

PB275599



PSYCHOLOGICAL, BEHAVIORAL, AND ORGANIZATIONAL FACTORS AFFECTING COAL MINER SAFETY AND HEALTH

Technical Report BSC-5
July, 1976



Behavioral Services Center

© Westinghouse Electric Corporation

Prepared for the National Institute for Occupational Safety and Health

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2.	3. Recipient's Accession No. PB275399
4. Title and Subtitle PSYCHOLOGICAL, BEHAVIORAL, AND ORGANIZATIONAL FACTORS AFFECTING COAL MINER SAFETY AND HEALTH		5. Report Date July 1976	
7. Author(s) C. Michael Pfiefer, Jr., Joseph L. Stefanski, and Craig B. Grether		8. Performing Organization Rept. No. BSC-5	
9. Performing Organization Name and Address Behavioral Services Center Westinghouse Electric Corporation Columbia, Maryland		10. Project/Task/Work Unit No.	
		11. Contract/Grant No. HSM-99-72-151	
12. Sponsoring Organization Name and Address National Institute for Occupational Safety and Health 4676 Columbia Parkway Cincinnati, Ohio 45226		13. Type of Report & Period Covered	
		14.	
15. Supplementary Notes			
16. Abstracts <i>This report represents the first wide-scale survey of the coal industry with regard to psychological, behavioral, and organizational variables which may have an impact on safety and health in the mines. Fifteen pairs of mines were selected for inclusion in the survey, with one high-accident mine and one low-accident mine in each pair. Responses of personnel in high-accident mines were compared with responses of personnel in low-accident mines. Separate survey instruments were developed for use with each of seven distinct samples: underground miners, above-ground miners, union officials, foremen, safety directors, managers, and miners' wives. Survey results indicated that a number of alternative strategies are worth exploring in an attempt to further reduce accidents and illness in the coal industry. These strategies include organizational development techniques, work organization, training, behavioral programs to increase the frequency of safe job behaviors, redesign of safety equipment, improvements in company safety programs, and programs to reduce occupational stress.</i>			
17. Key Words and Document Analysis. 17a. Descriptors			
Industrial hygiene Coal mining Epidemiology Sociopsychological surveys Accident investigations Industrial accidents Accident prevention Occupational diseases Preventive medicine Safety engineering		Industrial psychology Industrial management Stress (psychology) Human factors engineering	
17b. Identifiers/Open-Ended Terms			
Industrial health programs Safety programs			
17c. COSATI Field/Group		06/J	
18. Availability Statement Release unlimited		19. Security Class (This Report) UNCLASSIFIED	21. No.
		20. Security Class (This Page) UNCLASSIFIED	22. Price PC A 14 MF A01

PSYCHOLOGICAL, BEHAVIORAL, AND ORGANIZATIONAL
FACTORS AFFECTING COAL MINER SAFETY
AND HEALTH

By

C. Michael Pfeifer, Jr., Joseph L. Stefanski, and Craig B. Grether

July 1976

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Biomedical and Behavioral Sciences
Cincinnati, Ohio 45202

Contract No. HSM 99-72-151

Westinghouse Behavioral Services Center
Columbia, Maryland

UNCLASSIFIED

i a

ACKNOWLEDGMENTS

This report on the effect of psychological, behavioral, and organizational factors on safety and health in the coal industry was funded by the National Institute for Occupational Safety and Health (NIOSH). Mr. Joseph Hurrell, Technical Project Officer for the contract, participated and lent assistance in all phases of the project. Dr. William H. Kroes served as Technical Project Officer in early stages of the project and provided considerable input to the design of the survey instruments. Dr. Bruce Margolis also served as Co-Project Officer during initial project stages. Dr. Marilyn Hutchinson provided assistance in obtaining necessary mine accident data.

The editors wish to thank a number of organizations and individuals without whose help completion of the report would have been impossible. We wish to thank the personnel of the Mining Enforcement and Safety Administration (MESA) Data Center, and in particular, Mr. Leonard Larsen, who provided accident statistics that were required for the selection of participating mines. We wish to thank Mr. Herschel Potter and his staff for assisting in the selection of particular mines to be included in the survey. We wish to thank officials of the United Mine Workers of America (UMWA) who helped in promoting miner participation as well as in locating retired miners to serve as interviewers. Particular recognition is due to Mr. Mike Trbovich, Vice President of the UMWA, Mr. Bernard Aaronson, executive assistant, and to a number of UMWA District officials including Mr. Richard Carter, Mr. Ivan White, Mr. Jack Perry, and Mr. John Gusek. We also wish to express appreciation to UMWA local officials, and officials of the Progressive Mine Workers, the Southern Labor Union, and the Redstone Workers Association. Sincere thanks are also due to all of the retired miners, their wives and co-workers, who helped in collecting survey data, and to all of the miners and their wives who generously gave their time in completing survey instruments. Recognition is also due to management officials at all participating mines, who made their facilities available for conducting the survey and who also gave the time required to complete survey instruments themselves.

A number of consultants have helped at various stages of the project. These include Dr. Helen Lewis, Dr. Ronald Althouse, Mr. George Judy, and Dr. Rex Lucas. We sincerely appreciate the help and encouragement they have provided.

Many Westinghouse Behavioral Services Center personnel have toiled long and hard in the completion of this report. Special recognition is due Ms. Randee Hartwell who coordinated the preparation of many drafts of survey instruments and the draft of the final report. Other staff members who assisted include Ms. Judy Craig, Ms. Wilma Bell, Ms. Beth Thurman, and Ms. Ginny Huff. Thanks are also due to Dr. Thomas Tuttle and Mr. Dennis Reed who assisted in data collection, and to Ms. Monica Schaeffer who assisted in survey development.

ABSTRACT

This report represents the first wide-scale survey of the coal industry with regard to psychological, behavioral, and organizational variables which may have an impact on safety and health in the mines. Fifteen pairs of mines were selected for inclusion in the survey, with one high-accident mine and one low-accident mine in each pair. Responses of personnel in high-accident mines were compared with responses of personnel in low-accident mines. Separate survey instruments were developed for use with each of seven distinct samples: underground miners, above-ground miners, union officials, foremen, safety directors, managers, and miners' wives. Survey results indicated that a number of alternative strategies are worth exploring in an attempt to further reduce accidents and illness in the coal industry. These strategies include organizational development techniques, work organization, training, behavioral programs to increase the frequency of safe job behaviors, redesign of safety equipment, improvements in company safety programs, and programs to reduce occupational stress.

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGMENTS	ii
ABSTRACT.	iii
LIST OF FIGURES	vii
LIST OF TABLES	viii
INTRODUCTION.	1
METHODOLOGY	3
MINE SELECTION AND PAIRING	3
DEVELOPMENT OF SURVEY INSTRUMENTATION	8
DATA COLLECTION.	14
DATA ANALYSIS.	16
RESULTS	17
MINER CHARACTERISTICS AND BACKGROUND INFORMATION	17
Underground Miners.	17
Above-ground Miners	20
Union Officials	23
Foremen	24
Safety Directors.	25
Management.	27
Miners' Wives	28
Summary and Discussion.	30
ATTITUDES TOWARD SAFETY AND ACCIDENT CAUSES.	32
Overall Mine Safety	32
Miners' Wives' Perceptions of Mine Safety	32
Number of Accidents Witnessed	34
Importance to the Company of Safety Practices	34
Importance of Safety to Miners.	38
Causes of Accidents	38
Summary	42
MAJOR PROBLEMS IN THE MINE	44
GENERAL COMPANY ATTITUDES.	44
Safety vs. Production	44
Management Attitudes Toward Miners.	47
Foremen Attitude Toward Miners.	47
Summary	49
GENERAL MINER ATTITUDES.	49
Personal Characteristics of Miners.	49
Internal vs. External Control	52
Fatalism.	53
Resistance to New Safety Procedures and Ideas	53
Miners' Attitudes as Accident Causes.	53
Summary	55

TABLE OF CONTENTS (Continued)

	<u>Page</u>
PHYSICAL AND STRESS-RELATED PSYCHOLOGICAL PROBLEMS.	55
Physical, Psychological Ailments	56
Use of Medicines, Tobacco, and Alcohol	58
Wives' Problems of Living.	61
Summary.	62
SAFETY AND HEALTH EQUIPMENT	63
Need for Safety and Health Equipment	63
Frequency of Inspection of Personal Protective Devices	66
Getting Miners to Use Safety Equipment	66
Disciplinary Actions Taken Against Workers Not Using Required Equipment.	66
Summary of Items Related to Safety and Health Equipment	68
USE OF AVAILABLE HEALTH PROGRAMS.	69
TRAINING.	69
Adequacy of Training	69
Source of Knowledge About Safety and Health Problems	71
Training Techniques Currently Employed	74
Availability of Safety Training.	74
Summary of Items Related to Training	74
SAFE JOB BEHAVIOR OF MINERS AND FOREMEN	77
Safety Behaviors of Miners	77
Other Job Behaviors of Miners.	78
Personal Safety Behaviors.	80
Foreman Behavior	83
Responsibility When Safety Procedures Are Not Followed.	84
Influence of Personnel on a Worker's Safety Behavior.	86
Summary.	86
JOB SATISFACTION.	88
Job Characteristics of Miners.	89
Opportunities for Intrinsic Reward	89
Job Satisfaction as Reported by Wives.	92
Husband's Career	95
Decision-Making Responsibility	96
Summary.	96
COMPANY SAFETY PROGRAMS'	104
Percentage of Safety Director's Time Spent in the Mine.	104
Safety Budget.	104
Approval of Work Processes	105
Consideration of Safety in Purchasing Equipment.	105
Approval of Newly Installed Equipment.	105
Sources of New Ideas About Safety and Health	105
Hindrances to Safety Program	107
Training Required for Safety Directors	107
Incentives Used in Promoting Worker Safety	107
Family or Community Efforts for Safety	111
Disciplinary Actions Imposed on Unsafe Miners.	111

TABLE OF CONTENTS (Continued)

	<u>Page</u>
Hazard Reporting Systems	111
Responsibility for Accident Investigation.	112
Special Programs for Increasing Safety	112
Suggested Changes by Safety Directors.	112
Changes Suggested by Union Officials for a Safer Mine.	114
Summary.	114
PERCEPTIONS OF OUTSIDE ORGANIZATIONS.	115
Unions	115
Length of Unionization	115
Activity of Rank and File Members.	117
Safety as a Bargaining Tool.	117
Bureau of Mines.	117
State Mining Bureaus	119
Frequency of Inspections	119
Government Pressure.	119
Family and Community Effects on Safety	119
Summary.	123
SUMMARY AND RECOMMENDATIONS	125
ORGANIZATIONAL DEVELOPMENT TECHNIQUES.	125
WORK ORGANIZATION.	127
TRAINING	128
PROGRAMS TO INCREASE THE FREQUENCY OF SAFE JOB BEHAVIORS	129
IMPROVEMENTS IN COMPANY SAFETY PROGRAMS.	130
REDESIGN OF SAFETY EQUIPMENT	131
PROGRAMS TO REDUCE OCCUPATIONAL STRESS	131
FINAL NOTE	132
REFERENCES.	135
APPENDIX A - Underground Miner Survey	136
APPENDIX B - Above-Ground Miner Survey.	163
APPENDIX C - Union Officials Survey	185
APPENDIX D - Foreman Survey	201
APPENDIX E - Safety Director Survey	227
APPENDIX F - Management Survey.	249
APPENDIX G - Miners' Wives Survey	275
APPENDIX H - Instructions for Interviewers.	291
APPENDIX I - Coding Categories Utilized in Classifying Mine Personnel	303

LIST OF FIGURES

	<u>Page</u>
Figure 1. Outline of Questionnaire Topics	11

LIST OF TABLES

	<u>Page</u>
Table 1. Geographic Distribution of Mines	5
Table 2. Summary of Mines Selected for Inclusion in Survey	7
Table 3. Age of Underground Miners.	18
Table 4. Particular Shift Worked: Underground Miners . .	18
Table 5. Age of Above-Ground Miners	20
Table 6. Particular Shift Worked: Above-Ground Miners. .	21
Table 7. Age of Union Officials	23
Table 8. Age of Foremen	24
Table 9. Particular Shift Worked: Foremen.	25
Table 10. Education Level of Foremen	26
Table 11. Age of Safety Directors.	27
Table 12. Age of Managers.	28
Table 13. Age of Miners' Wives	29
Table 14. Mean Ratings of Overall Mine Safety.	33
Table 15. Mean Ratings of Importance to the Company of Safety Practices	36
Table 16. Mean Ratings of Importance to Miners of Safety Practices.	39
Table 17. Mean Ratings of Causes of Accidents.	40
Table 18. Mean Ratings of Causes of Accidents as Reported by Miners' Wives	42
Table 19. Major Problems in the Mine	45
Table 20. Company Attitudes Toward Safety.	46
Table 21. Mean Ratings of Management Attitudes Toward Miners	48

LIST OF TABLES (Continued)

	<u>Page</u>
Table 22. Mean Ratings of Foremen Attitude Toward Miners	48
Table 23. Mean Ratings of Personal Characteristics of Miners	51
Table 24. Internal-External Orientation.	52
Table 25. Mean Ratings of Miners' Attitudes as Accident Causes	54
Table 26. Mean Ratings of Wives' Physical and Psychological Ailments	56
Table 27. Mean Ratings of Husbands' Physical Ailments. . .	57
Table 28. History of Husbands' Illnesses	59
Table 29. Mean Responses Indicating Use of Medicines, Tobacco, and Alcohol	60
Table 30. Mean Responses Indicating Wives' Problems. . . .	61
Table 31. Mean Responses Indicating Need for Safety and Health Equipment	64
Table 32. Mean Scores Indicating Reasons for Not Using Safety and Health Equipment.	65
Table 33. Disciplinary Actions Taken	67
Table 34. Reasons for Not Using Health Programs.	70
Table 35. Mean Ratings of Adequacy of Miner Training . . .	72
Table 36. Mean Ratings of the Adequacy of Alternative Sources of Knowledge About Safety and Health Practices.	73
Table 37. Use of Alternative Safety Training Techniques. .	75
Table 38. Availability of Initial Safety Training.	76
Table 39. Availability of Continuing Safety Training . . .	76
Table 40. Mean Ratings of the Frequency of Alternative Safety Behaviors of Miners	78

LIST OF TABLES (Continued)

	<u>Page</u>
Table 41. Mean Ratings of the Frequency of Other Job Behaviors of Miners	79
Table 42. Mean Ratings of the Frequency of Personal Safety Behaviors.	81
Table 43. Mean Ratings of the Frequency of Foreman Behavior.	82
Table 44. Responsibility When Safety Procedures and Policies Are Not Followed.	85
Table 45. Influence of Personnel on a Worker's Safety Behavior.	87
Table 46. Mean Ratings of Job Characteristics of Miners .	90
Table 47. Mean Ratings of the Opportunities for Intrinsic Reward.	91
Table 48. Mean Ratings of Wives' Satisfaction with Husband's Job.	93
Table 49. Husbands' Likes with Regard to Job.	94
Table 50. Impediments to Husbands' Obtaining Desired Jobs.	97
Table 51. Decision-Making Responsibility for Setting Production Goals.	98
Table 52. Decision-Making Responsibility for Making Safety Inspections.	99
Table 53. Decision-Making Responsibility for Approving or Disapproving Equipment Purchases	100
Table 54. Decision-Making Responsibility for Shifting Workers to Less Hazardous or Healthier Jobs . .	101
Table 55. Decision-Making Responsibility for Planning and Organizing Work	102
Table 56. Decision-Making Responsibility for Work Crew Safety	103

LIST OF TABLES (Continued)

	<u>Page</u>
Table 57. Mean Ratings of the Contribution of Alternative Sources of New Ideas About Safety and Health	106
Table 58. Mean Ratings of the Degree to which Alternative Factors Hinder the Safety Program	108
Table 59. Training Required for Safety Directors. . . .	109
Table 60. Incentives Used in Promoting Safety	110
Table 61. Disciplinary Actions Imposed on Unsafe Miners.	113
Table 62. Responsibility for Accident Investigation . .	113
Table 63. Mean Ratings of the Extent of Alternative Union Activities.	116
Table 64. Mean Ratings of the Activity of Rank and File Union Members.	118
Table 65. Characteristics of Bureau of Mines Inspectors.	120
Table 66. Characteristics of State Mining Inspectors. .	121
Table 67. Frequency of Inspections.	122
Table 68. Mean Ratings of the Amount of Government Pressure in Alternative Areas	124

INTRODUCTION

Underground coal mining is the most hazardous industry in the United States. The National Safety Council reported an average of more than 30 disabling injuries per million work hours (National Safety Council, 1974, 1975). Historical trends in the past 25 years for fatal accidents in bituminous coal mines indicate that there has been almost no change in the number of fatalities per million man hours worked, and in recent years there has been almost no change in the number of fatalities per million tons of coal produced (Theodore Barry & Associates, 1972).

