duty to the Secretary because of the lack of a safety and health position on their staff. Untrained unions also assign this task to the Secretary because the leadership is not attuned to the importance of safety and health matters. However, given the fact that significance was reached for both local size and treatment effects, this interpretation is tentative at best and, the variable was eliminated from further analysis.

The second variable reaching dual significance was similar to the one discussed above. Item 19.0(A) asked the respondent to indicate whether foremen were involved as management officials on the joint committee. In terms of size, small locals were more likely to have the foremen involved in the joint committee than the larger locals. This result reached a significance level of .05, which is the established cutoff for this test. For the treatment effect the significance level was .013. The untrained unions were more likely to utilize foremen in the joint
committee than the trained unions. The same logic applies here as in the above interpretation. Small locals were more likely to be associated with small management staffs with fewer resources to dedicate to safety and health matters. Therefore, the task of sitting on the joint committee goes to the lower levels of management in the foreman's position. Also, the untrained unions may have been less aware of the need for management representatives with decision making power on the joint committee and, therefore, did not insist on such staffing. Since this variable reached significance on both size and treatment, it was difficult to make an accurate interpretation. Again, the variable was eliminated from further consideration.

The third variable to reach simultaneous significance for both the local union size and treatment effects was item 20.0. This item asked the respondents how often joint labor management meetings were held. The results of the analysis revealed that this variable was significant for both comparisons at the .01 level of significance. This result implies that larger locals tend to have more frequent meetings than smaller locals or, trained unions have more frequent meetings than untrained locals or both. The problem becomes determining which of these variables is the more accurate predictor of meeting frequency. Therefore, the variable was rejected for further analysis.

The final variable that showed significant differences
on both comparisons was item 29.0. This item asked respondents to indicate how many hazards had been reported to management in the last 12 months. The categories for their responses were none, 1 to 10, 11 to 25, 26 to 50 and more than 50. For local union size this result was significant at .050 which is the cutoff for rejection of the null. On the test for differences between treatment and comparison groups, the result was significant at the .025 level again the cutoff for this test. As was the case above, this variable was also eliminated from the rest of the analysis.

The Impact of The LERS Training Effort

The effects of the LERS training efforts was determined by testing the following four null hypotheses.

Ho 1: There is no difference in the amount of involvement of the local union in safety and health activities at the worksite between the local unions that have been exposed to LERS training and those that have not been exposed.

Ho 2: There is no difference in the development of in-plant, self-education programs between local unions that have exposed to the LERS training and those that have not been exposed.

Ho 3: There is no difference in the degree to which local unions cooperate effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices between the local unions that have been exposed to the LERS training and those that have not been exposed.

Ho 4: There is no difference in the degree to which hazards are recognized, avoided and prevented between the local unions that have been exposed to the LERS training and those that have not been exposed.
Each of these hypotheses will be discussed separately in terms of the results of the analysis in the following sections.

Hypothesis One

Of the thirty-seven testable items for hypothesis one, eight resulted in significance levels that allowed the rejection of the null hypothesis.

Item 1.0 asked respondents whether the union had filed any formal complaints with OSHA concerning conditions at the worksite during the last three years. It was thought that local unions that had been trained would file more complaints. The result was in the expected direction and significant at the .003 level. The distribution of responses for Item 1.0 are presented in Table 4.
TABLE 4
RESPONSES TO ITEM 1.0:

In the past three years has the Union filed any formal complaints with OSHA concerning conditions at the worksite?

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Trained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>19</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>57.6</td>
<td>42.4</td>
<td>57.9</td>
</tr>
<tr>
<td>COMPARISON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Untrained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>20.8</td>
<td>79.2</td>
<td>42.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>24</td>
<td>33</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>42.1</td>
<td>57.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U statistic significant at p = .003

Items 1.1(A) through 1.1(C) asked the respondents to indicate the number of complaints filed in the years 1979, 1980 and 1981. Again, trained unions tended to file more formal complaints in all three years than the untrained unions. The differences were significant for 1979 and 1980 at the .001 and .021 levels of significance respectively. The level of significance for the difference in 1981 approached significance at the .034 level. Thus, it appears that the LERS training had an impact on the number of times the local unions utilized their rights to file complaints.
under the OSH Act. The number of reported OSHA complaints filed for these three years is presented in Table 5.

**TABLE 5**

RESPONSES TO ITEMS 1.1, 1.2, AND 1.3:

Approximately how many OSHA complaints were filed by the Union in 1979, 1980, and 1981?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16 21 22</td>
<td>21 21 21</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>8 5 4</td>
<td>2 2 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5 3 4</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2 0 0</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0 3 1</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0 0 2</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1 0 0</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1 0 0</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0 1 0</td>
<td>0 0 0</td>
<td></td>
</tr>
<tr>
<td>TOTAL *</td>
<td>38 32 26</td>
<td>7 7 7</td>
<td></td>
</tr>
</tbody>
</table>

* Totals are calculated by summing the number filed times the number of locals reporting that number filed.

Mann-Whitney U Statistic significant at \( p = .001 \) for 1979, \( p = .021 \) for 1980, and \( p = .034 \) for 1981.

One interesting observation that can be made from the responses to the above items is the fact that it appears that the total number of complaints filed declined in each of the three years. While it is impossible to draw valid
conclusions from the existing data one can speculate that the decline is the result of less recognized hazards at the worksite resulting from the complaints filed in the previous year(s).

Item 3.1 ascertained whether the local unions were aware of the Technical Assistance (TA) service offered by LERS. This service was provided to the locals for the purposes of advice and assistance in safety and health matters. There was no significant difference in the extent that local unions were aware of this service. However, there was a significant difference at the .006 level for item 3.1 which asked respondent locals whether they had ever used this service. Although trained and untrained unions were equally aware of the TA service, trained unions were much more likely to use the service. The use of this service implies a greater involvement of the local in the safety and health activities at the worksite. The distribution of responses for Item 3.1 is presented in Table 6.
TABLE 6
RESPONSES TO ITEM 3.1:

Has your Union ever requested the Technical Service offered by the Labor Education and Research Service of the Ohio State University?

<table>
<thead>
<tr>
<th>TREATMENT (Trained)</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>10</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td>Percent</td>
<td>32.3</td>
<td>67.7</td>
<td>57.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPARISON (Untrained)</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>1</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Percent</td>
<td>4.3</td>
<td>95.7</td>
<td>42.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>11</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>Percent</td>
<td>20.4</td>
<td>79.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .006

Item 4.0 showed a significant difference favoring the rejection of the null at the .001 level. This item asked respondents whether the local union had requested contractual language or changes concerning safety and health matters in the last round of contract negotiations. Trained unions asked for more contractual agreements than the untrained unions. The distribution of responses for Item 4.0 is presented in Table 7 below.
TABLE 7
RESPONSES TO ITEM 4.0:

In the last round of contract negotiations, did your local union request contractual language or changes concerning safety and health matters?