Compared with most types of work, coal mining involves an inordinate number of natural hazards. One must work with heavy, complicated equipment beneath tons of earth in a severely constricted, poorly illuminated, noisy environment. Many mines have a methane gas problem, some are susceptible to flooding, and all have dust. Any one of these factors is enough to cause increased accident rates.

Accident rates and safety hazards, however, do not provide a complete picture of the problem. Many workers who die or are disabled as a result of mining are victims of pneumoconiosis or "black lung". As of September 1972, 12.4% (7,035 out of the 56,731) of the coal miners examined under the Appalachian Laboratory for Occupational Respiratory Diseases (ALFORD) program were found to have evidence of pneumoconiosis (Shoub & Kroes, 1973). It is clear that health hazards, as well as safety hazards have a major effect on the well-being of the mining population. It seems evident that these conditions are not necessarily due to the lack of technological advances. Recent developments in longwall and shortwall mining techniques, improved design of mining equipment, and personal protective devices have all been directed toward the improvement of the coal mine work environment. Yet, little marked improvement in safety and health performance has been realized. The International Labor Office noted that "...the level of accidents seems to have reached a plateau and is stubbornly resistant to the usual methods of lowering it" (International Labor Office, 1976). Consequently, new approaches must be entertained.

Recently, researchers have turned to the investigation of the relationship between human processes and safety and health practices. A growing body of evidence (Tuttle, Grether, Liggett and Killian, 1973; Pfeifer, Schaeffer, Grether, Stefanski & Tuttle, 1974; Tuttle, Wood, Grether & Reed, 1974) indicates that psychological and behavioral factors, e.g., knowledge, attitudes, motivation, and work practices, have a direct impact on worker safety and health. The Coal Mines Committee of the International Labor Office has also called for renewed efforts in the behavioral area. Specific suggestions included a general safety strategy for safe working over a given period, participation of workers in promoting safety activities, programs to encourage workers to conform strictly to safety rules, and national standards for training and retraining (International Labor Office, 1976).

The present investigation is intended to provide more information about the behavioral aspects of safety by analyzing the relationship between accident statistics and a variety of attitudinal and motivational variables. General topic areas investigated include biographical and background information, attitudes toward safety and accident causes, physical and psychological problems of miners and their wives, job satisfaction, attitudes toward safety and health equipment, training, company safety programs, and many more. Responses of personnel in high-accident mines were compared with responses of personnel in low-accident mines. In this way, empirical, quantitative data are provided with regard to the relationship of attitudinal and motivational variables with accident history statistics.

Previous investigations of psychological, behavioral, and organizational factors operating in the coal industry have often been inferential and anecdotal. Case studies, in-depth interviews with small numbers of mine personnel, and similar techniques have been employed. While these studies have provided valuable information, it is hard to generalize results because of the limited samples employed. Often all respondents participating in the studies have been drawn from a single geographic area. The current survey includes respondents from each of nine states, representing all major coal producing areas in the United States. Attitudes and opinions of more than one thousand individuals (including underground miners, above ground miners, union officials, foremen, safety directors, managers, and miners' wives) have been measured. The data presented are statistical summaries of the responses of these individuals, not subjective, non-quantifiable general impressions drawn from a limited number of interviews.

In summary, this report represents the first wide-scale survey of the coal industry with regard to behavioral variables which may have an impact on safety and health in the mines. As such, it is a step toward providing the foundation for implementing needed changes in organizational policies and work practices in the coal industry.

METHODOLOGY

The study was designed to compare responses to a comprehensive safety and health attitude survey of personnel working in mines with an exceptionally high accident rate to responses of personnel working in mines with an exceptionally low accident rate. The description of methodology can be divided into four sections. The first section describes the selection of mines. Subsequent sections deal with survey instrument construction, data collection, and data analysis.

MINE SELECTION AND PAIRING

Fifteen pairs of mines were selected for inclusion in the survey, with one high-accident mine and one low-accident mine in each pair. Mines were classified as either high-accident mines or low-accident mines on the basis of an injury cost rate, computed according to the methodology described by Petersen (1971). The injury cost rate makes use of four categories of accidents in arriving at a modified cost for accidents per million man-hours worked. The number of accidents in each category is multiplied by a severity or average cost factor. The sum of these four factors is then divided by the total number of manhours worked (expressed in terms of millions of man-hours), to provide a measure of accident experience which includes both accident frequency and accident severity. The four categories of accidents, together with the average cost factors for each category, are as follows:

- 1) Temporary total disability (average cost factor = 1)
- 2) Permanent partial disability (average cost factor = 4)
- 3) Fatality (average cost factor = 40)
- 4) Permanent total disability (average cost factor = 80)

An example will illustrate the computation of the injury cost rate. Let us assume that over a four year period a mine had the following accident record: 43 temporary total disabilities, 5 permanent partial disabilities, 1 permanent total disability, and 2 fatalities. Over that same four-year period, a total of 4,774,983 man-hours were worked. Computation of the injury cost rate would be as follows:

$$\begin{aligned} \text{Injury cost rate} &= \frac{1(\# \text{temporary total disabilities}) + 4(\# \text{permanent partial disabilities}) + 40(\# \text{fatalities}) + 80(\# \text{permanent total disabilities})}{\# \text{man-hours (in millions)}} \\ &= \frac{1(43) + 4(5) + 40(2) + 80(1)}{4.77} \\ &= 46.75 \end{aligned}$$

In selecting mines for inclusion in the survey, injury cost rates were computed on the basis of information provided by the Mining Enforcement and Safety Administration (MESA) Data Bank in Colorado. This data source has a number of advantages. All information in the Data Bank is stored on magnetic tape, providing easy access to data. The information has been collected using standardized forms and standard definitions of accident categories. All data required for computation of Petersen's injury cost rate were available from the Data Bank, and updated information for each mine could be easily obtained.

Accident statistics were obtained from the MESA Data Bank for every underground coal mine operating in the United States for the years 1970 and 1971. A number of candidate mines were selected from the upper extremes and the lower extremes of the injury cost rate continuum. Accident statistics were then obtained for the years 1968 and 1969 for these candidate mines. The final selection of mines to be included in the survey was thus based on four years of accident statistics (1968-1971). Mines which exhibited inconsistency in injury cost rate from year to year were eliminated from further consideration. For example, a mine which, over the four-year period, had a good safety record, but which experienced a catastrophe in which there were several fatalities, was not considered as a candidate for a high-accident mine, even though it had an extremely high injury cost rate in the year in which the catastrophe occurred. Although no separate analyses were performed to assure constancy across years for number of man-hours worked, the injury cost rate statistic itself represents a modified cost for accidents per million man-hours worked, and consequently a consistent accident record per unit of man-hours worked was assured.

Once candidate mines had been identified in this manner, fifteen pairs of mines were selected. Within each pair, one mine was drawn from the upper extreme of injury cost rate and one was drawn from the lower extreme. Before data collection began, accident statistics were obtained for the years 1972 and 1973 for each mine selected to further insure the consistency of injury cost rate over a long period of time.

In comparing survey responses of mine personnel in high-accident mines with responses of personnel in low-accident mines, care had to be taken to control as much as possible for potentially confounding variables. Coal mines vary along a number of dimensions which have been demonstrated to have been related to accidents, and which consequently could affect safety and health attitudes of mine personnel. Theodore Barry and Associates (1972) reported that in auger mines "the size of mines (number of men employed) and height of seams were two of the strongest factors correlating with the fatal accident rate (p.103)". Analyses in underground coal mines also found these variables to be related to the fatal accident rate, although the relationship was not as strong for seam height. Captive vs commercial operation is another variable which can be demonstrated to have been related to accident rate. Traditionally captive mines, especially those owned by steel companies, whose coal is used within the companies' other operations, have a better accident-record than do commercial mines, whose coal is sold on the open market. Conventional vs. continuous miner method of extraction is yet another variable of concern. Theodore Barry and Associates (1972) noted a trend toward increasing

equipment-related fatalities. The differences in type of equipment used in the two methods of extraction make this variable an important one to control. For example, the continuous miner is a relatively more dangerous piece of equipment (ranking fourth in total equipment-related fatal accidents and second in equipment-related fatal accidents per thousand machines) than the cutting machine or the face drill used in a conventional operation.

In addition to controlling variables related to accident rate, care had to be taken to control for other variables which could affect miners' reported attitudes and opinions. Geographic location for example, could have a profound effect on safety and health attitudes of mine personnel. Many studies have demonstrated unique attitudes and opinions among Appalachian coal miners. Comparing attitudes of miners in a high-accident mine in West Virginia with those of miners in a low-accident mine in Colorado could easily lead to erroneous conclusions. Another variable which could affect miners' safety attitudes is unionization.

Within each pair of mines, therefore, mines were selected to be as similar as possible (with the single exception of a divergence in injury cost rate). Matching with regard to the following background variables was performed.

Geographic Location. Mines in each pair were invariably drawn from within the same state. Table 1 presents the number of matched pairs drawn from of the nine states included in the survey.

Table 1
Geographic Distribution of Mines

State	Number of Matched Pairs
Alabama	1
Colorado	1
Illinois	1
Kentucky	2
Ohio	1
Pennsylvania	4
Utah	1
Virginia	1
West Virginia	3
TOTAL	15

Number of employees. Each mine was categorized as belonging to one of three categories:

- A. 20-100 employees
- B. 101-250 employees
- C. Greater than 250 employees

In thirteen of the fifteen pairs, both mines of the pair belonged to the same category. In no instance was a mine in the first category paired with a mine in the third category.

Annual production figures. Each mine was categorized as belonging to one of four categories:

- A. Less than 50,000 short tons
- B. 50,000 - 200,000 short tons
- C. 200,000 - 500,000 short tons
- D. Greater than 500,000 short tons

In fourteen of the fifteen pairs, both mines of the pair belonged to the same category. In the remaining pair a mine in Class D was paired with a mine in Class C.

Seam height. Each mine was categorized as belonging to one of four categories:

- A. Less than 36 inches
- B. 37 - 48 inches
- C. 49 - 72 inches
- D. Greater than 72 inches

In twelve of the fifteen pairs, both mines of the pair belonged to the same category. In one instance a mine in category A was paired with a mine in category B, and in two instances a mine in category B was paired with a mine in category C.

Unionization. In 25 of the 30 mines workers belonged to the UMWA. Workers in the five remaining mines belonged to one of four other unions. Thus all 30 mines visited were unionized. In only two of the 15 pairs of mines was a high-accident mine paired with a low-accident mine where workers belonged to a different union.

Captive vs. commercial operation. Captive vs commercial operation was the variable for which matching was most difficult to achieve. In 9 of the 15 pairs of mines a match was achieved in terms of type of operation. Although a higher degree of match would have been desirable, sacrifice had to be made in order to achieve a high degree of match for other background characteristics.

Conventional vs. continuous method. In 12 out of 15 pairs of mines, the high and low accident mines used the same method of extraction. In nine of the 30 mines both conventional and continuous methods were used.

All mines designated as high-accident mines in subsequent data analyses had a substantially higher injury cost rates for the year immediately preceding collection of survey data than did the low-accident mines with which they were paired. Table 2 summarizes the background characteristics for each of the 30 mines selected for inclusion in the survey, including injury cost rates and the total number of respondents from each mine. The mean injury cost rate for high-accident mines was 103.26, significantly higher ($p < .01$) than the injury cost rate for low-accident mines which was 25.36.

7. Summary of Mines Selected for Inclusion in Survey

State	Code Number	Number of Employees	Annual Production	Seam Height	Unionization	Captive vs Commercial Operation	Conventional vs Continuous Method	Injury Cost Rate 1968-1974	Number of Respondents
Alabama	1	C	D	C	Union	Comm.	Conv.	37.4	72
	2	C	D	C	Union	Capt.	Conv.	9.4	33
Colorado	3	A	C	D	Union	Comm.	Conv.	47.8	9
	4	A	C	D	Union	Comm.	Conv.	9.2	11
Illinois	5	C	D	D	Union	Capt.	Cont.	35.0	58
	6	C	D	D	Union	Capt.	Conv.	7.2	63
Kentucky	7	B	D	C	Union	Comm.	Conv.&Cont.	59.1	27
	8	C	D	C	Union	Comm.	Conv.	37.9	66
	9	A	B	A	Union	Comm.	Cont.	183.8	5
	10	A	B	B	Union	Comm.	Cont.&Conv.	14.3	34
Ohio	11	B	D	C	Union	Comm.	Conv.&Cont.	50.2	36
	12	B	D	C	Union	Comm.	Conv.	19.5	29
Pennsylvania	13	C	D	C	Union	Comm.	Conv.	45.3	31
	14	C	D	C	Union	Capt.	Conv.	31.6	15
	15	C	D	B	Union	Capt.	Cont.	59.2	21
	16	C	D	C	Union	Capt.	Cont.	27.3	44
	17	A	B	B	Union	Comm.	Cont.	129.7	24
	18	A	B	C	Union	Capt.	Conv.	32.8	27
	19	A	B	A	Union	Comm.	Cont.	87.0	38
	20	A	B	A	Union	Comm.	Cont.	17.1	37
Utah	21	B	D	D	Union	Comm.	Conv.	412.5	59
	22	A	C	D	Union	Comm.	Cont.	30.8	53
Virginia	23	A	B	A	Union	Comm.	Conv.	111.6	55
	24	A	B	A	Union	Comm.	Conv.&Cont.	0	22
W.Virginia	25	B	D	D	Union	Comm.	Cont.&Conv.	115.4	13
	26	B	D	D	Union	Capt.	Conv.&Cont.	55.6	37
	27	C	D	C	Union	Comm.	Conv.&Cont.	129.3	68
	28	C	D	C	Union	Capt.	Conv.&Cont.	35.4	50
	29	C	D	C	Union	Comm.	Conv.&Cont.	145.6	24
	30	C	D	C	Union	Capt.	Cont.	52.3	0*

* A wildcat strike was called in 1974.

DEVELOPMENT OF SURVEY INSTRUMENTATION

A preliminary literature review showed several general categories of variables to be important with regard to safety and health issues. These categories include background characteristics, job perception variables, interpersonal characteristics including risk taking, task variables, and training and support variables. In order to insure that as many content areas of importance as possible were included in the survey instruments, interviews were held with both mine workers and management personnel. Open-end questions asked during the interviews were centered around the categories of variables identified in the literature review.

Eight group interviews were conducted with a total of fifty-five mine workers. The vast majority of interviewees were underground miners, although several above-ground mine workers and first-line foremen participated as well. Two of the group interviews were conducted at mines in West Virginia; four of the interviews were conducted following a union meeting in Pennsylvania; and one interview was held following the day shift at a non-union mine in Pennsylvania. The miners interviewed, therefore, represent a cross-section of workers with respect to particular job, geographical location, and unionization.

Twenty-five individual interviews were conducted as well. The interviewees included four mine superintendents, six upper-level management personnel, five safety directors, five union stewards and five mine foremen. Twelve different mines were visited, representing variation in geographical location, size and unionization.

The interviews, both group and individual, were not highly structured. Fifteen general, open-end questions served as a guide for the interviews. Topics discussed were not limited to those outlined on the interview schedule, but rather included any topic which the interviewer considered important with regard to safety and health in coal mines. After the general questioning and discussion, several open-end topics concerning particular characteristics of the mine, management, workers, etc., which might have been related to mine safety and health were discussed. Fifty such questions served as a topic guideline in discussing the particular characteristics of the mine, etc. All topics, however, were not discussed with each interviewee, because the time required to have done so would have been prohibitive.

Approximately 50% of the interviews were tape-recorded. In instances in which there were inadequate facilities for taping, or in which interviewees objected to tape recording, notes were taken by hand. All interviews, both group and individual, lasted approximately one hour.

In addition to the unstructured interview, three item formats were administered to the interviewees to determine the feasibility of their use. One format required the individual to judge whether the company he worked for possessed more, the same amount, or less of a particular characteristic than the item itself described. The mixed-standard scale (Blanz & Ghiselli, 1972) was used as a model for the more-less format. The second format required the individual to judge whether a statement about his company was true or false. The third format was a 5-point agreement scale on which interviewees were required to indicate the extent to which they agreed with a statement about their company.

The more-less format was not successful in the preliminary interviewing. Interviewees were often confused by the wording and had difficulty conceptualizing the more-less dimension. After the item was read, the typical respondent found it easier to simply agree or disagree to the item, than to make a comparative judgement about his company with regard to the item. The more-less format utilized two statements for each item. One statement was high on the characteristic measured by the item; the other statement was low on the characteristic. Statements were presented so that the two statements of each item did not appear close to each other during the interview. An attempt was made to construct a 5-point scale on the basis of the respondent's answers to the two statements. Inconsistent responses often made the assignment of a number impossible. Difficulties with both the administration and the scoring of the items led to the decision to eliminate the more-less format from consideration.

Both true-false format and the agreement-scale format proved workable in the preliminary interviewing. Of the three formats, interviewees preferred true-false most often, and the agreement scale second most frequently. The true-false items were structured like the Blanz-Ghiselli items in that two statements were written for each item. One statement was high on the characteristic measured by the item; the other statement was low on the characteristic. Since only half the number of items can be presented per unit time using this format as opposed to a format using only one statement per item, it was not thought to be maximally efficient. The preference of the interviewees for a dichotomous decision, however, led to the adoption of a three-point scale, whenever possible.

From the preliminary interviews it became obvious that in addition to a number of common issues affecting all levels of personnel within the mining industry, there existed a number of unique issues for various populations. As a result, seven questionnaires were developed for the following populations within the mining community:

- 1) Underground miners
- 2) Above ground miners
- 3) Union officials
- 4) Foremen

- 5) Safety directors
- 6) Management
- 7) Miner's wives

The content outline for the questionnaires appears in Figure 1. With the assistance of NIOSH and several consultants, items were developed for each of the topic areas. The questionnaires were reviewed and evaluated by NIOSH personnel, the United Mine Workers of America, and outside consultants. In addition, a pre-test of the items on the various survey questionnaires was performed with 30 persons from the mining community. As a result of this evaluation process, revisions in item content, format, and wording were made.

The revised questionnaires were then submitted to the Human Subjects Review Board of NIOSH for review and approval. Subsequent to incorporating the recommended modifications from the Human Subjects Review Board, the questionnaires were submitted to the Office of Management and Budget (OMB) for review and approval. OMB clearance Number 68-S 72047 was assigned to the questionnaires. The final questionnaires appear in Appendices A through G.

Figure 1

Outline of Questionnaire Topics

- I. Biographical and background information
 - Underground miners
 - Above ground miners
 - Union officials
 - Foremen
 - Safety directors
 - Management
 - Wives
- II. Attitudes toward safety and accident causes
 - Safety ladder
 - Number of accidents witnessed
 - Wives' perceptions of mine safety
 - Importance of safety to company
 - Importance of safety to miners
 - Causes of accidents
 - Safety Director: Major causes of accidents
- III. Major problems in the mine
 - Absenteeism
 - Turnover
 - Productivity
 - Safety Training
 - Job Training
 - Labor Problems
 - Problems with safety and health laws
 - Equipment maintenance
 - Public image
 - Too many accidents
- IV. General company attitudes
 - Safety vs. production
 - Management attitudes towards miners
 - Foreman attitudes towards miners
- V. General miner attitudes
 - Personal characteristics of miners
 - Miners attitudes as accident causes
 - Resistance of miners to new ideas
 - Fatalism
 - "Internal- External" Locus of Control Scale
- VI. Physical and psychological problems
 - Physical ailments
 - Use of medicines
 - Problems of wives

Figure 1 (Cont.)

VII. Safety and health equipment

- Need for equipment
- Reasons for not using equipment
- Disciplinary action against those who don't use equipment
- Need for equipment
- Reasons for not using equipment
- Frequency of equipment inspection
- Getting miners to use safety equipment

VIII. Use of health programs

IX. Training

- Adequacy of training
- Sources of knowledge
- Training techniques employed
- Availability of training

X. Job behaviors

- Miners
- Other behaviors of miners
- Safety behaviors
- Foremen
- Responsibility when safety practices are not followed
- Disciplinary actions imposed on risk takers
- Influence of personnel on workers' safe behavior

XI. Job satisfaction

- Job characteristics
- Opportunities for intrinsic reward
- Decision-making responsibility
- Job satisfaction as reported by wives
- Husband's career as reported by wives

XII. Company safety programs

- Safety budget
- Percentage of safety director's time in the mine
- Approval of work processes
- Consideration of safety in purchase of equipment
- Approval of new equipment
- Sources of new ideas
- Hindrances to safety program
- Training required for safety director
- Incentives used
- Family or community efforts
- Hazard reporting system
- Responsibility for accident investigation
- Special programs
- Suggested changes by safety directors
- Suggested changes by union officials

Figure 1 (Cont.)

XIII. Perceptions of outside organizations

Unions

Length of unionization
Activity of rank and file members
Safety as a bargaining tool

Bureau of Mines
State mining bureaus
Frequency of inspections
Government pressure
Family and community

DATA COLLECTION

The first step in data collection was securing management cooperation. Mine superintendents and upper management representatives of selected coal companies were contacted by telephone to explain the purpose of the research and to solicit permission to collect survey data.

Each mine was then visited by a member of the Behavioral Services Center professional staff. During that visit, a written survey was administered to the mine superintendent and the mine safety director. The interviewer remained with the respondents as they completed the survey to answer any questions which may have arisen and to listen to any additional comments or interpretation of responses which respondents may have given. An unstructured open-ended interview followed administration of the written survey to probe the respondent's feelings toward salient safety and health issues.

Following interviews with the mine superintendent and safety director, facilities for administering surveys to underground miners, above ground miners, and foremen were examined. In many instances, the president of the local union and members of the union safety committee were visited to assure union cooperation in the collection of survey data. In addition, a roster of all men (categorized by job classification) was secured for each mine, in order to select those individuals to be asked to complete a survey.

Selection of underground miners, above-ground miners, and foremen within each mine was made on a random basis. A random number table was used to identify a pool of respondents from among the rosters supplied by mine managers. At larger mines (those employing 80 or more underground miners) approximately 40 underground miners, three foremen, and 15% to 20% of the surface workers were selected. At smaller mines (those employing fewer than 80 underground miners) approximately 50% of the underground miners were selected on a random basis, together with all foremen and surface workers. The remaining 50% of the underground miners in smaller mines were asked to complete a NIOSH Occupational Environment Questionnaire. In addition to those individuals listed above, two union officials, and three miners' wives were selected at each mine. Union officials and wives were not selected on a random basis, however. All union officials were asked to complete a survey at each mine. Wives were selected by asking participating underground miners (who had been randomly selected) if they were married, and if their wives would consent to completing a survey. As soon as three wives were identified who consented to completing a survey, further inquiries were terminated.

Although initial selection of a pool of respondents for underground miners, above-ground miners, and foremen was made on a random basis, interviewers were instructed to ask additional individuals to complete survey instruments in the event that initial respondents refused participation. The final sample of respondents in each mine was, therefore, not a truly random sample for any of the target populations.

After management survey data had been collected, and cooperation from management in the remainder of data collection assured, retired miners were recruited to collect survey data from above ground miners, underground miners, union officials, and foremen. Retired miners were required to provide the

assistance of their wives or other female assistants in collection of survey data from the wives of underground miners at each mine. Detailed instructions which were mailed to each retired miner are presented in Appendix H.

Prior visits to the mine site by retired miners, all individuals selected to complete surveys were mailed a letter explaining the purpose of the survey, and soliciting their cooperation in completing the survey instruments. In most instances, letters were mailed to miners' homes. In several cases, however, where mine management could not provide accurate addresses for mine workers, letters were distributed to miners with their pay check the week prior to scheduled survey data collection.

Retired miners were provided with a list of names of those individuals randomly selected to complete survey instruments. Retired miners were instructed to spend the first day at the mine talking to these miners, telling them when and where they would be administering survey instruments. In addition to collecting survey data for this research project, miners distributed a NIOSH Occupational Environment Questionnaire to miners not participating in the current project. During the first day, these NIOSH surveys were distributed. Also, on the first day, retired miners were instructed to administer survey instruments to foremen selected for participation in the current study. Foremen interviews were completed, wherever possible, in a group situation following a change of shift at the mine. Retired miners remained with the foremen as they completed the survey instruments, reading instructions out loud to the men, and answering any questions arising as foremen completed survey instruments.

During the remainder of the week, retired miners were instructed to administer surveys to above ground miners, underground miners, and union officials using the same techniques that they used with foremen. Wherever possible, surveys were administered in a group situation, with the retired miner reading instructions and remaining to answer questions until all men had completed the survey instruments.

Wives or other female assistants administered surveys to wives of underground miners. Interviews with wives were conducted in the home in a manner similar to that with which interviews were conducted with management personnel. Interviews were conducted in a one-to-one situation, with the retired miner's wife reading instructions and remaining to answer any questions which may have arisen. Miners' wives were instructed to answer questions without talking with their husbands.

In several instances, these procedures could not be strictly followed. For example, in two mines management refused to allow collection of survey data on mine property. In those two instances survey data was collected through union cooperation. Behavioral Services Center personnel attended a monthly union meeting to administer survey instruments. A union wives organization aided in the collection of survey data from wives of underground miners. In another instance, a prolonged wildcat strike prohibited any collection of survey data whatsoever. As a result, survey data was collected from a total of only 29 mines, instead of the scheduled 30 mines. However, to the extent possible, survey data were collected according to the format described above.

In several instances management surveys were administered to management personnel at the corporate level. In these instances the mines selected for inclusion in the survey were a part of a larger company which owned and operated several mines including the mine selected for inclusion in the study. Interviews with top management personnel were conducted by Behavioral Services Center personnel under the same conditions as were interviews with mine superintendents.

Data Collection began in January, 1975, and continued until May, 1975. The total number of respondents from each of the 29 mines is shown in Table 2.

DATA ANALYSIS

Answers to all open-ended discussion items included in management surveys and items requiring verbal written responses were analyzed using content analysis procedures. Multiple-choice and scaled items were keypunched for quantitative analyses. Univariate analyses were utilized to determine significant differences between high and low accident mines. Means for each item were computed separately for high and low accident mine groupings.

In performing statistical analyses all high-accident mines ($N = 15$) were grouped together and all low-accident mines ($N = 14$) were similarly grouped. As noted above, a prolonged wildcat strike prohibited data collection at the fifteenth low-accident mine. It was felt that any potential imbalance between high and low accident mine groups in background characteristics caused by including the extra high-accident mine in analyses would be outweighed by the benefit of basing conclusions on a larger overall sample.

In addition to the univariate analysis of variance statistics computed for each scalable item, frequency distributions were constructed for multiple-choice items and other non-scalable items. Chi-square tests for significance of the difference of observed frequencies from expected frequencies were computed for each non-scalable item.

The underground miner survey contained eleven items adapted from Rotter's (1966) Internal-External (I-E) scale of motivation. These items were combined to form a summative scale intended to measure the degree of internal vs. external motivation exhibited by miners. A univariate analysis of variance was then performed to determine if a significant difference existed on the I-E scale between miners working in high-accident mines and miners working in low-accident mines.

In addition to the univariate analyses of variance and chi-square tests of frequency distributions, descriptive statistics were computed for each item based on the total sample size (i.e., high- and low-accident mine groupings combined) in order to be able to identify a consensus among all personnel within a given target population.

RESULTS

As noted above, survey instruments explored a wide variety of topic areas having an impact on safety and health in underground coal mines. Results of surveys administered to the seven distinct target populations will be reviewed by topic area, as opposed to reviewing entire surveys separately for each distinct group. In this way, all responses to questions which were asked of more than one target population can be presented in a single table, allowing comparison of responses of different populations to the same questions.

Topic areas to be reviewed include the following: background information, including biographical data for each of the seven samples; general attitudes toward safety and causes of accidents; major problems in the mines surveyed; general company attitudes; general miner attitudes, safety and health equipment; health programs; training; job behaviors of mine personnel; job satisfaction; company safety programs; perceptions of outside organizations; and physical and psychological problems of miners and their wives.

The primary emphasis of all data analyses to be reported below is a comparison of responses in high-accident mines with responses in low-accident mines. In reporting the significance of differences between these two groups, standard cut-offs at the .05 and .01 levels of significance were employed. Wherever statistical tests reached these levels of significance, results are reported either in tables or in the text. For ease in reading, the reader is frequently left to consult tables to determine the specific level of significance for individual items. Results reported as non-significant failed to achieve the .05 level of significance.

MINER CHARACTERISTICS AND BACKGROUND INFORMATION

As a means of characterizing each of the sample groups surveyed, each questionnaire contained several questions of a biographical nature. Information such as birth date, length of experience in mining, length of time in their particular mine, and their current position were asked of mine personnel samples. More detailed information such as commuting distance to the mine, the number of injuries and near misses experienced, yearly household income, and educational level completed were asked of selected samples, including underground miners. A summary of these background characteristics is presented below for each individual sample.

Underground Miners

A total of 612 underground miners completed surveys: 328 in low accident mines, and 284 in high-accident mines. Of these 612 miners, fifty percent were between the ages of 20 and 39. Table 3, which summarizes the age data, shows that high-accident mines have a slight but non-significant tendency to employ younger workers, particularly in the 20-29 age bracket.

Table 3
Age Of Underground Miners

Age	No. of individuals in low-acc. mines (N=328)	No. of individuals in high-acc. mines (N=284)	Total number of individuals (N=612)
19 years and younger	0 (0%)	1 (1%)	1 (1%)
20-29 years	73 (22%)	89 (31%)	162 (26%)
30-39 years	81 (25%)	64 (23%)	145 (24%)
40-49 years	56 (17%)	38 (13%)	94 (15%)
50-59 years	54 (16%)	51 (18%)	105 (17%)
60 years and older	64 (20%)	41 (14%)	105 (17%)

Using scale categories ranging from "less than 1 year" to "30 or more years", underground miners indicated how long they had been a coal miner, how long they had worked for their particular company, how long they had worked in their particular mine, and how long they had worked at their present job. Responses of miners in low- and high-accident mines were not significantly different. Mean responses of underground miners indicated that they had been coal miners for an average of 6-9 years, and had worked for their current company for a period only slightly shorter. The hypothetical typical miner had worked in his particular mine for a period of about 6 years, and had worked at his present job for about 3-5 years.