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Trained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>25</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td>Percent</td>
<td>80.6</td>
<td>19.4</td>
<td>56.4</td>
</tr>
<tr>
<td>COMPARISON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Untrained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>10</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>41.7</td>
<td>58.3</td>
<td>43.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>35</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>Percent</td>
<td>63.6</td>
<td>36.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .001

Item 4.1 asked whether the requests were granted. While there was not a significant difference in the number of times the requests were granted further analysis revealed that 53.7 percent of the trained unions asked for and received contractual agreements compared to 13.8 percent of the untrained unions. Thus, it can be assumed that training had an impact on the degree to which local unions formalize the safety and health matters through the contract at the worksite.

Item 5.0(A) through 5.0(D) inquired about the type of safety and health procedures that existed at the worksite.
While there were no significant differences in the type of procedures, there was a significant difference in the existence of such a procedure. Item 5.1 which reached a significance level of .002 revealed that trained unions overall were more likely to have an established safety and health procedure, but this item must be rejected because it also reached significance on the affiliation measure. However, if the locals reported in item 5.1 that a procedure existed, they were asked in item 5.3 whether the procedure was a result of member(s) attending training session(s) offered by the LERS. Nine of the thirty locals in this category or 30 percent attributed the local's procedure to the LERS training and thus weakened the case for the conclusion that the observed difference was the result of affiliation alone. The conclusion drawn from these results is that the training has a positive impact on the local union establishing a safety and health procedure, if one is not dictated at the National or International level.

Items 8.0(A) through 8.0(G) tapped the extent to which certain local union officials were directly involved in safety and health matters at the worksite. There was only one significant difference in the list of local union officials involved between trained and untrained locals. Item 8.0(F) asked whether the safety and health officer of the local was involved and exhibited a significant difference at the .006 level indicating trained locals were more
likely to have this official involved. Another way of interpreting this result is that trained unions were simply more likely to have such a position at the local level. Either interpretation supports the conclusion that the training had an impact on the amount of involvement of the union at the local level. The response rates for Item 8.0(F) are reported in Table 8.

| TABLE 8 |
| RESPONSES TO ITEM 8.0(F): |
| Is the Safety and Health Officer of the Local directly involved in safety and health matters at your worksite? |

<table>
<thead>
<tr>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT (Trained)</td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>Percent</td>
</tr>
<tr>
<td>96.6</td>
</tr>
<tr>
<td>COMPARISON (Untrained)</td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>Percent</td>
</tr>
<tr>
<td>69.2</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>37</td>
</tr>
<tr>
<td>Percent</td>
</tr>
<tr>
<td>88.1</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .006

The final significant difference found under hypothesis 1 was for item 11.0. This item asked the respondent the number union members who had been trained in safety and health concerns in the last three years. Trained unions
reported significantly more members trained during this period compared to untrained unions. The result reached a .015 level of significance and implies that the LERS training had an impact on the amount of training provided to union members at the worksite. The response rates for Item 11.0 are reported in Table 9 below.

**TABLE 9**
RESPONSES TO ITEM 11.0:

Approximately how many union members have been trained in safety and health concerns in the last three years?

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>NONE</th>
<th>1 to 5</th>
<th>6 to 10</th>
<th>11 to 20</th>
<th>MORE THAN 20</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT (Trained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>2</td>
<td>20</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>6.1</td>
<td>60.6</td>
<td>6.1</td>
<td>12.2</td>
<td>15.2</td>
<td>57.9</td>
</tr>
<tr>
<td>COMPARISON (Untrained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>11</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>45.8</td>
<td>25.0</td>
<td>12.5</td>
<td>4.2</td>
<td>12.5</td>
<td>42.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>13</td>
<td>26</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>22.8</td>
<td>45.6</td>
<td>8.8</td>
<td>8.8</td>
<td>14.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .015

In conclusion, the null was rejected for hypothesis 1. It was concluded that the LERS training efforts had a positive impact on the amount of involvement of the local union
in safety and health activities at the worksite.

**Hypothesis Two**

Of the seven testable items for hypothesis two, only one reached a significance level that allowed for the rejection of the null. In addition, one descriptive item supported the impact of LERS on the extent to which the union promoted self-education programs on safety and health.

Item 13.0 asked respondents whether the union had initiated any programs designed to educate workers in the area of worksite hazards in the last three years. The difference here was significant at the .012 level with trained unions indicating that they had initiated more programs. The response rates for Item 13.0 are presented in Table 10.
TABLE 10
RESPONSES TO ITEM 13.0:

In the past three years has your union initiated any programs designed to educate workers in the area of worksite hazards?

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>YES</th>
<th>NO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT (Trained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>21</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>63.6</td>
<td>36.4</td>
<td>57.9</td>
</tr>
<tr>
<td>COMPARISON (Untrained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>33.3</td>
<td>66.7</td>
<td>42.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>29</td>
<td>28</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>50.9</td>
<td>49.1</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .012

However, when asked in item 13.1 whether there had been an increase in the amount of time devoted to education in worksite hazards in the last three years, the result failed to reach significance. These results appear somewhat contradictory in interpretation. How could the local union initiate new programs, and at the same time, fail to reach significance in terms of the amount of time devoted to education in worksite hazards? One conclusion that seemed to make sense was that local unions that were trained by LERS instituted new or redesigned training programs over the three year period but did not change the amount of time
dedicated to these programs. Item 13.2 asked those respondents of the treatment group and who responded affirmatively to either item 13.0 or item 13.1 whether the reported changes were the direct result of member(s) attending a training session(s) offered by LERS. In response, 16 of the 25 local unions, or 76.2 percent, indicated that the changes in local union education efforts in the area of worksite hazards were a direct result of the LERS training.

The remaining items under hypothesis two tapped the extent to which the local union utilized different communications media to disseminate information concerning safety and health matters at the worksite. None of these reached significance for trained versus untrained unions.

Given the fact that the trained unions reported instituting self-education programs for workers to a greater extent than untrained unions, and that a strong majority of these local unions credited LERS training directly, the null was rejected for hypothesis two. The conclusion drawn is that the LERS training efforts did have a positive impact on local union efforts to promote or develop self-education programs on safety and health.

**Hypothesis Three**

Twenty-eight testable items were included in the questionnaire for hypothesis three. Of these items only four reached an acceptable level of significance for rejection
of the null. However, two of these items, 19.0(A) and 20.0 also were significant for the effects of size, and thus were rejected from the analysis. The remaining two items were from the cluster of items which asked the respondents to disclose their perceptions of how their members in the local rated safety and health issues in relation to other common collective bargaining issues. These items were included in the questionnaire under the assumption that trained local unions would rate safety and health as more important than traditional issues to a greater extent than would the untrained locals. In turn this greater concern would lead to more pressure on management to engage in safety and health related activities at the worksite. Yet, for both items that reached significance the result was in the opposite direction expected.