Table 4 shows the distribution of miners across different shifts. Mines were not matched on the basis of shift schedules, and, in fact, a greater percentage of underground miners in low-accident mines were on rotating shifts, and a smaller percentage were on the first and second shifts when compared to miners in high-accident mines. A chi-square test of the significance of the difference between the two distributions was significant ($p < .01$). The largest percentage of miners in both high- and low-accident mines were on rotating shift work. On the average miners had been on the same shift assignment for about 5-6 years, which is comparable to the average length of present job and mine employment.

Table 4
Particular Shift Worked: Underground Miners

Shift	No. of responses in low-acc. mines (N=328)	No. of responses in high-acc. mines (N=284)	Total number of responses (N=612)
First shift	69 (21%)	89 (31%)	158 (26%)
Second shift	40 (12%)	46 (16%)	86 (14%)
Third shift	35 (11%)	32 (11%)	67 (11%)
Rotating shift	163 (50%)	108 (38%)	271 (44%)
No response	21 (6%)	9 (3%)	30 (5%)

Information on the distance from home to the mine and travel time was elicited. Miners in high-accident mines had both a longer distance and travel time than miners in low-accident mines ($p < .01$). On the average, the miners in low-accident mines drive approximately 10-15 miles in slightly less than 20-30 minutes, while miners in high-accident mines drive closer to 15-20 miles in approximately 30-40 minutes. Virtually all miners indicated that they lived at home during the work week.

Miners were asked to indicate on a four-point scale ranging from "extremely pleased" (1.0) to "extremely displeased" (4.0) how happy their wives were about their working as a coal miner. The mean in both high- and low-accident mines was 2.11, slightly on the positive (pleased) side of the mid-point (2.5) of the scale. (Wives were asked how satisfied they were with various aspects of their husband's job. See results on p. 92.)

Underground miners were asked the number of accidents they had experienced in recent years. Miners in both high- and low-accident mines reported that in the last three years they had had an average of less than one accident which had kept them off work -- .35 accidents in low-accident mines, and .39 accidents in high-accident mines. The difference between the two means was not significant. Miners in high-accident mines, however, reported a significantly ($p < .01$) greater number of injuries in the last year which did not keep them off work than did miners in low-accident mines. The mean in high-accident mines was .63 accidents, while that in low-accident mines was .35 accidents. Both groups reported experiencing an average of between one and two near misses in the preceding year, the difference between the two group means being non-significant.

The average total household yearly income in the year preceding the survey was reported to be slightly higher in low-accident mines than in high-accident mines, although the difference was not significant. The mean for both groups was within the \$9,000-\$12,000 range. Miners in high-accident mines, however, reported significantly ($p < .05$) fewer dependents. The low-accident mine group had a mean of 2.08 on a six-point scale ranging from none (0) to nine or more (5) compared to a mean for the high-accident group of 1.91.

In terms of family history in mining, 50% of underground miners in both high- and low-accident mines reported that their brothers had been miners. A larger percentage (76% in low-accident mines and 70% in high-accident mines) of miners indicated that their fathers had been miners. In quite a few instances miners' grandfathers had also been miners (in 41% of the cases in low-accident mines and 31% of the cases in high-accident mines). Finally, approximately 14% of the miners in both groups stated that they had a great grandfather who had been a miner.

The sample of 612 underground miners was quite representative of the overall underground miner population in the U.S. in terms of particular job worked. It was comprised of individuals from 34 different jobs. The

jobs with the largest number of representatives were: shuttle car operator (N=52), mechanic (N=56), roof bolter (N=49), general inside laborer (N=49), motorman (N=31), continuous mining machine operator (N=30), beltman (N=28), faceman (N=27), electrician (N=24), fireboss (N=23), and general inside repairman (N=20).

In terms of educational background, a total of 149 underground miners (26%) stated that they were high school graduates, while another 148 (26%) indicated that they had finished between the tenth and twelfth grades without completing high school. One hundred thirty-three miners (23%) reported that they had completed school between the seventh and ninth grades, and 41 (7%) had had a sixth grade education or less. College or technical school graduates numbered 16 (3%), and an additional 87 miners (15%) had attended college or technical school without receiving a degree. Responses of miners in high-accident mines were not significantly different from responses in low-accident mines.

Above-ground Miners

A total of 157 above-ground miners completed surveys: 87 in low-accident mines, and 70 in high-accident mines. The same background information questions were asked of above-ground miners as were asked of underground miners. In all cases the rating scales used to provide responses were identical.

As might be expected, above-ground miners are, in general, older than underground miners. As shown in Table 5, the largest percentage of miners are in the 50-59 year age bracket, as opposed to the 20-29 year age bracket for underground miners. More than 50% of above-ground miners are over 50 years of age. Although there is a tendency for low-accident mines to have a higher percentage of above-ground miners in the upper age brackets, age distributions for high and low-accident mines were not significantly different at the .05 level.

Table 5
Age of Above-Ground Miners

Age	No. of individuals in low-acc. mines (N=87)	No. of individuals in high-acc. mines (N=70)	Total number of individuals (N=157)
19 years and younger	0 (0%)	0 (0%)	0 (0%)
20-29 years	3 (3%)	6 (9%)	9 (6%)
30-39 years	19 (22%)	12 (17%)	31 (20%)
40-49 years	17 (20%)	19 (27%)	36 (23%)
50-59 years	27 (31%)	21 (30%)	48 (31%)
60 years and older	21 (24%)	12 (17%)	33 (21%)

In terms of family history in mining, responses of above-ground miners were very similar to those of underground miners. About half of the above-ground miners reported that their brothers had been miners (56% in low-accident mines and 47% in high-accident mines). A considerably larger percentage had fathers who were miners (76% in low-accident mines and 79% in high-accident mines). In quite a few instances above-ground miners' grandfathers had also been miners (31% of the individuals in low-accident mines and 29% of the individuals in high-accident mines). Finally, 23% of the above-ground miners in low-accident mines and 10% of the above-ground miners in high-accident mines stated that they had a great grandfather who had been a miner. In no instances were responses of miners in high-accident mines significantly different from responses of miners in low-accident mines.

In answering questions about tenure as a coal miner and tenure in their present company, mine, and job, responses of above-ground miners in low-accident mines were similar to those in high-accident mines. In no case were there any significant differences between means of the two groups. Mean responses of above-ground miners indicated that they had been coal miners for an average of 10-19 years, and had worked for their current company for a period only slightly shorter. The hypothetical typical above-ground miner had worked in his current mine for about 6-9 years, and in his current job for about 3-5 years.

Table 6 shows the distribution of above-ground miners across different shifts. The largest number of above-ground miners (29%) were working permanent day shift, 23% reported working permanent second shift, 11% were working permanent third shift, and 27% were on rotating shift work. Although a larger number of above-ground miners in high-accident mines were working rotating shifts, the difference between the two distributions was not significant at the .05 level.

Table 6.

Particular Shift Worked: Above-Ground Miners

Shift	No. of responses in low acc. mines (N=87)	No. of responses in high acc. mines (N=70)	Total no. of responses (N=157)
First Shift	26 (30%)	19 (27%)	45 (29%)
Second Shift	21 (24%)	15 (21%)	36 (23%)
Third Shift	11 (13%)	6 (9%)	17 (11%)
Rotating shift	19 (22%)	24 (34%)	43 (27%)
No response	10 (11%)	6 (9%)	16 (10%)

On the average, above-ground miners had been on the same shift for about 7-8 years. Above-ground miners in low-accident mines tended to have been working on their current shift for a shorter period of time than above-ground miners in high-accident mines, although the difference was not significant.

Above-ground miners in both low- and high-accident mines indicated that they had to travel approximately 10-15 miles to get to work, and that the drive took them 20-30 minutes. There were no significant differences on these variables between high- and low-accident mines as opposed to the significant differences found in the sample of underground miners. As with underground miners, virtually all above-ground miners stated that they lived at home during the work week.

Above-ground miners indicated that their wives were generally pleased about the fact that they were working as a coal miner. On a four-point scale ranging from "extremely pleased" (1.0) to "extremely displeased" (4.0), the mean rating in low-accident mines was 2.07, while the mean in high-accident mines was 2.04. (See p. 92 for results indicating how satisfied miners' wives were with various aspects of their husbands' jobs.)

Above-ground miners in both high- and low-accident mines reported that in the last three years they had had an average of less than one accident which had kept them off work. The mean number of accidents was .17 in low-accident mines and .23 in high-accident mines. The difference between the two means was not significant.

Similarly, above-ground miners reported experiencing an average of less than one accident in the last year which did not keep them off work. The mean number of accidents was .30 in low-accident mines and .36 in high-accident mines. Curiously, those in low-accident mines reported having had a significantly ($p < .01$) greater number of near misses (.93 as opposed to .29 in high-accident mines).

The average household total yearly income in the year preceding the survey was reported to be slightly higher in low-accident mines than in high-accident mines, although the difference was not significant. The mean for both groups indicated an average income in the range of \$12,000-\$15,000. Both high- and low-accident mine groups reported having an average of two or three dependents. Means on a five-point scale ranging from none (0) to nine or more (5) were 1.37 for the low-accident group and 1.66 for the high-accident group.

The sample of 157 above-ground miners was comprised of individuals from 22 different jobs. The jobs with the largest number of representatives were: mechanic (N=24), unskilled labor (N=15), repairman (N=14), stationary equipment operator (N=12), mobile equipment operator (N=10), and electrician (N=10).

In terms of educational background, a total of 33 above-ground miners (22%) stated that they were high school graduates, while another 43 (29%) indicated that they had finished school between the tenth and twelfth grades without completing high school. Forty-five individuals (30%) reported that they had completed school between the seventh and ninth grades, and 9 (6%) had had a sixth grade education or less. College or technical school graduates numbered 4 (3%), and an additional 14 (9%) miners had attended college or technical school without receiving a degree. Responses of miners in high-accident mines were not significantly different from responses in low-accident mines.

Union Officials

A total of 54 union officials completed surveys: 28 in low-accident mines and 26 in high-accident mines. Table 7 summarizes the age data for union officials. The largest percentage of union officials in both high- and low-accident mines was in the 50-59 age bracket. No significant differences were found between the age distributions for low and high-accident mines.

Table 7

Age of Union Officials

Age	No. of individuals in low-acc. mines (N=28)	No. of individuals in high-acc. mines (N=26)	Total No. of individuals (N=54)
19 years and younger	1 (4%)	0 (0%)	1 (2%)
20-29 years	5 (18%)	4 (15%)	9 (17%)
30-39 years	3 (11%)	6 (23%)	9 (17%)
40-49 years	7 (25%)	3 (12%)	10 (19%)
50-59 years	9 (32%)	10 (38%)	19 (35%)
60 years and older	3 (11%)	3 (12%)	6 (11%)

In answering questions about tenure as a coal miner and tenure in their present company, mine, and job, union officials indicated that they had been coal miners an average of 10-19 years, and had worked for their present company for only a slightly shorter period of time. Union officials had worked in the same mine for an average of 6-9 years, and had been union officials for about 3-5 years. No significant differences were found between low- and high-accident mines on these factors. About half of the union officials in both high- and low-accident mines indicated that they were currently active members of the union safety committee.

Foremen

A total of 102 foremen completed surveys: 50 in low-accident mines and 52 in high-accident mines. Approximately 50% of all foremen were between the ages of 30 and 49. Table 8 summarizes the age data for foremen. The high- vs. low-accident mine age distributions were not found to be significantly different (chi-square test, $p < .05$).

Table 8

Age of Foremen

Age	No. of individuals in low-acc. mines (N=50)	No. of individuals in high-acc. mines (N=52)	Total no. of individuals (N=102)
20-29 years	8 (16%)	10 (19%)	18 (17%)
30-39 years	14 (28%)	12 (23%)	26 (25%)
40-49 years	10 (20%)	12 (23%)	22 (25%)
50-59 years	13 (26%)	8 (15%)	21 (20%)
60 years and older	5 (10%)	10 (19%)	15 (14%)

In terms of family history in mining, responses of foremen were very similar to those of both underground miners and above-ground miners. Slightly more than half of the foremen indicated that their brothers had been miners (56% in low-accident mines and 58% in high-accident mines). A considerably larger percentage had fathers who were miners (80% in low-accident mines and 77% in high-accident mines). In quite a few instances foremen had grandfathers who had been miners as well (34% in low-accident mines and 35% in high-accident mines). Finally, 10% of the foremen in low-accident mines and 19% of the foremen in high-accident mines stated that they had a great grandfather who had been a miner.

Responses of foremen indicated that they had been coal miners for an average of 10-19 years, and that they had worked for their current company for about 6-9 years. The typical foreman had worked in the same mine for about 6-9 years, and had held his current job for 3-5 years.

Table 9 shows the distribution of foremen across different shifts. By far, the largest percentage of foremen were on rotating shift. The distribution of shift assignments for low- and high-accident mines was not significantly different. On the average, foremen had been on the same shift for about 5 - 6 years.

Table 9

Particular Shift Worked: Foremen

Shift	Number of responses in low-accident mines (N=50)	Number of responses in high-accident mines (N=52)	Total number of responses (N=102)
First shift	11 (22%)	12 (23%)	23 (22%)
Second shift	13 (26%)	14 (27%)	27 (26%)
Third shift	4 (8%)	4 (8%)	8 (8%)
Rotating shift	22 (44%)	20 (38%)	42 (41%)
No response	0 (0%)	2 (4%)	2 (2%)

Foremen indicated that their wives were generally pleased about the fact that they were working as a coal miner. On a four-point scale ranging from "extremely pleased" (1.0) to "extremely displeased" (4.0), the mean rating in low-accident mines was 2.10, while the mean in high-accident mines was 2.13. (See p. 92 for results indicating how satisfied miners' wives were with various aspects of their husbands' jobs.)

Foremen in both high- and low-accident mines indicated that they had to travel approximately 20-30 minutes to get to work.

The average total household yearly income in the year preceding the survey was reported to be approximately \$18,000 to \$21,000 in both high- and low-accident mines.

A total of 32 foremen (31%) stated that they were high school graduates, while another 19 (19%) indicated that they had finished school between the tenth and twelfth grades without completing high school. Ten foremen (10%) reported that they had completed school between the seventh and ninth grades. There were five college or technical school graduates (5%), and an additional 24 foremen (24%) had attended college or technical school without receiving a degree. A greater percentage of foremen in low-accident mines attended college or technical (chi square test, $p < .05$). The education level of foremen is indicated in Table 10.

Safety Directors

A total of 27 safety directors completed surveys: 13 in low-accident mines and 14 in high-accident mines. Table 11 summarizes the age data for safety directors. Overall, the largest percentage of safety directors were in the 50-59 year age bracket. The second largest percentage was 30-39 years old. The distribution of ages in low-accident mines was not significantly different from that in high-accident mines.

Table 10
Education Level of Foremen

Education Level	Number of responses in low-accident mines (N=50)	Number of responses in high-accident mines (N=52)	Total number of responses (N=102)
7th-9th grade	6 (12%)	4 (8%)	10 (10%)
10th-12th grade	9 (18%)	10 (19%)	19 (19%)
high school graduate	15 (30%)	17 (33%)	32 (31%)
attended college or technical school	15 (30%)	9 (17%)	24 (24%)
college or technical graduate	4 (8%)	1 (2%)	5 (5%)
No response	1 (2%)	11 (21%)	12 (12%)

Table 11

Age of Safety Directors

Age	Number of individuals in low-accident mines (N=13)	Number of individuals in high-accident mines (N=14)	Total number of individuals (N=27)
19 yrs. & younger	1 (8%)	0 (0%)	1 (4%)
20-29 yrs.	2 (15%)	3 (21%)	5 (19%)
30-39 yrs.	2 (15%)	4 (29%)	6 (22%)
40-49 yrs.	2 (15%)	0 (0%)	2 (8%)
50-59 yrs.	6 (46%)	4 (29%)	10 (37%)
60 yrs. & older	0 (0%)	3 (21%)	3 (11%)

There was a slight but non-significant tendency for safety directors in low-accident mines to have been in coal mining longer and to have worked for their current employer longer than their counterparts in high-accident mines. Safety directors in low-accident mines had been in coal mining for close to 20 to 29 years, whereas those in high-accident mines had been in coal mining an average of 10-19 years. Similarly, safety directors in low-accident mines had been with their current company for about 10-19 years, whereas those in high-accident mines had been with their companies an average of 6-9 years. Both groups indicated that they had been working the same mine for about 3-5 years.

Almost every safety director in both groups indicated that he was a certified miner, or that he had previously been a certified miner. Similarly, the vast majority of safety directors in both groups reported that they had had special instruction or training specifically in safety. The specific types of training mentioned were MESA training, Bureau of Mines training courses, state mining bureau training courses, company training, National Safety Council seminars, and college level courses.

Management

A total of 32 managers were interviewed: 15 in low-accident mines and 17 in high-accident mines. As Table 12 shows, fifty percent of all managers were between the ages of 50 and 59. An additional 38% were between the ages of 40 and 49.

Table 12

Age of Managers

Age	Number of individuals in low-accident mines (N=15)	Number of individuals in high-accident mines (N=17)	Total number of individuals (N=32)
30-39 yrs.	1 (7%)	2 (12%)	3 (9%)
40-49 yrs.	6 (40%)	6 (35%)	12 (38%)
50-59 yrs.	7 (47%)	9 (53%)	16 (50%)
60 yrs. & older	1 (7%)	0 (0%)	1 (3%)

Managers in low-accident mines tended to have been in coal mining longer, with their current employer longer, in their current jobs longer, and in a boss's position longer than their counterparts in high-accident mines, although none of the differences reached significance. All managers as a group reported that (1) they had been in coal mining an average of 20-29 years; (2) they had been with their current company an average of 10-19 years; (3) they had been in their current jobs an average of 3-5 years; and (4) they had been in a boss's position an average of 10-19 years.

More than one-third of the managers in both high- and low-accident mines reported that their total household yearly income in the year preceding the survey was in excess of \$27,000. On the average, managers earned approximately \$21,000-\$24,000. Although managers in low-accident mines reported earning slightly more than managers in high-accident mines, the difference was not significant.

A total of nine managers indicated that they had graduated from college or technical school, while 11 indicated that they were high school graduates. Twelve managers said they finished school at a level between the tenth and twelfth grades without receiving a high school diploma, while three had completed school at the seventh to ninth grade level. An additional five managers indicated that they had received some form of additional technical training. Responses of miners in high-accident mines were not significantly different from responses in low-accident mines.

Miners' Wives

A total of 77 miners' wives completed surveys: 39 in low-accident mines and 38 in high-accident mines. Table 13 shows the distribution of ages of miners' wives in both high- and low-accident mines. Fifty-eight percent of the miners' wives were between the ages of 40 and 59. The wives' age distributions for high- and low-accident mines were not significantly different.

Table 13

Age of Miners' Wives

Age	Number of individuals in low-accident mines (N=39)	Number of individuals in high-accident mines (N=38)	Total number of individuals (N=77)
19 yrs. & younger	1 (3%)	1 (3%)	2 (3%)
20-29 yrs.	5 (13%)	10 (26%)	15 (19%)
30-39 yrs.	6 (15%)	4 (11%)	10 (13%)
40-49 yrs.	13 (33%)	9 (24%)	22 (29%)
50-59 yrs.	12 (31%)	10 (26%)	22 (29%)
60 yrs. & older	2 (5%)	4 (11%)	6 (8%)

Responses of miners' wives indicated that they had been married for an average of about 16-20 years, and that on the average their husbands had been miners for slightly less than that length of time. More than half of the miners' wives (57% in low-accident mines and 55% in high-accident mines) indicated that their husbands were already working in a mine when they were married. No significant differences between high- and low-accident mines were found on any of these items.

The wives family mining history was very similar to that of the miners themselves. In low-accident mines, 45% of miners' wives reported that they had brothers who had been miners, 69% had fathers who had been miners, 17% had grandfathers who had worked in the mines, 57% had uncles with mining experience, and 5% had great grandfathers who had been miners. In high-accident mines, a greater percentage of wives reported family experience in mining, but in no instances were differences statistically significant. In high-accident mines 68% of miners' wives had brothers who had been miners, 74% had fathers who had been miners, 32% had grandfathers who had worked in the mines, 66% had uncles with mining experience, and 11% had great grandfathers who had been miners.

Respondents were asked to indicate on a scale ranging from "less than 8 hours" to "16-17 hours" the number of hours their husbands spent at the mine, including the time it takes him to get to and from work. Wives in low-accident mines indicated that their husbands spent slightly more than 8-9 hours at the mine, while wives in high-accident mines indicated that their husbands spent closer to 10-11 hours at the mine. Although the difference is not significant, it is consistent with the report of underground miners in high-accident mines that they lived further from the mines and had longer commuting times.

Wives were asked to indicate how many children they had. The mean number in low-accident mines was 3.40, while that in high-accident mines was 2.79. Again, although the difference was not significant, it is consistent with the report of underground miners in high-accident mines that they had a greater number of dependents.

Summary and Discussion

In general, there were few statistically significant differences between responses of persons in low-accident mines and those in high-accident mines when considering background, biographical information. In other words, with only a few exceptions, miners working in mines with poor accident records are essentially the same demographically as those working in mines with good accident records. Pragmatically this fact implies that mines with good accident records have the same raw material to work with in terms of human resources as do those with poor records. There doesn't appear to have been a personnel selection policy utilized by low-accident mines (at least there hasn't been one which has led to a substantially different miner population in low-accident mines), nor does selection of personnel on the basis of a biographical inventory appear to be a promising approach for the future.

There were, however, a few statistically significant differences between high- and low-accident mines in terms of background information of personnel, which should be highlighted. First, miners in high-accident mines stated that they had to travel further to get to work, both in terms of distance traveled and length of time required for the commute, than did miners in low-accident mines. This same fact is evident from responses of wives, which showed that husbands of wives in high-accident mines spent more time at work (including commuting time), than did husbands of wives in low-accident mines. (Although the difference in wives' responses was in the right direction, it did not reach statistical significance at the .05 level.)

Second, underground miner responses indicated that miners in low-accident mines have a greater number of dependents. Again, this fact was confirmed by responses of miners' wives, although the difference between means in the wives' sample did not reach statistical significance. One interpretation of this result is that miners who have a greater family responsibility (in terms of the number of individuals dependent on them for support) are more cautious than those with less family responsibility. If family responsibility does, in fact, play an important role in determining miners' safe job behaviors, then posters and future safety campaigns in the coal industry should emphasize that being safe on the job leads to a more secure financial future for all family members.

Third, rotating vs. fixed work shifts do distinguish between low- and high-accident mines. In the underground miner sample, low-accident mines had a significantly greater percentage of individuals on rotating shift work than did high-accident mines. This same tendency was observed in the sample of foremen, although in that sample the difference between low- and high-accident mines did not reach statistical significance. Only in the above-ground miner sample was this relationship reversed. It appears, therefore, that rotating shift work, with the accompanying disturbances in miners' biological rhythm, does not have an adverse effect on accident record, and may, in fact, have a beneficial effect. However, the fact that results did not reach significance

in the foreman sample, and results were in the opposite direction in the above-ground miner sample, make further investigations in the area imperative.

Finally, there was a confirmation of the validity of mine classifications as either high- or low-accident mines. Both underground miners and above-ground miners in the high-accident mine grouping reported having experienced a greater number of accidents.

ATTITUDES TOWARD SAFETY, AND ACCIDENT CAUSES

A number of questions included in the survey instruments dealt with perceptions of the overall level of safety in the mine, attitudes toward safety on the part of both management and labor, and specific questions with regard to causes of accidents.

Overall Mine Safety

All seven groups were asked to indicate how safe they felt their mine was overall when compared to the safest mine they could imagine and the most unsafe mine they could imagine. The question utilized a ten-point scale, presented in discrete steps in a vertical format, so as to suggest a "safety ladder". The top of the ladder was labelled "safest", and the bottom "most unsafe". Mean responses of all six samples are indicated in Table 14.

In all samples except underground miners, individuals in high-accident mines actually perceived their mines to be less safe than did individuals in low-accident mines. The difference between means was significant ($p < .01$), however, in only the sample of union officials. Underground miners in high-accident mines felt that their mines were safer than did underground miners in low-accident mines. Means for all six samples were well above the mid-point of the scale, the lowest overall mean being in the sample of union officials (6.94). In other words, all samples perceived their mines as being fairly safe. Looking only at means for high-accident mines, individuals from the seven groups still indicated their mines to be relatively safe when compared with the most unsafe mine they can imagine.

In addition to the safety ladder question, wives were asked to indicate on a three-point scale ranging from "very safe" (1.0) through "somewhat safe" (2.0) to "not very safe" (3.0) exactly how safe they felt their husband's mine was. Wives of miners in both high- and low-accident mines felt that the mines their husbands worked in were quite safe. The mean rating in low-accident mines was 1.88, while that in high-accident mines was 1.92. On the other hand, when asked if they normally think of their husband's work as being dangerous or hazardous, 71% of the wives in low-accident mines answered yes, and 82% of the wives in high-accident mines answered yes. Neither of these differences reached statistical significance.

Miners' Wives' Perceptions of Mine Safety

Wives were asked to check off which of several alternative reasons why they would consider their husbands' jobs as safe, if they, in fact, did consider his job to be safe. They were also asked to check off which of several alternative reasons why they would consider their husbands' job to be dangerous, if they did consider his job to be dangerous. The reason most frequently cited by wives for considering their husbands' job safe was their husbands' carefulness. Ten wives in low-accident mines and eleven wives in high-accident mines cited this reason. On two items significant differences

Table 14
Mean Ratings of
Overall Mine Safety

<u>Underground miners</u>	
Low-Accident Mines	7.27
High-Accident Mines	7.57
Overall	7.41
<u>Above-ground Miners</u>	
Low-Accident Mines	8.16
High-Accident Mines	7.97
Overall	8.08
<u>Union Officials</u>	
Low-Accident Mines	7.75**
High-Accident Mines	6.08
Overall	6.94
<u>Foremen</u>	
Low-Accident Mines	8.50
High-Accident Mines	7.81
Overall	8.15
<u>Safety Directors</u>	
Low-Accident Mines	8.69
High-Accident Mines	7.64
Overall	8.15
<u>Management</u>	
Low-Accident Mines	8.33
High-Accident Mines	7.76
Overall	8.03
<u>Miners' Wives</u>	
Low-Accident Mines	6.98
High-Accident Mines	6.34
Overall	6.68

**Significantly different ($p < .01$) from the mean for high-accident mines

1. Rating scale used: 1 = Most Unsafe Mine
10 = Safest Mine

were found in responses of wives in the two groups. A significantly larger number of wives in low-accident mines (13 as opposed to 4 in high-accident mines) felt that their husbands jobs were safe because of the safety rules and laws. A significantly larger number of wives in high-accident mines (10 as opposed to 4 in low-accident mines) felt that their husbands' jobs were basically safe. Relatively few wives cited as reasons for considering their husband's job safe either safety programs (a total of eight responses), or safety of the physical environment (a total of eight responses), or safety of the facilities and equipment (a total of ten responses).

The reasons cited by wives for considering their husbands' jobs to be dangerous were similar in high- and low-accident mines. No significant differences were found in the number of responses given in the two groups. The most frequently cited reason (a total of 26 responses) was lack of training for miners, followed closely (25 responses) by poor maintenance of equipment and facilities. Other frequently cited reasons were management's neglect (20 responses) and workers' carelessness (19 responses). Relatively few wives (seven) felt that their husbands' jobs were dangerous because safety laws are no good.

When asked what should be done to make the work in the mines safer, wives gave several different responses. The most frequently mentioned item (cited by 24 wives) was the need for more and better training. Twenty-two wives stated that inspections were the answer, mentioning specifically a need for more inspections and inspectors, and better inspections. Sixteen wives felt that more and better safety laws were needed, and eight wives called for stricter enforcement of existing laws. A number of other responses were given including a need to impress men with their personal responsibility for safety, improved equipment maintenance, and a better attitude toward safety on the part of management. A couple of wives felt that relations needed to be improved between the bosses and the men, and one suggested a buddy system.

Number of Accidents Witnessed

Both underground miners and above-ground miners were asked how many accidents involving others they had seen in the last year. Respondents were asked to use a scale ranging from "none" to "more than four".

The mean rating of underground miners in low-accident mines was 1.05 while that in high-accident mines was 1.10. The difference between the two means was not significant. Similarly, mean ratings were not significantly different in the above-ground miner sample. The mean in low-accident mines was 0.89, while the mean in high-accident mines was 1.09.

Importance to the Company of Safety Practices

The next major topic area investigated was the importance to the company of each of 15 different items. Most items included in the question involved safety practices directly, such as the importance of keeping good safety records, or the importance of having miners not take chances. Other items involved areas of concern which could have an impact on safety, such as the importance of keeping miners satisfied in their jobs, and the importance of assuring miners' security.

Respondents were asked to indicate on a four-point scale ranging from "not important" (1.0) to "very important" (4.0) the importance of each of the 15 items. A summary of the responses are displayed in Table 15.

Underground miners reported that most safety practices were moderately important to very important to the company. Items which received mean ratings above 3.0 included: keeping good safety records, correcting safety hazards in the mine, having miners not take chances, having miners wear protective equipment, checking for gas in the mine, making sure mine walls are rock dusted, having miners report safety hazards, and upholding the company safety record. Items dealing with miners' general job satisfaction and security received substantially lower ratings. Each of the following items received a mean rating of less than 3.0: having miners participate in decisions involving safety, keeping miners satisfied in their jobs, assuring miners' security, and having competition among work crews. In addition, it was felt that having miners get both physical exams and black lung exams was of relatively less importance than other safety practices. The item which received the lowest mean rating by underground miners was the only item negatively worded: getting coal out regardless of safety.

In three instances, significant differences were found between the responses of underground miners in low- and high-accident mines. Miners in low-accident mines felt that keeping good safety records and upholding the company safety record were more important to their companies, ($p < .01$) and that having competition among work crews was less important to their companies ($p < .05$) than in high-accident mines.

Responses of union officials were similar to those of underground miners. In only one instance was a significant difference found between high- and low-accident mines. Union officials in low-accident mines felt that correcting safety hazards in the mine was significantly ($p < .05$) more important to the company than did union officials in high-accident mines. Above-ground miners in low-accident mines, however, felt that most safety practices were less important to the company than did above-ground miners in high-accident mines. Differences in this direction (significant at at least the .05 level) were observed for 10 safety practices, and above-ground miners in low-accident mines felt that getting coal out regardless of safety was significantly ($p < .01$) more important to the company than did above-ground miners in high-accident mines.