For item 16.0(A) the trained local union respondents reported their member's concern for safety and health as less important than wages. This result was significant at the .011 level. In addition, when asked in item 16.0(E) how the members rated safety and health compared to seniority the result was significant at the .018 level, as seniority was the more important issue. The response rates for Item 16.0(A) and Item 16.0(E) are reported in Tables 11 and 12 respectively.
TABLE 11
RESPONSE RATES FOR ITEM 16.0(A):

How would your members rate safety and health compared to wages?

<table>
<thead>
<tr>
<th>SAFETY AND HEALTH ISSUES ARE:</th>
<th>MORE IMPORTANT</th>
<th>EQUALLY IMPORTANT</th>
<th>LESS IMPORTANT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TREATMENT</strong> (Trained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>1</td>
<td>16</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>3.0</td>
<td>48.5</td>
<td>48.5</td>
<td>57.9</td>
</tr>
<tr>
<td><strong>COMPARISON</strong> (Untrained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>5</td>
<td>13</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>20.8</td>
<td>54.2</td>
<td>25.0</td>
<td>42.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>6</td>
<td>29</td>
<td>22</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>10.5</td>
<td>50.9</td>
<td>38.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .011
TABLE 12
RESPONSE RATES FOR ITEM 16.0(E):

How would your members rate safety and health compared to seniority?

<table>
<thead>
<tr>
<th>SAFETY AND HEALTH ISSUES ARE:</th>
<th>MORE IMPORTANT</th>
<th>EQUALLY IMPORTANT</th>
<th>LESS IMPORTANT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT (Trained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>2</td>
<td>15</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>Percent</td>
<td>6.1</td>
<td>45.5</td>
<td>48.5</td>
<td>57.9</td>
</tr>
<tr>
<td>COMPARISON (Untrained)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Percent</td>
<td>29.2</td>
<td>41.7</td>
<td>29.2</td>
<td>42.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>9</td>
<td>25</td>
<td>23</td>
<td>57</td>
</tr>
<tr>
<td>Percent</td>
<td>15.8</td>
<td>43.9</td>
<td>40.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mann-Whitney U Statistic significant at p = .018

It would seem that if the training intervention had had any impact, the local unions would rate safety and health as more important over other issues than untrained unions. One explanation here might be that the respondent's perception colors the results. That is, if the respondents saw safety and health issues as being important (as a result of experiencing the training) but were faced with the traditional emphasis on the issues of wages and seniority issues in intraorganizational bargaining processes, they would respond as was the case in this analysis. However,
there was no evidence in this study to support this contention and, therefore, the null hypothesis cannot be rejected.

To reiterate, the conclusion was that the LERS training efforts had no discernible impact on the importance that union members assigned to safety and health issues compared to other collective bargaining issues. If this is in fact the case then no concrete conclusions can be drawn as to the impact of the training on the extent to which the union and management cooperate on safety and health matters at the worksite.

Hypothesis Four

Hypothesis four was included in this study to test the impact of the LERS training on the mandate of the OSH Act. This mandate stated that the efforts of OSHA should result in the recognition, avoidance and prevention of hazards at the worksite. Twenty testable items were included in the questionnaire for the purpose of testing this hypothesis.

Only one item reached significance for the effect of training. Item 29.0 asked respondents how many hazards had been reported to management in the last twelve months was significant at the .025 level. However, it should be noted that this level was the cutoff for assigning a significant difference in this study. Further, this item was also significant at $p = .046$ for the effect of local union size in
terms of membership. Given these results it is not possible to reject the null on any evidence for hypothesis four.

It could be that this lack of support may be a function of the training not being diffused adequately to the local membership because of lack of contact with the trained member(s) or simply a lack of sufficient time. However, the conclusion that is drawn here is that the LERS training efforts have had no impact on the extent to which hazards are recognized, avoided and prevented at the worksite.

**Implications of Analysis Results**

From the results reported above, it appears that the LERS training efforts have had some impact on the activities of workers at the worksite but have not been completely successful. The training appears to have a positive impact on the involvement of local unions in safety and health matters at the worksite and the degree to which these local unions engage in self-education processes. On the other hand, there is no evidence garnered here to support the positive impact of the LERS training efforts on cooperative efforts of labor and management and the recognition, avoidance and prevention of hazards at the worksite. The implications of these results and alternative explanations are offered in the following chapter.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study had two major purposes. First, to examine the impact of the LERS/OSHA training efforts, and second to attempt to develop a methodology for assessing the impact. Each of these purposes are discussed in this chapter in light of the results reported in the previous chapter.

As with most studies of the impact of OSHA, this study concludes with mixed results. While several of the hypotheses of this study are supported by the results, others are not. It appears that the LERS/OSHA training may have had some impact on the safety and health activities and experiences of workers, but the exact extent remains undetermined. This chapter will serve to examine the results of this study and to discuss the implications that spring from these results. Also, this chapter offers suggestions to LERS and other organizations engaged in similar programs regarding the future directions that should be pursued.

In terms of the methodology used in this study, several typical problems of evaluation research were faced and
addressed. The methodology utilized here is less like other methods used in the past for public policy concerns, and more like traditional training evaluations utilized by organizations to evaluate the impact of specific training interventions. In both types of evaluation, several inherent problems are persistent and cannot be eliminated given current research methods. Yet, in this study some of the traditional problems were eliminated by the combination of methodologies. This chapter discusses the success of the method utilized along with the observed strengths and weaknesses, and also offers suggestions for improvements in future studies.

Finally, this chapter focuses on future directions for OSHA in reaching the goals of the original legislation at the macro national policy level and the micro plant and worker level. Suggestions are offered concerning the targeting of future training efforts as well as future evaluative efforts.

Study Results

This study focused on the impact of the specific training efforts of the LERS under the New Directions grant. The basic question was simply, "what impact have these efforts had?" Based on the results, the best answer that can be given is that the impact has been minimal. While it appeared that there had been some impact on the
involvement of the local union in safety and health activities at the worksite and the development of in-plant, self-education programs, these results must be viewed with caution.

It is possible that these observed differences could simply be artifacts rather than true differences. More specifically, the local unions that opted to expose their members to the LERS training sessions could easily have been more safety and health conscious than the comparison locals in the study. This greater level of interest may only explain the decision to attend and participate in the training. That is, locals that were more safety and health conscious would be more likely to both opt for the training and have established internal mechanisms for greater involvement in safety and health activities and self-education programs. In short, causality is difficult, if not impossible, to prove with these results. This is a function of the totally post-hoc nature of the study. If before and after measures had been available for the locals in this study, then a more convincing case for the impact of the LERS/OSHA training could be made.

However, the methodology utilized here has merit, and the results cannot be totally explained by potential effects of methodological faults. Since the level of significance for rejection was set at the conservative level of \( p = .025 \), any conclusions posited are strongly
The training did appear to have some impact on the internal safety and health efforts of local unions, and therefore, appeared to have merit on that basis.

At the same time, the training appeared to have no impact on the degree to which local unions cooperate effectively with management in establishing joint labor-management programs, and the extent to which hazards were recognized, avoided and prevented at the worksite. These findings of no difference cannot be explained as a function of the artifact in the methodology discussed above, because there is no difference between trained and untrained locals. Therefore, the argument that there is a predisposition of one group for the observed result is moot because there was no significant difference in the observed results.

The fact that the first two hypotheses were supported, while the second two were not, leads to speculation. The first two hypotheses dealt with the activity of local unions internally and results indicate that the training had a significant impact on those activities. The third hypothesis dealt with the degree to which management was involved with the local union in safety and health activities. The fourth dealt with the degree to which hazards were recognized, avoided and prevented. In other words, hypotheses one and two dealt with independent action on the part of the local union while hypotheses three and four
dealt with cooperative efforts between the local union and management. It is quite possible that this need for cooperation in the latter two hypotheses explains the apparent lack of impact of the training.

This lack of impact may be further explained by the fact that LERS typically trained unions to the exclusion of management. For instance, even if local union members were properly trained, management's resistance at the worksite may preclude the training's impact. In other words, even though worker representatives were well trained in the areas of establishing joint labor-management programs and methods for recognizing, avoiding and preventing hazards, management's failure to cooperate at the worksite results in a lack of training transfer. In fact, if this is the case, then it appears that either training must to be provided to management, or that management must be offered an economic incentive, or both. These concepts are further developed later in this chapter.

Analysis of the Methodology

The inconclusive results of this study were not totally unexpected. Given the nature of the study and the experimental design imposed in post-hoc evaluative research of this type, inconclusive results tend to be the norm,
rather than the exception. Problems with interpretation of the results were further exacerbated by the type of data collected and the method of collection.

Because this study was conceived after the training had occurred, a post-hoc approach was required. Therefore, any attempt to collect pre-measures as a point of comparison was impossible. In addition, a true random assignment of subjects to the treatment and comparison groups was blocked. The potential impact of non-random selection was reflected in the artifact effects discussed above. The fact that a particular local union was assigned to the treatment or comparison group was a function of self-selection. That is, if a local chose to participate in the training, then it was eliminated for consideration as a comparison group, and vice versa.

Problems were also encountered in the variables and instrumentation used to measure the impact of the LERS training interventions. The measures used in this study were self reports of activities and perceptions that were gathered through a questionnaire. Thus, uncontrolled biases in the data were more likely. The problem here was that what the locals report doing and what they actually did may differ. The use of a mailed questionnaire may have had inherent problems also. It was impossible to control the conditions under which the instruments were completed; the
knowledge of the subject matter possessed by the person(s) completing the instrument; and the particular subjects who chose to return the instrument.

Although problems discussed above may exist, this methodology appears to have some merit, especially when compared to past methodologies utilized to determine the impacts of training and other OSHA efforts. The futility of using injury and illness rates as a measure of training was discussed in Chapter 3. While it would be ideal to have hard, reliable data for the results of the training, no such measure currently exists. The extraneous variables that could potentially impact these measures are legion and thus, interpretations of any observed differences are highly suspect. On the other hand, OSHA has evaluated the impact of the training efforts of LERS and similar organizations on the basis of "institutional competency" and "self-sufficiency." Neither of these measures address the effectiveness of the training. These measures are loosely defined. Even when organizations receive high marks on both, there is no evidence that the institutional efforts have had any real impact on the safety and health experiences of the workers. The fact that an institution is self-sufficient and judged to be competent does not necessarily reflect an impact through the training.

The behavioral level of measurement used in this study focused on the actual activities of the local unions in
terms of the goals posited by LERS. This level of measurement allowed the examination of differences in the behavior of trained versus untrained locals, and provided the ability to draw conclusions concerning the effect that the training may have had on any of the observed differences. Further, this type of measurement allowed for the observation of the direct effects of the training on behaviors rather than the indirect effects measured through injury and illness rates. With this methodology it was possible to determine the impact of the training directly, and therefore provided support for continuation, elimination or modification of programs. Therefore, this methodology provided an efficacious approach, albeit flawed, for assessing the impact of the LERS training efforts. This is not to imply that the ultimate method of evaluation has been found. Recommendations for future studies are presented next.

Recommendations

The intent of this study was not to be perjorative in assessing the impact of the LERS training efforts, but rather to be prescriptive in terms of what should be done in the future. Since roughly 95 percent of the original grantees training in this area are self-sufficient and currently provide training, it is imperative that the results of this study be incorporated into their future efforts.
The recommendations in this section focus on two areas. First, the problems of training effectiveness evaluation will be discussed. This section focuses on the underlying need for training evaluation and the methodologies for achieving it. Second, the future directions that LERS might want to pursue in targeting their training efforts to achieve a greater impact on the safety and health experience of workers will be discussed.

Evaluation of Training

Many organizations provide services to their publics as a function of the public policy that initiated the organization. In the case of LERS, the OSH Act provides the basis for the training activities offered. Unfortunately, as with most public policy interventions, proper evaluation of the training's impact is also lacking in the efforts of LERS and OSHA.

In discussing the apparent lack of proper evaluation of social action programs and the lack of success of evaluations that have been attempted, Cain and Hollister, (1969:6-7) point out:

...existing evaluations of social action programs, (and we are including our own), have fallen short of meeting the standards possible within the disciplines of the social sciences. The reasons for these shortcomings are easy to identify. The programs typically involve investments in human beings, a relatively new area of empirical research in economics. They are aimed at such social and political goals as equality and election victories, as well as economic
objectives concerning, say, income and employment. They often attempt to deliver services on a large enough scale to make a noticeable impact upon the community. And at the same time, they are expected to provide a quasi-experimental basis for determining what programs ought to be implemented and how they ought to be run.

The LERS training efforts under the New Directions grant fall into Cain and Hollister's (1969) category of social action programs. Typically there are two broad types of evaluation strategies available for the purpose of evaluating social action programs. The first of these is process evaluation which is the approach utilized by OSHA in evaluating the activities of grantees under New Directions. Process evaluation attempts to establish the degree to which "a particular program intervention or treatment was implemented according to its stated guidelines" (Freeman and Bernstein, 1975:12). OSHA's emphasis on the institutional competency and self-sufficiency measures for grantees is a prime example of this process evaluation approach.

The second type of evaluation available to policy makers is impact or outcome evaluation.

Here the concern is with gauging the extent to which a program effects a change in the desired direction. It implies that there are a set of pre-specified, operationally-defined goals and criteria of success, and measured impact refers to movement toward the desired objectives (Freeman and Bernstein, 1975:13).

With this type of evaluation the whole concept of the program is brought into question, and it is certainly possible that a project might be judged
to be a success or a failure irrespective of how well it was being administered (Cain and Hollister, 1969:8).