Responses of managerial personnel were similar to those of underground miners, although the safety practices were generally rated as somewhat more important by managers than by underground miners. Managers agreed that getting coal out regardless of safety was least important of all the items listed, and that having miners get physical exams and black lung exams were relatively less important than other safety practices. Keeping good safety records was rated as significantly more important by managers in low-accident mines.

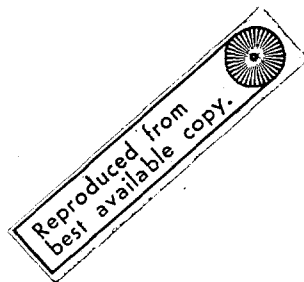


Table 15
Mean Ratings of Importance to the Company of
Safety Practices

	Under-Ground Miners			Above-Ground Miners			Union Officials			Foremen			Safety Directors			Management		
	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall
Keeping good safety records	3.57**	3.35	3.47	3.38	3.37	3.38	3.61	3.15	3.39	3.94	3.85	3.89	3.92	3.64	3.78	3.93*	3.59	3.75
Correcting safety hazards in the mine	3.36	3.27	3.32	2.99**	3.31	3.13	3.46*	3.00	3.24	3.86	3.88	3.87	4.00	3.93	3.96	4.00	3.94	3.97
Having miners not take chances	3.34	3.24	3.30	2.98*	3.29	3.11	3.25	3.04	3.15	3.92	3.88	3.90	3.92	3.93	3.93	4.00	3.94	3.97
Having miners participate in decisions involving safety	3.03	2.91	2.98	2.64*	3.07	2.83	3.00	2.65	2.83	3.28*	3.63	3.46	3.69	3.36	3.52	3.13	3.24	3.19
Having miners wear protective equipment	3.54	3.51	3.53	3.36	3.54	3.44	3.57	3.19	3.39	3.80	3.83	3.81	4.00*	3.71	3.85	3.87	3.65	3.75
Having miners get physical examinations	2.97	2.84	2.91	2.57**	3.11	2.82	2.75	2.46	2.61	3.10	3.31	3.21	3.23	3.43	3.33	3.07	3.12	3.09
Checking for gas in the mine	3.60	3.51	3.56	3.56*	3.76	3.65	3.43	3.38	3.41	3.88	3.87	3.87	4.00	3.79	3.89	3.73	3.88	3.81
Making sure mine walls are rockdusted	3.39	3.35	3.37	3.22	3.44	3.32	3.29	3.19	3.24	3.88	3.81	3.84	3.92	3.71	3.81	3.80	3.76	3.78
Keeping miners satisfied in their jobs	2.57	2.65	2.61	2.18**	2.84	2.48	2.64	2.27	2.46	3.14	3.19	3.17	3.62	3.64	3.63	3.60	3.71	3.66
Assuring miners' security	2.74	2.81	2.77	2.31**	2.93	2.59	2.93	2.92	2.93	3.32	3.25	3.28	3.85	3.71	3.78	3.53	3.65	3.59
Having competition among work crews	2.06*	2.26	2.15	2.34	2.16	2.26	2.14	2.00	2.07	2.82	2.60	2.71	2.92	3.07	3.00	3.20	3.53	3.38
Having miners report safety hazards	3.12	2.98	3.05	2.64*	3.06	2.83	2.89	2.69	2.80	3.62	3.65	3.64	3.92	3.79	3.85	4.00	3.88	3.94
Getting coal out regardless of safety	2.02	2.07	2.04	2.45**	2.00	2.25	2.32	2.65	2.48	3.32	3.25	3.28	1.23	1.21	1.22	1.27	1.18	1.22
Having miners get black lung examinations	2.54	2.52	2.53	2.13**	2.83	2.44	2.61	2.31	2.46	2.66	2.69	2.68	3.11	3.50	3.41	3.00	3.18	3.09
Upholding the company safety record	3.30**	3.08	3.20	3.14*	3.43	3.27	3.04	2.77	2.91	3.66	3.83	3.75	3.85	3.93	3.89	3.80	3.59	3.69

Rating scale used: 1 = Not important 2 = Slightly important 3 = Moderately important 4 = Very important

* Significantly different ($p < .05$) from the mean for high-accident mines.

** Significantly different ($p < .01$) from the mean for high-accident mines.

Responses by safety directors and foremen were very similar to those of managers. In general, safety practices were rated as somewhat more important to the company by these two groups than they were by underground miners. Having miners get black lung exams was the item rated as least important to the company by foremen. Having competition among work crews and having miners get physical exams were rated as relatively less important to the company by both groups. In addition, foremen felt that keeping miners satisfied in their jobs was relatively less important to the company than many other items. Safety directors in low-accident mines felt that having miners wear protective equipment was significantly more important to the company than did safety directors in high-accident mines. On the other hand, foremen in low-accident mines felt that having miners participate in decisions involving safety was significantly less important to the company than did foremen in high-accident mines.

Responses of above-ground miners and union officials were similar in pattern to the other groups although in general, they felt that safety practices were less important to the company than did the other four groups. Both above-ground miners and union officials felt that having competition among work crews was least important to the company of all the items listed (with the exception for above-ground miners of the negatively worded item, "getting coal out regardless of safety"). In the union official group, correcting safety hazards in the mine was rated as significantly more important to the company in low-accident mines ($p < .05$). There was a curious tendency for above-ground miners in low-accident mines to report that safety practices were less important to the company than above-ground miners in high-accident mines reported. The difference in means reached significance at at least the .05 level in 11 out of 15 instances. The direction of the differences between means of low-accident versus high-accident above-ground miners was different from the direction of all other significant differences found in other groups with one exception. (Foremen in low-accident mines reported that having miners participate in decisions involving safety was less important to the company than did foremen in high-accident mines).

To summarize, responses from all six groups of mine personnel (underground miners, above-ground miners, union officials, foremen, safety directors, and managers) indicate that following safety practices is important to the company. There is a tendency for traditional safety practices to be viewed as more important by the company than practices which may be viewed as more tangential to safety, such as having miners participate in decision-making, keeping miners satisfied with their jobs, and assuring miners' security. The data indicate that differences in concern for safety practices from mine to mine are perceived by the personnel working at the mines, and that, in general, companies which are viewed to have a greater concern for safety practices do in fact have better safety records.

Importance of Safety to Miners

A topic highly related to the importance to the company of safety practices is, of course, the importance to miners themselves of similar safety practices. Managers and foremen were asked to indicate on a four-point scale ranging from "not important" (1.0) to "very important" (4.0) the importance of each of 18 items to miners. As with the item discussed above, most items included in the question involved safety practices directly. Other items involved areas of concern which could have an impact on safety, such as family life, job security, and satisfaction with their job. A summary of the responses are provided in Table 16.

Almost all of the items listed in Table 16 were rated by foremen and management as being moderately important to very important to miners. Foremen and managers both felt that participating in decision-making, moving to a less dusty job, producing as much as other crews and having physical examinations were relatively less important to miners than other items in the list. Both groups also felt that getting coal out regardless of safety was least important to miners of all of the items listed. It is interesting to note that items considered by managerial personnel to be less important to miners are similar to items considered by miners to be relatively less important to the company. These items are those which may be viewed as more tangential to safety as opposed to items dealing directly with safety practices such as wearing protective equipment, reporting safety hazards, and checking for gas in the mine.

No significant differences were found between the responses of individuals in high-accident mines versus those in low-accident mines in either of the groups surveyed.

Managers were also asked about miners' general attitude toward the company. Managers in both low-and high-accident mines felt that miners' attitudes toward the company were generally good. (Mean ratings were 4.06 and 3.82 respectively on a scale ranging from 1.0 to 5.0, the difference being non-significant).

Causes of Accidents

One question asked of all mine personnel samples was the extent to which eighteen different items was related to accidents in the mine. Respondents were asked to give their answers using a 3-point scale ranging from "not much" (1.0) to "a lot" (3.0). Responses are given in Table 17.

Underground miners indicated that of the eighteen items listed, human error and bad top were the two factors most related to accidents. Faulty equipment, rib rolls, and worker attitude were listed as being somewhat related to accidents, and, to a lesser extent, cramped working conditions and seam height. Gas, layout of the mine and dust were seen as least related to accident of the eighteen items. Four items were seen as related to accidents to a significantly greater degree in high-accident mines: dust ($p < .01$), lighting, ($p < .01$), foremen ($p < .05$), and faulty equipment ($p < .05$). Rib rolls were seen as related to accidents to a significantly greater degree in low-accident mines ($p < .05$).

Table 16.
Mean Ratings of
Importance to Miners of Safety Practices¹

	<u>Foremen</u>			<u>Management</u>		
	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall
A good safety record for the crew	3.44	3.54	3.49	3.60	3.29	3.44
Learning escape routes	3.48	3.54	3.51	3.80	3.53	3.66
The company safety record	3.18	3.25	3.22	3.20	2.88	3.03
Reporting safety hazards	3.60	3.75	3.68	3.80	3.65	3.72
Not taking chances	3.52	3.75	3.64	3.73	3.59	3.66
Correcting safety & health hazards	3.56	3.67	3.62	3.67	3.82	3.75
Participating in decision-making	2.78	3.00	2.89	2.80	2.94	2.88
Getting coal out regardless of safety	1.52	1.71	1.62	1.33	1.76	1.56
Moving to a less dusty job	3.04	3.00	3.02	2.67	2.47	2.56
Wearing protective equipment	3.30	3.54	3.42	3.47	3.06	3.25
Having black lung examinations	3.20	3.12	3.16	3.13	2.88	3.00
Checking for gas in the mine	3.54	3.71	3.63	3.13	3.59	3.38
Making sure sections are rockdusted	3.32	3.37	3.34	3.40	3.24	3.31
Family life	3.60	3.40	3.50	3.80	3.71	3.75
Job security	3.52	3.56	3.54	3.80	3.65	3.72
Satisfaction with their jobs	3.32	3.40	3.36	3.33	3.65	3.50
Producing as much as other crews	2.70	2.98	2.84	2.73	2.71	2.72
Having physical examinations	2.86	3.00	2.93	2.93	2.71	2.81

¹Rating scale used: 1 = Not important
 2 = Slightly important
 3 = Moderately important
 4 = very important

Table 17
Mean Ratings of Causes of Accidents¹

How much are the following related to accidents in this mine?	Under-ground Miners			Above-ground Miners			Union Officials			Foreman			Safety Director			Management		
	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall	Low-Acc.	High-Acc.	Overall
Dust	1.32**	1.54	1.42	1.38	1.54	1.45	1.36	1.27	1.31	1.14	1.10	1.12	1.00	1.07	1.04	1.00	1.00	1.00
Gas	1.24	1.25	1.25	1.26	1.20	1.24	1.07*	1.42	1.24	1.18	1.10	1.14	1.00	1.00	1.00	1.00	1.00	1.00
Noise	1.65	1.62	1.64	1.76	1.81	1.78	1.64	1.85	1.74	1.24	1.25	1.25	1.00	1.07	1.04	1.13	1.12	1.13
Lighting	1.42**	1.57	1.49	1.66**	1.37	1.53	1.64	1.31	1.48	1.18	1.23	1.21	1.31	1.50	1.41	1.27	1.18	1.22
Company policy	1.55	1.60	1.57	1.67	1.59	1.63	1.68	1.73	1.70	1.20	1.12	1.16	1.08	1.07	1.07	1.20	1.12	1.16
Cramped working conditions	1.78	1.74	1.77	1.72	1.73	1.73	1.68	1.65	1.67	1.52	1.60	1.56	1.38	1.36	1.37	1.60	1.65	1.63
Seam height	1.70	1.77	1.73	1.68	1.71	1.69	1.82	1.58	1.70	1.58	1.69	1.64	1.85*	1.36	1.59	1.53	1.65	1.59
"Acts of God"	1.62	1.66	1.64	1.60	1.61	1.61	1.61	1.42	1.52	1.64*	1.38	1.51	1.38	1.29	1.33	1.20	1.29	1.25
Rib rolls	1.90*	1.77	1.84	1.90	1.77	1.84	1.71	1.73	1.72	1.84	1.75	1.79	1.62	1.57	1.59	1.33	1.71	1.53
Layout of the mine	1.31	1.29	1.30	1.38*	1.61	1.48	1.32	1.31	1.31	1.24	1.21	1.23	1.00	1.14	1.07	1.13	1.12	1.13
Worker attitude	1.80	1.88	1.83	1.93	1.90	1.92	1.75*	2.15	1.94	2.14	2.02	2.08	2.15	2.29	2.22	2.00	2.24	2.13
Foremen	1.59*	1.70	1.64	1.86	1.81	1.84	1.71	1.88	1.80	1.22	1.19	1.21	1.54	1.43	1.48	1.53	1.47	1.50
Bad top	2.23	2.24	2.23	2.17	2.09	2.13	1.93	2.12	2.02	2.02*	1.77	1.89	1.62	1.71	1.67	1.53	1.88	1.72
Faulty equipment	1.99*	2.10	2.04	1.97	2.00	1.98	1.75**	2.23	1.98	1.54	1.65	1.60	1.15	1.36	1.26	1.33	1.71	1.53
Human error	2.24	2.26	2.25	2.28	2.16	2.22	2.25	2.19	2.22	2.52	2.37	2.44	2.85	2.79	2.81	2.47	2.41	2.44
Water	1.52	1.55	1.54	1.57	1.59	1.58	1.32	1.62	1.46	1.36	1.25	1.30	1.15	1.29	1.22	1.13	1.12	1.13
Driving in	1.53	1.59	1.56	1.62	1.57	1.60	1.39	1.62	1.50	1.32	1.35	1.33	1.31	1.43	1.37	1.13	1.35	1.25
Retreating	1.70	1.66	1.68	1.71	1.64	1.68	1.68	1.65	1.67	1.66	1.42	1.54	1.38	1.50	1.44	1.33	1.35	1.34

¹Rating Scale used: 1 = Not much, 2 = Some, 3 = A lot

* Significantly ($p < .05$) different from the mean for high-accident mines.

** Significantly ($p < .01$) different from the mean for high-accident mines.

Responses of the other two labor groups (above-ground miners and union officials) very closely paralleled responses of underground miners. Both groups saw human error as the single factor most related to accidents, followed closely by bad top and faulty equipment. Similarly, gas, dust, and layout of the mine were viewed as relatively minor problems. Above-ground miners in low-accident mines felt that lighting was related to accidents to a significantly greater degree than did above-ground miners in high-accident mines ($p < .01$). Above-ground miners in high-accident mines saw a significantly greater problem with layout of the mine ($p < .05$), and union officials in high-accident mines saw significantly greater problems with worker attitude ($p < .05$) and faulty equipment ($p < .01$) than did similar groups in low-accident mines.

The three management groups (foremen, safety directors, and managers) concurred with labor groups that human error was the single factor most closely related to accidents. However, all three groups felt that worker attitude was the second biggest factor related to accidents. The pattern of responses was very similar to those given by underground miners. Dust, gas, and layout of the mine were all viewed as relatively minor factors. In general, all factors were viewed as less related to accidents by the three management groups than by underground miners, with the exceptions of human error and worker attitude. Both of these factors were viewed as related to accidents to a greater extent by all three management groups than by underground miners. "Acts of God" and bad top were felt to be related to accidents to a significantly greater degree ($p < .05$) by foremen in high-accident mines. Safety directors in low-accident mines felt that seam height was related to accidents to a significantly greater degree than did safety directors in high-accident mines ($p < .05$).