The study reported here falls into the outcome or impact evaluation category. The intent of this study was to determine the impact of the LERS/OSHA training on the safety and health activities of the local unions exposed. The goals of LERS were pre-specified but not operationally defined. This study began by operationalizing these goals in terms of the reported behaviors and activities of individuals and the local union organizations. Then, comparisons were made between trained and untrained local unions for the purpose of determining the impact of the LERS/OSHA training efforts. Unfortunately, and as pointed out above, this approach still leaves much to be desired because of the lack of strict controls and adequate pre-measures.

For the future it is recommended that the two approaches of process evaluation and impact evaluation be combined for evaluating the impact of the training efforts of LERS and similar organizations. By combining these two approaches a comprehensive evaluation can be realized and the resulting policy decisions can be based on more solid ground.

Ideally, all evaluations should contain both process and impact components. That is, for purposes of policy determination, as well as for contributions to basic social science knowledge, the most appropriate evaluation is one that includes both process and impact. A comprehensive evaluation is one in which appropriate techniques and ideas have been brought to bear so that it is
possible (1) to determine whether or not a program, intervention or treatment is carried out as planned, and (2) to assess whether or not the program resulted in changes or modifications consistent with the intended outcomes (Freeman and Bernstein, 1975:13).

In any training situation the need for systematic evaluation is critical. However, systematic evaluation is elusive to program administrators. Many practical and ethical problems exist when designing training evaluations. For example, the data may be unreliable, the changes generated may be too subtle to measure accurately, or it may simply be unethical to deny training for the sole purpose of creating a control group. In addition, both individual training administrators and organizations have resisted training evaluation for fear that the program may be assessed as ineffective which may result in an elimination of resources. In fact, Wildavsky (1980) implies that the terms organization and evaluation, may be contradictory. However, it is essential that OSHA, LERS and similar organizations adopt a "self-evaluating" stance in terms of the effectiveness of the training efforts.

The ideal organization would be self evaluating. It would continuously monitor its own activities so as to determine whether it was meeting its goals or even whether these goals should continue to prevail... Evaluators must become agents of change acting in favor of programs as yet unborn and clients that are unknown (Wildavsky, 1980; 441-442).

The need for evaluation rests on both economic and humanistic rationale. Limited resources are made available
for OSHA to accomplish its mission and must be utilized in the most effective and efficient manner possible. Further, it is quite likely that the majority of individuals in this country believe that workers should not suffer injuries, illnesses or death as a normal function of their employment. Therefore, it is imperative that efforts be made to find the best method for providing safe and healthful working conditions. This can only be done if a systematic evaluation of the training efforts is instituted in the most rigorous form possible and also with a commitment by administrators to policy decisions based on the results.

To achieve this end, OSHA, LERS and similar organizations should continue their present approach of record-keeping in terms of the number of individuals trained, the extent and content of the training, and the cost per training unit. In addition, these organizations should institute a data collection process that allows for conclusions as to the actual impact of the training. For these purposes, it is recommended that a time series design with comparable measures taken at several points prior to and after training be utilized. The measures utilized in this analysis should be comprehensive and include interview as well as observational data in addition to the type of data gathered in this study. It would also be helpful to gather data from
the managements involved to determine the impact of their attitudes toward safety and health activities at the worksite.

Such an approach will allow conclusions to be drawn regarding the impact of the training, the time frame in which the training takes effect, and the persistence of the training effects over time. Also, such a design would allow researchers and policy makers to control for the majority of the threats to the validity of the results that plagued this and other studies. By combining these approaches OSHA should be able to assess the training's impact at a macro level and determine the extent to which the training dollar is wisely invested.

This approach would prove helpful to those organizations that provide training at the micro level. If a particular training program or approach is not producing the desired results, it could be modified or eliminated. If, on the other hand, a particular program appears to have a significant impact on the goals of OSHA, the program can be utilized more widely.

Finally, it is recommended that reaction level data be gathered for the purpose of evaluating specific training programs. If reaction level data are gathered following training, as a part of the data collection process, individual programs can be modified and made more effective.
Reaction data should include measures of the trainee's assessment of program content, instructor competency, relevance of the material, and so on.

The Viability of the Training Approach

It seems that OSHA has been searching for the best method that would allow it to meet its original mandate since its inception with little luck. For the most part OSHA has depended on some variant of standards enforcement and inspection to reach its goals. However as pointed out in Chapter 2 this approach has simply not provided the impact desired. Several other approaches have been suggested but, in general, have been rejected for one reason or another.

Viscusi (1979) has argued for the implementation of an injury tax to realize the goals of OSHA. This approach would place severe economic pressure on employers to provide safe and healthful working conditions by heavily taxing them for injuries suffered by workers. While from a rational economic viewpoint this may make sense, there are several practical problems that would preclude success. For example, the tax would have to be viewed as a larger expense by the employer than the cost of hazard abatement. Therefore, the tax would have to be determined only after the cost for abatement had been calculated. Also, placing a value on an injury, disability or death is simply not
possible. Finally, it is quite likely that legislation supporting such an approach would never become a reality.

Smith (1976 and 1979) has argued that employees should be provided complete information about the potential risks inherent in a particular job so that they could demand an adequate wage to offset the risk. Again this argument holds only under the assumption of a perfect labor market. If employees had perfect knowledge of job related hazards and risks (which is unlikely), they may, in fact, demand higher wages. However, if this was the case, it is likely that employers would place the jobs in more favorable labor markets or that economically depressed employees would take the jobs. In the first case, more jobs leave the U.S. economy; the second is reminiscent of the conditions prior to work related safety and health legislation in this country. Even if this approach was utilized, it would require training similar to what is currently being provided by LERS.

Overall training appears to have merit for achieving the goals of the OSH Act. Training for workers and employers was provided for in the original legislation as a component of the overall strategy for realizing the goals of OSHA. Comprehensive training would not only provide the knowledge to allow the labor markets to function more effectively, but also to initiate attitudinal changes on the part of both labor and management. As pointed out in Chapter 2 the major proportion of injuries and illnesses
suffered by workers are due to undetectable hazards. Training would enlighten the workers and managements as to the cause of these injuries and illnesses, and also aid them in avoiding future accidents.

As demonstrated in this study, training seems to have a positive impact on some activities of people at work. Training also holds promise for strengthening the relationship between labor and management in joint safety and health efforts. Training offers the employer a non-punitive avenue to safety and health. It also offers the employee the opportunity to actively participate in safety and health on the job. Unfortunately, for whatever reason, training has not been utilized as a vehicle for the provision of safe and healthful working conditions in this country to the extent possible. However, training is a viable approach to realizing the goals set down by the framers of the OSH Act and should be pursued as such.

Future Directions in Training

Earlier in this chapter a point was made that the observed impact of the training could be an artifact. This provides speculation regarding the targeting of future training. If the trained unions in this study did have a predisposition to participate in the training, then program content may be a secondary issue. The primary issue becomes attracting those local unions with less concern for safety
and health issues to the training programs. This would involve an expansion of the process evaluation of the training efforts of LERS and similar organizations. Since the training does have some measurable impact on the safety and health activities of workers, as many workers as possible should be exposed to the training. Although OSHA currently tracks the absolute number of workers trained and the cost per trainee, more data are needed. It is recommended that OSHA institute methods for identifying organizations with workers and managers in need of this training and make efforts to provide the training.

Currently OSHA identifies high risk industries and organizations, and targets them for inspection. Using the same mechanism OSHA could encourage workers and managers at these worksites to participate in the training programs offered by LERS and similar organizations. This macro needs analysis approach could substantially increase the impact of training efforts.

A second recommendation is that OSHA and the grantees begin to offer joint training for labor and management. Given the fact that the current approach seems to have little impact on the safety and health activities that require joint efforts, this innovation seems to have merit. Joint training holds the promise of providing the realization of the goals of the original legislation. However,
joint training alone would have little impact without some incentive for both labor and management to engage in such training.

Currently OSHA is providing such an incentive through its Voluntary Protection Program (VPP). Programs such as TRY and STAR are designed to recognize and reward employers who meet guidelines set down by OSHA concerning safety and health practices at the worksite. These programs provide employers relief from general schedule inspections if they qualify. To qualify employers must demonstrate that certain safety and health activities are practiced at the worksite, including the involvement of labor organizations in safety and health activities. If joint training and subsequent activities were tied to a similar relief from general schedule inspections, it is more likely that both management and labor would engage the training and, that the intended outcomes of the training would be realized.

Final Comments

The results of this study provide a beginning for future research and policy making. In general, it appears that the LERS/OSHA training efforts have had some impact on stated goals of the New Directions program. However, as with any exploratory study, there remains a great need for further research and study. As pointed out in the preliminary pages of this study, the task of providing safe and
healthful working conditions is indeed monumental. The goal of providing a society totally free from work-related injuries and illnesses is, at least currently, impossible. However, it is possible to provide an environment that is better than that presently experienced by the working men and women of this country.

While the exact impact of the LERS/OSHA training efforts is unclear, it is clear that some positive ground has been gained. OSHA, its agencies and contractors, needs to move ahead in the quest for safer and healthier working conditions by eliminating ineffective programs, expanding effective programs, and instituting new programs. Research efforts to determine the impact of these programs are essential to the goals of the legislation and must continue.
APPENDIX A

QUESTIONNAIRE

UNION SAFETY OFFICIAL

Your Name______________________________________________

Your Official Union Title___________ Local#__________

Name of Your Worksite____________________________________

Work Phone #(______)________________________

How many active members are there in your local?___________

What is the name and title of the management representative
who you primarily deal with on safety and health issues?

Name____________________________________ Job Title___________

A. IN THIS SECTION WE ARE INTERESTED IN THE SAFETY AND HEALTH
ACTIVITIES ENGAGED IN BY THE UNION.

1.0 In the past three years has the union filed any formal
complaints with OSHA concerning conditions at the
worksite?

Yes____  No____

1.1 If yes, approximately how many were filed in:

A) 1979____  B) 1980____  C) 1981____

2.0 Are you aware of the free consultation service offered
for safety and health by the Ohio Industrial Commission?

Yes____  No____
Appendix A (continued)

2.1 In the past three years has the union requested this service?

   Yes___  No___

2.2 If yes, approximately how many times was this service requested in:

   A) 1979____  B) 1980____  C) 1981____

3.0 Are you aware of the Technical Assistance Service offered by the Labor Education and Research Service of The Ohio State University?

   Yes___  No___

3.1 Has your union ever requested this service?

   Yes___  No___

3.2 If yes, approximately how many times was this service requested in:

   A) 1979____  B) 1980____  C) 1981____

4.0 In the last round of contract negotiations, did your local union request contractual language or changes concerning safety and health matters?

   Yes___  No___

4.1 If yes, were these requests granted by management?

   Yes___  No___
Appendix A (continued)

5.0 Does your union have any of the following safety and health procedures?

   Yes____ No____

B) An internal Union Safety/Health Committee only.
   Yes____ No____

C) An individual union representative that meets with management.
   Yes____ No____

d) An internal Union Safety Committee that meets with management.
   Yes____ No____

5.1 Does your union have an established safety and health procedure?
   Yes____ No____

5.2 If yes, approximately when was this procedure established?
   Year 19____

5.3 Was this procedure established as a result of members attending training session(s) offered by the Labor Education and Research Service at the Ohio State University?
   Yes____ No____
Appendix A (continued)

6.0 How many union people are involved directly in the administration of safety and health concerns at your worksite?

- 0 __ 4 __ 8
- 1 __ 5 __ 9
- 2 __ 6 __ 10 or more
- 3 __ 7

7.0 About how much of your time do you devote to safety and health matters?

- Full-time position __
- Between 76 and 100 percent __
- Between 51 and 75 percent __
- Between 26 and 50 percent __
- Around 25 percent or less __

8.0 Please check the union officials who are directly involved in safety and health matters at your worksite. (check all that apply)

- A) President of Local __
- B) Vice President of Local __
- C) Secretary of Local __
- D) Steward(s) __
- E) Business Agent __
- F) Safety and Health Officer of the Local __
- G) Worker's Compensation Officer of the Local __
Appendix A (continued)

9.0 Approximately how often do union meetings on safety and health matters take place?

___ Two or more times a week
___ About once a week
___ About twice a month
___ About once a month
___ Every two or three months
___ Only as needed
___ Never

10.0 How is safety and health information communicated to the membership? (check all that apply)

a) Reports at local meetings
   Yes___ No___

b) Use of local newsletter
   Yes___ No___

c) Postings on bulletin boards
   Yes___ No___

11.0 Approximately how many union members have been trained in safety and health concerns in the last three years?

___ None
___ 1 to 5
___ 6 to 10
___ 11 to 20
___ More than 20
Appendix A (continued)

12.0 How often are safety and health inspections of the work site made?

___ More than once a week
___ About once a week
___ About once every two weeks
___ About once a month
___ Every two or three months
___ About once a year
___ Never
Appendix A (continued)

B. IN THIS SECTION WE ARE INTERESTED IN THE EXTENT TO WHICH
THE UNION (WITH OR WITHOUT THE AID OF MANAGEMENT) HAS
PROMOTED OR DEVELOPED SELF-EDUCATION PROGRAMS ON SAFETY
AND HEALTH.

13.0 In the past three years has your union initiated any
programs designed to educate workers in the area of
worksite hazards?

Yes____ No____

13.1 Has there been an increase in the amount of time devoted
to education in worksite hazards in the last three
years?

Yes____ No____

13.2 If you answered yes to either of the above two questions
was this action a result of members attending a training
session offered by the Labor Education and Research
Service of the Ohio State University?