Another question dealing with causes of accidents was asked of miners' wives. Wives were asked if they felt that accidents could be prevented, and the extent to which each of several factors contributed to accidents. Wives were asked to respond using a scale ranging from "not much" (1.0) to "to a great extent" (3.0). Results, presented in Table 18, seem to indicate, as did responses to similar questions in other samples, that miners and their wives are not as fatalistic as might have been thought. Wives indicated that they felt that accidents could be prevented to a great extent, and that accidents did not happen by chance to any great extent. They felt that accidents were primarily a result of peoples' mistakes, and that to some extent they happened because of bad equipment. There were no significant differences between the means in high-versus low-accident mines.

Table 18
Mean Ratings of Causes of Accidents as Reported by Miners' Wives

To what extent do you think that most accidents in the mines...	Low-accident Mines	High-accident Mines	Overall
could be prevented?	2.26	2.42	2.34
happen by chance?	1.74	1.79	1.76
happen because of company policies?	1.62	1.74	1.68
happen because of bad equipment?	2.05	1.97	2.01
happen because of men worrying about personal problems?	1.95	1.95	1.95
happen because of peoples mistakes?	2.40	2.55	2.48

Rating scale used: 1 = Not much
2 = To some extent
3 = To a great extent

One final indication of the major causes of accidents can be gleaned from responses of safety directors to an open-ended question which asked specifically what the major causes of accidents were in their mines. Taking chances, disregarding established safety rules, carelessness, neglect, and other descriptions of human negligence typified the single category of responses reported most often by safety directors as the major causes of accidents in both high- and low-accident mines.

The second most frequent response was improper lifting and materials handling. Several safety directors mentioned other causes such as roof falls and rib rolls; lack of experience of miners (mentioned as being related to a high turnover rate); and slipping, tripping, and falling. Other causes which were mentioned included battery operated equipment, poor worker attitude, poor supervision, inadequate safety training, and problems arising from the union contract (e.g. not being able to place the most experienced men on hazardous jobs). There were no major differences between the responses of safety directors in high-accident mines and those in low-accident mines.

Summary

It seems that while coal mining is viewed by miners' wives as a dangerous occupation as a whole as is witnessed by the large majority of wives who indicated that they thought their husbands' jobs were hazardous, individual mines in which respondents are currently working are viewed as relatively safe. Wives felt that the main reason their husbands' jobs were safe was because of their husbands' carefulness.

In summarizing respondents' perceptions of the causes of accidents, it is safe to say that human error was the most widely recognized cause. All six mine personnel groups stated that human error was the single factor most related to accidents in their mine. When asked an open-ended question about the causes of accidents, safety directors specifically stated human error more frequently than anything else. Wives demonstrated that they were not fatalistic by stating that they felt that accidents could be prevented, and that most accidents were the result of a person's mistakes. Even when factors other than human error were mentioned as causes of accidents, they were generally worker-oriented factors, or factors under human control. For example, managers cited worker attitude as second only to human error as a cause of accidents. Safety directors mentioned improper lifting and materials handling as a cause of accidents. Faulty equipment or improperly maintained equipment, the correction of which is certainly under human control, were mentioned by underground miners in high-accident mines, above-ground miners in high-accident mines, and miners' wives. And underground miners in high-accident mines even felt that foremen were a recognizable cause of accidents.

Somewhat related to the fact that human error and ineptitude are perceived as the major cause of accidents is the fact that wives recognized lack of training and poor maintenance of equipment as the primary factors causing their husbands' job to be dangerous. Similarly more and better training was seen as a way of making mines safer.

One other fact worth reviewing is that traditional safety procedures such as keeping good safety records, checking for gas, and correcting hazards were viewed as both more important to the company and to miners than were organizational factors or job satisfaction factors such as having miners participate in decision-making, keeping miners satisfied with their jobs, and assuring miners' security. It is interesting to note, too, that personnel in low-accident mines tended to rate safety practices as more important to the company than did personnel in high-accident mines. In other words, the data indicate that differences in concern for safety practices from mine to mine are perceived by the personnel working at the mines and, in general, companies which are viewed as having a greater concern for safety practices do in fact have better safety records.

These results seem to underline the fact that future improvements in accident records are dependent mainly on behavioral techniques. Although there are many physical dangers involved in mining, human error is the most widely recognized cause of accidents. It appears that training is the behavioral technique considered most often by miners and management alike as a way of dealing with human error. Other behavioral techniques dealing with organizational factors (e.g. proper use of safety competition among work crews) or techniques aimed at improving miners' job satisfaction are accorded less importance by miners and management. Increased emphasis in these areas, therefore, appears to be justified.

MAJOR PROBLEMS IN THE MINE

All six samples of mine personnel were asked to indicate which of eleven different factors were major problems in their mine. Respondents answered either "Yes", "Unsure", or "No" to each factor. Table 19 summarizes the responses of each group.

Responses of labor groups (including underground miners, above-ground miners, and union officials) tended to differ quite a bit from responses of management groups (including foremen, safety directors, and managers). Labor groups felt that lack of management training, and poor equipment maintenance were very often problems in their mine. All three management groups indicated that lack of management training and poor equipment maintenance were not particular problems. Management groups, on the other hand, felt that too low worker productivity and too high job turnover were more often than not problems. A greater number of individuals in labor groups stated that productivity and turnover were not particular problems (with the single exception that a large number of above-ground miners did feel productivity to be a problem). All six groups felt that too much absenteeism was a problem in their mine. Union officials tended to see a larger number of problem areas than any other group. In addition to the items mentioned above, union officials more often than not felt that the following items were major problem areas: poor safety training, poor job training, too many labor problems, and trouble with safety and health laws. In no other sample did such a large proportion of respondents say that these items were major problems. None of the samples felt that too many accidents or a bad public image were great problems.

GENERAL COMPANY ATTITUDES

In addition to asking about the importance of specific safety practices to the company, personnel were asked about the posture of the company on a safety vs. production continuum. The general attitude of management toward miners and the general attitude of foremen toward miners were explored as well.

Safety vs. Production

Respondents were asked to indicate in a multiple-choice format the extent to which their company places a higher priority on safety as opposed to productivity. Responses are presented in Table 20.

More than half of the underground miners (311) surveyed stated that the company gives both safety and production equal importance. The next largest group of underground miners (157) reported that the company puts production over safety. Only 72 underground miners stated that the company puts safety over production. Extremely few miners reported that the company pays almost no attention to safety or almost no attention to production.

Table 19
Major Problems in the Mines

Problems	Underground Miners				Above-ground Miners				Union Officials				Foremen				Safety Directors				Management			
	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses	Number of responses	Total number of responses		
																							In Low-Acc. mines	In High-Acc. mines
Too much absenteeism	182	139	321	54	44	98	20	20	40	42	45	87	10	10	20	14	14	28						
	Unsure	88	81	19	15	14	3	3	3	10	7	3	0	0	3	3	0	0	0					
Too high job turnover	52	53	105	11	8	19	5	4	9	5	1	5	1	1	4	1	1	3	4					
	Unsure	43	39	82	20	17	37	4	7	7	17	18	35	7	7	14	6	11	17					
Too low worker productivity	137	113	250	34	27	61	9	9	18	15	24	39	2	2	2	2	2	5	12					
	Unsure	139	99	29	49	238	10	12	22	24	18	42	5	6	11	7	5	12						
Poor safety training	94	47	141	29	19	48	9	10	19	25	21	46	8	8	16	6	13	19						
	Unsure	124	121	33	32	65	3	3	6	12	16	28	3	4	7	3	1	4						
Lack of management training	98	85	183	19	14	33	6	6	12	12	14	26	2	2	4	6	3	9						
	Unsure	90	78	22	22	44	12	15	27	2	8	30	1	1	2	1	0	1						
Too many labor problems	144	101	245	31	22	53	10	7	17	36	42	78	12	12	24	12	14	26						
	Unsure	118	104	37	25	62	18	14	32	5	6	11	1	1	2	2	4	6						
Trouble with safety and health laws	84	67	151	31	24	55	4	4	8	17	9	26	2	2	4	2	3	5						
	Unsure	111	60	27	27	54	13	10	23	11	16	27	7	7	14	5	5	10						
Too many accidents	128	103	231	36	26	62	11	8	19	24	21	45	4	4	8	3	3	6						
	Unsure	95	58	153	21	19	40	9	13	22	8	16	5	6	11	5	5	10						
Poor equipment maintenance	127	97	224	31	26	57	11	7	18	15	14	29	2	2	4	3	3	6						
	Unsure	52	63	115	12	20	32	5	7	12	9	19	4	6	10	4	4	8						
Bad public image	217	123	340	51	32	83	17	13	30	33	35	68	8	8	16	9	9	18						
	Unsure	158	140	298	41	27	68	13	17	30	14	28	4	4	8	5	5	10						
Poor job training	58	49	107	20	19	39	4	4	8	10	13	23	2	2	4	1	1	2						
	Unsure	100	60	160	22	19	41	10	14	26	25	51	7	7	14	6	6	12						
	48	39	87	16	8	24	7	6	13	4	4	8	2	2	4	1	1	2						
	Unsure	107	61	168	30	26	56	8	11	22	11	23	3	3	6	2	2	4						
	156	134	290	40	27	67	12	13	25	33	36	69	8	8	16	11	11	22						
	Unsure	117	100	217	28	19	47	14	11	25	10	13	3	3	6	1	1	2						
	65	56	121	4	4	9	9	13	13	10	10	20	2	2	4	1	1	2						
	Unsure	133	94	227	26	22	48	7	6	13	27	39	11	11	22	10	10	20						

Table 20

Company Attitude Toward Safety

Which of the following would you say describes your company best?	Number of Underground Miner Responses				Number of Above-Ground Miner Responses				Number of Foremen Responses				Number of Safety Director Responses				Number of Management Responses			
	Low-Accident Mines (N=328)		High-Accident Mines (N=284)		Low-Accident Mines (N=87)		High-Accident Mines (N=70)		Low-Accident Mines (N=50)		High-Accident Mines (N=57)		Low-Accident Mines (N=102)		High-Accident Mines (N=14)		Low-Accident Mines (N=15)		High-Accident Mines (N=17)	
	Overall (N=612)		Overall (N=612)		Overall (N=157)		Overall (N=157)		Overall (N=102)		Overall (N=102)		Overall (N=27)		Overall (N=14)		Overall (N=15)		Overall (N=17)	
a. The company puts production over safety	71 (222)	86 (302)	157 (262)	23 (262)	17 (242)	40 (252)	2 (42)	1 (22)	3 (32)	0 (02)	1 (72)	1 (42)	0 (02)	0 (0)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	
b. The company puts safety over production	47 (142)	25 (92)	72 (122)	7 (82)	10 (142)	17 (112)	16 (322)	15 (292)	31 (302)	4 (312)	7 (502)	11 (412)	5 (332)	10 (592)	15 (472)	15 (472)	15 (472)	15 (472)	15 (472)	
c. The company gives both safety and production equal importance	173 (532)	138 (492)	311 (512)	51 (592)	33 (472)	84 (342)	24 (482)	28 (342)	52 (512)	9 (692)	6 (432)	15 (562)	9 (602)	7 (412)	16 (502)	16 (502)	16 (502)	16 (502)	16 (502)	
d. The company pays almost no attention to safety	7 (22)	5 (22)	12 (22)	1 (12)	2 (32)	3 (22)	0 (02)	1 (22)	1 (12)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	
e. The company pays almost no attention to production	2 (12)	1 (02)	3 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	

1. No significant differences were found in any of the groups surveyed between responses of individuals in high-accident mines versus those in low-accident mines (chi-squares test, .05 level of significance).

Responses from other personnel groups asked the same question (above-ground miners, foremen, safety directors, and management) were similar in that the largest number of respondents in each group stated that the company gives both safety and production equal importance. The second largest group of above-ground miners felt that the company puts production over safety. In each of the managerial groups, however, the second most frequent response was that the company puts safety over production. In all, 31 foremen, 11 safety directors, and 15 management personnel gave this response. Extremely few persons in any of the three managerial groups stated that the company puts production over safety or that the company pays almost no attention to safety or production. No significant differences were found between the responses of individuals in high-accident mines versus those in low-accident mines in any of the groups surveyed.

Management Attitudes Toward Miners

All seven groups were asked to rate the general attitude of management toward miners in their company on the following scale: 1 = very bad, 2 = bad, 3 = indifferent, 4 = good, 5 = very good. Mean ratings for each group are shown in Table 21.

In general, mean responses for the labor-oriented groups (underground miners, miners' wives, above-ground miners, and union officials) were lower than the mean responses for the three managerial groups (foremen, safety directors, and management). Responses from the four labor-oriented groups indicated that management attitudes toward miners were somewhere between indifferent and good. The three management groups, on the other hand, indicated that management attitudes toward miners were good to very good. No significant differences were found between the responses of individuals in high-accident mines versus those in low-accident mines in any of the groups surveyed.

Foremen Attitude Toward Miners

In addition to rating the general attitude of management toward miners, underground miners, above-ground miners, and safety directors were asked to rate along the same scale the general attitude of foremen toward miners. Mean ratings for each group are shown in Table 22.

All of the three groups indicated foreman attitudes toward miners were good. Mean ratings for the three groups ranged from 3.55 to 4.00. None of the differences between mean responses of individuals in high-accident mines versus those in low-accident mines were significant.

Table 21
Mean Ratings of Management Attitudes Toward Miners¹

Personnel Group	Low-Accident Mines	High-Accident Mines	Overall
Underground Miners	3.61	3.61	3.61
Above-ground Miners	3.61	3.70	3.65
Union Officials	3.36	3.19	3.28
Foremen	4.32	4.27	4.29
Safety Directors	4.62	4.36	4.48
Management	4.60	4.29	4.44
Miners' Wives	3.86	3.68	3.78

¹Rating scale used:

- 1 = very bad
- 2 = bad
- 3 = indifferent
- 4 = good
- 5 = very good

Table 22
Mean Ratings of Foremen Attitude Toward Miners¹

Personnel Group	Low-Accident Mines	High-Accident Mines	Overall
Underground Miners	3.73	3.64	3.69
Above-ground Miners	3.56	3.55	3.55
Safety Directors	3.85	4.14	4.00

¹Rating scale used:

- 1 = very bad
- 2 = bad
- 3 = indifferent
- 4 = good
- 5 = very good

Summary

In general, all groups surveyed agreed that coal companies attach substantial importance to both safety and production. Labor groups tend to feel that slightly more emphasis is put on production, whereas managerial groups feel that more emphasis is put on safety. In addition, all groups felt that both management and foremen attitudes toward miners were good, although there was a tendency for managerial groups to view management attitude toward miners as better than labor groups perceived it to be.

These results seem to indicate that coal companies (including both low-accident mines and high-accident mines) could communicate company policy and philosophy to miners in more effective way than they have in the past. Although managerial groups feel that more emphasis is placed on safety by the company than on production, this emphasis is not communicated to miners, who feel that the company places more emphasis on production. The top down phenomenon has been repeatedly demonstrated in other contexts. Workers perceive the attitudes and expectations of those above them in the organizational structure and tend to modify their behavior in that direction (Livingston, 1969; Schneider, 1973). It has been found that the best correlate of worker's attitude towards safety was the attitude of his foreman (Vandenput, 1970). It seems that management must communicate to workers both verbally and through their behavior the relative importance of safety. Tuttle et al. (1973) suggest that this can be done in a number of ways including stressing safety in initial preemployment interviews, stressing safety in training, and ensuring that new workers have contacts with experienced workers who follow recommended safety procedures. They also suggest various methods for improving organizational communication.