Yes____ No____

14.0 Which of the following does the union use to disseminate
information concerning safety and health matters at the
worksite? (check all that apply)

A) Memos to stewards

B) Special safety and health newsletters

C) Use of a portion of the local newsletter

D) Posting on bulletin boards

E) Regular union meetings
C. IN THIS SECTION WE ARE INTERESTED IN THE DEGREE TO WHICH
THE UNION AND MANAGEMENT COOPERATE ON SAFETY AND HEALTH
MATTERS AT THE WORKSITE.

15.0 Does a Joint Labor-Management Committee (or similar
joint mechanism) exist at your worksite?

Yes  No

15.1 If yes, would you say that the mechanism came into being
as a result of union members attending a training
session(s) offered by the Labor Education and Research
Service of the Ohio State University?

Yes  No

15.2 If no, (in question 15.0) is any attempt being made to
start such a mechanism?

Yes  No
16.0 How would your local union members rate safety and health compared to the other issues below?

TO OUR LOCAL UNION MEMBERSHIP: (check one in each comparison)

A) __ More Important Than:
   Safety and Health is __ About Equally Important to: Wages
   __ Less Important Than:

B) __ More Important Than:
   Safety and Health is __ About Equally Important to: Grievance Procedures
   __ Less Important Than:

C) __ More Important Than:
   Safety and Health is __ About Equally Important to: Vacation Provisions
   __ Less Important Than:

D) __ More Important Than:
   Safety and Health is __ About Equally Important to: Manning Requirements
   __ Less Important Than:

E) __ More Important Than:
   Safety and Health is __ About Equally Important to: Seniority
   __ Less Important Than:

F) __ More Important Than:
   Safety and Health is __ About Equally Important to: Production Standards
   __ Less Important Than:

G) __ More Important Than:
   Safety and Health is __ About Equally Important to: Compensation
   __ Less Important Than:
Appendix A (continued)

17.0 How would you rate management's concern for safety and health matters at the worksite?

___ A) Extremely concerned
___ B) Somewhat concerned
___ C) Minimal concern
___ D) Not concerned at all

18.0 In your dealings with management on safety and health matters, do you feel: (select one choice)

___ That both labor and management will benefit from joint efforts to limit hazards.
___ That only one side will benefit while the other will lose in joint efforts to limit hazards.

19.0 Indicate which management officials are directly involved in the joint committee. (check all that are directly involved)

___ A) Foreman
___ B) Head Production Manager
___ C) Personnel Manager
___ D) Labor Relations Director
___ E) Safety Officer

20.0 How often are joint labor/management meetings held?

___ Once a week or more
___ About twice a month
___ About once a month
___ Every two or three months
Appendix A (continued)

21.0 To what degree would you say management openly shares information such as injury and illness rates, chemical compounds and employee medical records with the union?

___ All information is openly shared.
___ Not all information is shared but a reasonable amount above what is legally or contractually required is shared.
___ Only information that is legally or contractually required is shared.
___ Less information than is legally or contractually required is shared.
___ No information is shared.

22.0 To what degree can the union influence the decisions of management on safety and health matters at the work site?

___ Decision making power is greater for the union than for management.
___ Decision making power is equally shared by the union and management.
___ Decision making power is greater for the management than the union.

23.0 Is lost time of union members attending safety and health committee meetings compensated by:

___ A) management
___ B) the union

24.0 Is lost time of union members for walk-around inspections compensated by:

___ A) management
___ B) the union
Appendix A (continued)

25.0 In your opinion, how much authority has the management safety representative(s) been given by top management to agree to actions concerning safety and health issues? (check only one)

___ A) He/She can make all decisions on his/her own.

___ B) He/She can make most decisions, but must consult with his/her supervisor(s) on some.

___ C) He/She can make some decisions on his/her own, but must consult with his/her supervisor(s) on most.

___ D) He/She can't decide anything without consulting his/her supervisor(s).
Appendix A (continued)

26.0 Please indicate how often your union has used each of the actions during the past 12 months to get management to take corrective actions on safety and health matters.

A) Threaten to file a complaint with OSHA, if the problem was not corrected.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Never</th>
<th>4 to 6 times</th>
<th>7 to 9 times</th>
<th>10 or more times</th>
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<tbody>
<tr>
<td>1 to 3 times</td>
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<tr>
<td>10 or more times</td>
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</table>

B) Threaten to file a grievance, if the problem was not corrected.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Never</th>
<th>4 to 6 times</th>
<th>7 to 9 times</th>
<th>10 or more times</th>
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<tbody>
<tr>
<td>1 to 3 times</td>
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<tr>
<td>10 or more times</td>
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</table>

C) Threaten to go to arbitration, if the problem was not corrected.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Never</th>
<th>4 to 6 times</th>
<th>7 to 9 times</th>
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D) Threaten to take the issue up in contract negotiations, if the problem was not corrected.

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<th>Frequency</th>
<th>Never</th>
<th>4 to 6 times</th>
<th>7 to 9 times</th>
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</table>

E) Offer to work with management to find an acceptable solution to the problem.

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<tr>
<th>Frequency</th>
<th>Never</th>
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<th>7 to 9 times</th>
<th>10 or more times</th>
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**Appendix A (continued)**

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**D. IN THIS SECTION WE ARE CONCERNED WITH THE DEGREE TO WHICH WORKERS ARE AWARE OF HAZARDS AT THE WORKSITE AND THE DEGREE TO WHICH THEY ARE AVOIDED OR PREVENTED.**

---

27.0 How often do each of the following occur? (check one space for each event)

A) A member files a grievance on a safety issue.

<table>
<thead>
<tr>
<th></th>
<th>About once</th>
<th>About every</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a day</td>
<td>2 to 3 months</td>
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<tr>
<td></td>
<td>a week</td>
<td>once or twice a year</td>
</tr>
<tr>
<td></td>
<td>a month</td>
<td>Never</td>
</tr>
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</table>

B) Rank and file members make suggestions for safety improvements to you.

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<thead>
<tr>
<th></th>
<th>About once</th>
<th>About every</th>
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<tbody>
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<td></td>
<td>a day</td>
<td>2 to 3 months</td>
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<tr>
<td></td>
<td>a week</td>
<td>once or twice a year</td>
</tr>
<tr>
<td></td>
<td>a month</td>
<td>Never</td>
</tr>
</tbody>
</table>

C) A member makes a verbal complaint to you about a safety issue.

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<tr>
<th></th>
<th>About once</th>
<th>About every</th>
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<tbody>
<tr>
<td></td>
<td>a day</td>
<td>2 to 3 months</td>
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<td></td>
<td>a week</td>
<td>once or twice a year</td>
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<td>a month</td>
<td>Never</td>
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</table>
Appendix A (continued)

28.0 In general, how closely do the workers keep in touch with you on the status of safety and health hazards at the worksite?

___ Very closely
___ Not too closely
___ Not at all

29.0 In the past 12 months, about how many hazards have been reported to management?

___ More than 50
___ 26 to 50
___ 11 to 25
___ 1 to 10
___ None

30.0 If you reported hazards to management in the past 12 months, about what percentage were acted on in some way? (protective equipment, limit exposure, elimination of hazard, etc.)

___ 76 to 100 percent
___ 51 to 75 percent
___ 26 to 50 percent
___ 1 to 25 percent
___ None
Appendix A (continued)

31.0 Please indicate below the appropriate category that depicts activities that took place after a hazard was reported to management.

A) Exposure to the hazard was eliminated.
   ___ Never  ___ Sometimes  ___ Always

B) The amount of exposure to the hazard was limited.
   ___ Never  ___ Sometimes  ___ Always

C) Specific training on the hazard was offered.
   ___ Never  ___ Sometimes  ___ Always

D) Protective equipment was provided.
   ___ Never  ___ Sometimes  ___ Always

E) Training on the use of protective equipment was provided.
   ___ Never  ___ Sometimes  ___ Always

F) The hazard was totally removed from the worksite.
   ___ Never  ___ Sometimes  ___ Always
Appendix A (continued)

32.0 Once each of the following hazards has been brought to the attention of management at your worksite, how long does it usually take management to take action?

A) General housekeeping:

<table>
<thead>
<tr>
<th>We don't have</th>
<th>Within a</th>
<th>Never</th>
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</thead>
<tbody>
<tr>
<td>have this hazard</td>
<td>week or two</td>
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<tr>
<td>Within a day</td>
<td></td>
<td></td>
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<tr>
<td>or two</td>
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<td></td>
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</tbody>
</table>

B) Machine or equipment guarding:

<table>
<thead>
<tr>
<th>We don't have</th>
<th>Within a</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have this hazard</td>
<td>Week or two</td>
<td></td>
</tr>
<tr>
<td>Within a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or two</td>
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</table>

C) Noise:

<table>
<thead>
<tr>
<th>We don't have</th>
<th>Within a</th>
<th>Never</th>
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<tbody>
<tr>
<td>have this hazard</td>
<td>week or two</td>
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</tr>
<tr>
<td>Within a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or two</td>
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</table>

D) Dust and fumes:

<table>
<thead>
<tr>
<th>We don't have</th>
<th>Within a</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>have this hazard</td>
<td>week or two</td>
<td></td>
</tr>
<tr>
<td>Within a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or two</td>
<td></td>
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</tbody>
</table>
Appendix A (continued)

33.0 If management takes no action on a reported hazard, what is the next step usually taken by the union?

___ File a complaint with OSHA
___ Go to arbitration
___ File a grievance
___ Attempt to talk with someone in management

Thank you very much for your cooperation and time. Would you please be sure that you have responded to all the questions as it is important that we have your responses.
Dear __________:

The concern for a safe and healthful work environment has long been a concern of the American labor movement. This concern for the welfare of the workers and their unions existed long before the passage of the Occupational Safety and Health Act and is stronger today than it has ever been. However, the valiant efforts of Labor alone to provide acceptable working conditions has not resulted in a truly safe and healthful work environment.

The Labor Education and Research Service of The Ohio State University has shared this concern. We have attempted to aid you in your efforts by obtaining grants and providing training to union members on many topics. We are concerned with the effectiveness of our efforts and thus are having an objective detailed study conducted by Professor Ed Yost at Ohio University. In order to accomplish this study, we need to solicit the aid of selected locals in the state. Your local has been selected as a critical part of this study and we are asking you to help us in this effort. Because of the small number of locals that qualify for this study, it is imperative that your local participate fully. Your responses can make a significant difference in the future of LERS training and the working conditions of your brothers and sisters.

The enclosed questionnaire will be STRICTLY CONFIDENTIAL as the only identification used in the study will be by your International affiliation. Please complete the questionnaire, being sure to respond to all items as truthfully and accurately as possible. Be sure to complete the section on your name and address as we need this information to identify and follow up on non-respondents ONLY. The questionnaire should be completed by the local member with the greatest responsibility and knowledge of your local's safety and health activities. Once you have completed the form, please return it in the enclosed envelope to Professor Ed Yost at Ohio University as he will be performing the statistical analysis.
Appendix B (continued)

Remember, please, your response is critical to the success of this study as well as the future grants for LERS to conduct more training. You can and will have an impact on this important issue. If you should have any questions, please feel free to call Ed Yost at (614) 594-6335 or me at (614) 422-8157.

Thank you for your time and effort on this project.

Sincerely,

C. J. Slanicka
APPENDIX C

LEVELS OF SIGNIFICANCE FOR QUESTIONNAIRE ITEMS

HYPOTHESIS ONE: There is no difference in the amount of involvement of the local union in safety and health activities at the worksite between the local unions that have been exposed to the LERS training and those that have not.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>LOCAL UNION AFFILIATION (_2)</th>
<th>LOCAL UNION SIZE IN MEMBERSHIP (_3)</th>
<th>TREATMENT VS COMPARISON GROUPS (_4)</th>
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<td>0.333</td>
<td>0.003**</td>
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<td>0.001**</td>
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HYPOTHESIS TWO: There is no difference in the development of in-plant, self-education programs between local unions that have been exposed to the LERS training and those that have not been exposed.

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**HYPOTHESIS THREE:** There is no difference in the degree to which local unions cooperate effectively with management in establishing joint labor-management programs for the amelioration of plant safety and health practices between the local unions that have been exposed to the LERS training and those that have not been exposed.

<table>
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<th>ITEM NO.</th>
<th>LOCAL UNION AFFILIATION</th>
<th>LOCAL UNION SIZE IN MEMBERSHIP</th>
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### Appendix C (continued)

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Appendix C (continued)

HYPOTHESIS FOUR: There is no difference in the degree to which hazards are recognized, avoided and prevented between the local unions that have been exposed to the LERS training and those that have not been exposed.

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<th>ITEM NO.</th>
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Appendix C (continued)

1. Item numbers correspond to items on the questionnaire in Appendix 1. Items 1.0 through 12.0 are for the test of hypothesis 1, items 13.0 through 14.0(E) are for the test of hypothesis 2, items 15.0 through 26.0(E) are for the test of hypothesis 3 and items 27.0(A) through 33.0(D) are for the test of hypothesis 4.

2. Kruskal-Wallis one way analysis of variance for local union National/International affiliation. Two tail test with rejection at p < .05.

3. Kruskal-Wallis one way analysis of variance for local union size in membership. Two tail test with rejection at p < .05.

4. Mann-Whitney U test for treatment effects or training. One tail test with rejection at p < .025.

* Significant result at p < .05.

** Significant result at p < .025.

# These items reached significance on the treatment effects and either affiliation or membership or both and were eliminated from further analysis.
LIST OF REFERENCES


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Cronan, C. Chief: Division of Training and Educational Development, OSHA Training Institute, Des Plains, Ill.; Personal Interview; Aug. 8, 1986.


Slanicka, C. J. Proposed Amendments to LC 74-202. Labor Education and Research Service. The Ohio State University, Columbus, Ohio; 1975.