GENERAL MINER ATTITUDES

A number of questions were asked which were intended to assess general personal characteristics and attitudes of miners, and to assess the impact which these attitudes have on accidents in the mine. The first question, asked of all seven samples, dealt with 19 different personal characteristics. A great deal of emphasis has been placed in the past on the degree to which miners are fatalistic. Fatalism could have a substantial impact on safety behavior, insofar as a fatalistic outlook would be associated with the idea that accidents are going to happen anyway, and there is little that can be done to prevent them. Several items, therefore, dealt with fatalism. Miners were given a modified form of Rotter's internal-external control scale. In addition, managers were asked the degree to which miners are fatalistic, and the degree to which miners are resistant to new safety procedures. Finally, one question probed miners' attitudes as causes of accidents.

Personal Characteristics of Miners

All seven groups were asked how prevalent they felt each of 19 different personal characteristics were among miners in their mines. Each of these personal characteristics involved psychological variables which could indicate how miners

deal with the fact that their jobs are particularly hazardous. Many could be considered to be defense mechanisms, or ways of dealing with anxiety or fears associated with the inordinate hazards. Respondents were asked to indicate on a three-point scale ranging from "almost none" (1.0) to "a great many" (3.0) how many miners in their mines they felt possessed each characteristic. Results are indicated in Table 23.

Responses across the seven samples were very consistent. All groups indicated several characteristics to be more prevalent among miners than other characteristics. In general, it was felt that many men really enjoy working in the mines. They reported thinking more about the positive aspects of mining as opposed to the negative aspects. Additionally, they talk very little to their families about the dangers and accidents in mining. Nevertheless, quite a few miners indicated that they take a good deal of time off from work and feel a distrust of management. Further, many miners do not want their sons to go in the mines. It is noteworthy that many of the reported characteristics are in conflict, suggesting the use of defense mechanisms to cope with the stresses of mining.

In addition to there being a consensus with regard to characteristics most prevalent among miners, there was also agreement about characteristics which few miners possess. It was felt, generally, that few miners have warnings or premonitions of accidents and fatalities, and few have dreams and nightmares about getting hurt.

At least one significant difference was found in each sample when comparing mean responses of personnel in high-accident mines with those in low-accident mines. Underground miners in low-accident mines felt that a significantly greater number of miners talk a lot about accidents they have had ($p < .05$). Above-ground miners reported that a significantly greater number of miners in low-accident mines have dreams and nightmares about getting hurt ($p < .05$). Union official responses indicate fewer miners in low-accident mines are nervous while they are working ($p < .05$) and a greater number of miners in low-accident mines really enjoy working in the mines ($p < .01$). Foreman indicated that fewer miners in low-accident mines have warnings or premonitions of accidents and fatalities ($p < .05$). Safety directors in low-accident mines felt that fewer miners were superstitious ($p < .05$). Managers in high-accident mines reported that a greater number of miners felt that accidents are not caused, they just happen ($p < .05$). Finally, wives in high-accident mines felt that a greater number of miners take a lot of time off ($p < .05$).

Overall, the responses seem to indicate that miners are not as fatalistic as has sometimes been assumed. According to responses of all seven groups, relatively few miners feel that accidents are not caused, and relatively few are superstitious. There may be some basic differences between miners in high- and low-accident mines. Miners in high-accident mines do not apparently enjoy working in the mines as much, are more nervous while they're working and are more superstitious and fatalistic. They talk about accidents they have had less frequently, and have fewer dreams and nightmares about getting hurt. These differences between high- and low-accident mines provide an indication of both the level of stress to which each group is exposed and the respective degree of maladaptive coping.

Reproduced from
best available copy.

Table 23
Mean Ratings of Personal Characteristics of Miners¹

	Underground Miners			Above-ground Miners			Union Officials			Foremen			Safety Directors			Management			Miners' Wives		
	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall
a. are afraid of working underground?	1.56	1.55	1.55	1.67	1.71	1.69	1.42	1.44	1.44	1.50	1.35	1.42	1.23	1.43	1.33	1.27	1.24	1.25	1.95	1.87	1.91
b. have warnings or premonitions (signs) of accidents and fatalities?	1.41	1.36	1.38	1.61	1.67	1.64	1.31	1.39	1.39	1.32*	1.60	1.46	1.08	1.21	1.15	1.13	1.12	1.13	1.74	1.53	1.64
c. feel accidents are not caused, they just happen?	1.78	1.80	1.79	1.83	1.91	1.87	1.69	1.69	1.69	1.72	1.81	1.76	1.85	2.00	1.93	1.53*	2.00	1.78	1.95	1.87	1.91
d. talk a lot about accidents they have had?	1.98*	1.87	1.92	1.84	2.01	1.92	1.88	1.85	1.86	1.86	1.92	1.89	1.77	1.93	1.85	1.73	1.76	1.75	1.95	1.87	1.91
e. are superstitious?	1.55	1.58	1.57	1.68	1.70	1.69	1.35	1.46	1.46	1.46	1.40	1.43	1.23*	1.71	1.48	1.27	1.59	1.44	1.86	1.74	1.80
f. tend to be very religious and pray for safekeeping in the mine?	1.76	1.67	1.71	1.89	1.73	1.82	1.54	1.70	1.72	1.72	1.52	1.62	1.85	1.57	1.71	1.40	1.59	1.50	1.90	2.00	1.95
g. have dreams and nightmares about getting hurt?	1.34	1.31	1.33	1.54*	1.36	1.46	1.42	1.37	1.28	1.35	1.31	1.08	1.36	1.22	1.20	1.18	1.19	1.19	1.76	1.66	1.71
h. worry a lot about accidents?	1.72	1.68	1.70	1.72	1.77	1.75	1.73	1.69	1.68	1.58	1.63	1.56	1.64	1.59	1.60	1.59	1.59	1.59	1.95	1.84	1.90
i. are nervous while they are working?	1.64	1.66	1.65	1.63	1.74	1.68	2.00	1.81	1.50	1.58	1.54	1.54	1.69	1.57	1.63	1.47	1.53	1.50	1.69	1.79	1.74
j. think more about the good things of mining rather than the bad things?	2.21	2.17	2.19	2.18	2.11	2.15	2.12	2.20	2.24	2.21	2.23	2.23	2.23	2.50	2.37	2.20	2.29	2.25	2.40	2.32	2.36
k. never talk to their families about dangers and accidents?	1.91	1.86	1.89	1.86	1.99	1.92	1.96	1.89	1.88	1.88	1.88	1.88	2.00	2.07	2.04	1.93	1.94	1.94	1.90		
l. really enjoy working in the mines?	2.30	2.22	2.26	2.16	2.11	2.14	2.15	2.33	2.42	2.29	2.35	2.69	2.64	2.64	2.67	2.40	2.59	2.50	2.31	2.24	2.28
m. are afraid of losing their jobs?	1.76	1.66	1.71	1.66	1.70	1.68	1.96	1.85	1.32	1.38	1.35	1.23	1.29	1.26	1.26	1.20	1.29	1.25	1.64	1.68	1.66
n. need a few drinks to relax after work?	1.84	1.82	1.83	1.85	1.99	1.91	1.92	1.87	1.86	1.77	1.81	1.62	1.79	1.70	1.87	1.87	1.82	1.84	2.00	2.11	2.05
o. feel they cannot trust management?	2.10	2.10	2.10	2.25	2.10	2.18	2.04	2.15	1.92	1.94	1.93	2.08	2.43	2.26	2.00	2.00	1.82	1.91	1.88	2.00	1.94
p. feel they cannot trust mine inspectors?	1.84	1.83	1.84	2.02	1.89	1.96	1.88	1.91	1.74	1.65	1.70	1.85	2.07	1.96	1.87	1.87	1.82	1.84	1.83	1.74	1.79
q. wish they had never gone into the mines?	1.75	1.78	1.77	1.75	1.94	1.83	1.85	1.76	1.60	1.75	1.68	1.31	1.71	1.52	1.33	1.59	1.47	1.79	1.84	1.81	
r. do not want their sons to go into the mines?	2.14	2.10	2.12	2.37*	2.10	2.25	2.31	2.26	2.06	2.08	2.07	2.08	2.29	2.19	1.73	2.12	1.94	2.12	2.18	2.18	2.15
s. take a lot of time off?	2.00	2.03	2.01	2.03	2.13	2.08	2.31	2.19	2.26	2.10	2.18	2.15	2.43	2.30	2.13	2.24	2.19	2.02*	2.26	2.26	2.14

¹ Rating scale used:
1 = Almost none
2 = Some
3 = A great many

* Significantly different ($P < .05$) from the mean for high-accident mines

** Significantly different ($P < .01$) from the mean for high-accident mines

Internal Versus External Control

An attempt was made to construct an objective measure of the degree of fatalism which underground miners exhibited. The measure constructed was an adaptation of a scale originally used by Rotter (1966) to measure the concept of internal-external control. As originally defined, internal control represents a person's belief that rewards follow from his own behavior. External control represents the belief that rewards are controlled by forces outside of the individual and thus may occur independently of his own actions. A fatalistic individual would be expected to be highly external on the internal-external dimension, since he would view his fate as being determined primarily by forces beyond his control.

Underground miners were asked a series of eleven items in which they were requested to indicate which of two statements came closest to their opinion. In each item, one statement represented an internal control orientation, and one represented an external control orientation. An overall internal-external control score (I-E score) was computed for each individual by constructing a summative scale. Each of the eleven items for which an external-control response was chosen was scored "1.0", and each item for which an internal-control response was chosen was scored "0.0". Scores for each of the eleven items were then summed and divided by the total number of items answered to compute an overall I-E score. Overall I-E scores, therefore, ranged from 0 to 1, with higher scores reflecting a greater external control orientation (i.e. a more fatalistic outlook).

The mean I-E score in low-accident mines was 0.29, while the mean in high-accident mines was .31. The difference between means was not significant. In other words, miners in both high - and low-accident mines displayed an internal control orientation. Scores on the I-E continuum were categorized as belonging to one of five intervals as follows: extreme external orientation (I-E scores between .8 and 1.0), external orientation (I-E scores between .6 and .8), neither internal nor external (I-E scores between .4 and .6), internal orientation (I-E scores between .2 and .4), and extreme internal orientation (I-E scores between 0.0 and .2). The number of individuals falling into each of these five categories is shown in Table 24.

TABLE 24
Internal-External Orientation

Internal-External Orientation	Number of individuals in low-acc. mines (N=328)	Number of individuals in high-acc. mines (N=284)	Total number of individuals (N=612)
Extreme external orientation	5 (2%)	5 (2%)	10 (2%)
External orientation	18 (5%)	21 (7%)	39 (6%)
Neither internal nor external	64 (20%)	53 (19%)	117 (19%)
Internal orientation	105 (32%)	109 (38%)	214 (35%)
Extreme internal orientation	136 (41%)	96 (34%)	232 (38%)

The largest percentage of miners (38%) showed an extreme internal orientation, while the second largest percentage (35%) had a more moderate internal orientation. Only 2% of all miners showed an extreme external orientation, and only 6% showed even a more moderate external orientation.

Fatalism

To further probe the degree of fatalism previously thought to be exhibited by underground miners, managers were asked to respond in an open-ended format to a question asking if miners are fatalistic when it comes to coal mine safety. Out of 30 managers who responded to the question, only one felt that miners were fatalistic to any great degree. Ten managers responded by giving a flat "No". Others elaborated by saying that in years past miners may have been a lot more fatalistic. It was felt that today's miners are younger, better educated, and more able to recognize dangerous situations. While several managers stated that some miners might feel that way, it was generally agreed that most miners believe that each person determines his fate by his own actions, or the actions of his work group, and that most miners try to work safely and don't take chances.

Resistance to New Safety Procedures and Ideas

A second open-ended question was asked of managers to probe another personality characteristic of underground miners. Managers were asked if they believed that miners were resistant to new safety procedures and ideas. Managers were divided on this issue, with 18 indicating that they felt miners were resistant to new ideas, and 11 indicating that miners were not resistant to new ideas. There were no substantial differences in the responses of managers in high-vs. low-accident mines. Many of those who felt that miners were resistant to new safety procedures and ideas stated that miners often feel the new procedures only cause extra work and that the men who legislate some of the new procedures don't really know about mining. They further stated that many miners don't believe that safety devices prevent accidents. Many of those managers who felt that miners were not resistant to new safety procedures, and ideas stated that miners are no different from other workers. It was felt that miners would accept new procedures if they were properly explained and the reasons for the procedures were explained. Even those who felt that miners were resistant to new procedures and ideas often stated that better ways of introducing new procedures through training or safety talks could do much to overcome the resistance.

Miners' Attitudes as Accident Causes

Foremen and management were asked the extent to which each of 12 miner attitudes contributed to accidents in their mines. Some of the 12 items dealt with worrying about various things such as debts, marriage problems, or future health problems. Others dealt with such behavioral items as "just being careless and not following safety rules". Respondents were asked to indicate on a three-point scale ranging from "not much" (1.0) to "a lot" (3.0) just how much each of the 12 items led to accidents. Responses are summarized in Table 25.

Table 25

Mean Ratings of Miners' Attitudes as Accident Causes¹

	FOREMEN			MANAGEMENT		
	Low-Accident Mines	High-Accident Mines	Overall	Low-Accident Mines	High-Accident Mines	Over Mines
How much are accidents in this mine caused by the miners...						
worrying and being nervous about accidents?	1.30	1.27	1.28	1.27	1.18	1.
just being careless and not following safety rules?	2.24	2.15	2.20	2.53	2.65	2.
being afraid of losing their job? .	1.06	1.12	1.09	1.00	1.12	1.
thinking about problems with their children?	1.54	1.65	1.60	1.33	1.59	1.
worrying about debts?	1.58	1.65	1.62	1.27**	2.00	1.
being upset about marriage problems?	1.68	1.63	1.66	1.53*	1.88	1.
bad health and feeling bad?	1.66	1.56	1.61	1.33**	1.94	1.
being very tired or sleepy?	1.70	1.63	1.67	1.60	1.76	1.
hurrying to begin a vacation? . . .	1.64	1.65	1.65	1.47*	1.88	1.
worrying about future health problems? .	1.28	1.29	1.28	1.13	1.24	1.
just not giving a damn?	2.06	2.10	2.08	1.93	2.12	2.
not using good common sense and judgement?	2.32	2.23	2.27	2.20	2.41	2.

¹Rating scale used:

1=Not much

2=Some

3=A lot

*Significantly different ($p < .05$) from the mean for high-accident mines**Significantly different ($p < .01$) from the mean for high-accident mines

Of the 12 items listed in Table 23, three were rated by both foremen and management as causing accidents relatively more frequently than other items. These items included "just being careless and not following safety rules", "just not giving a damn", and "not using good common sense and judgement". The two items rated as causing accidents least frequently were "worrying and being nervous about accidents", and "worrying about future health problems".

Significant differences between mean responses in high-accident mines versus low-accident mines were found for four items in the management sample. Managers in high-accident mines felt that accidents were caused more often by miners worrying about debts, being upset about marriage problems, bad health and feeling bad, and hurrying to begin a vacation.

Summary

Underground miners appear to be much less fatalistic than has been assumed in the past. Responses to several independent questions confirm that miners do feel that they have some control over their destiny. Instead of fatalism, attitudes which were reported as leading to accidents included just being careless and not following safety rules, just not giving a damn, and not using good common sense and judgement.

There were several prevalent characteristics of miners reported, which give some insight into how miners deal with problems posed by their hazardous jobs. Miners were reported to think more about the good aspects of mining rather than the bad aspects. Furthermore, miners tend not to talk with their families about dangers and accidents. In addition, miners were reported to take a lot of time off. It was also reported that most miners did not want their sons to work in the mines.

The fact that miners are not as fatalistic as may have been assumed in the past is encouraging in terms of the application of behavioral techniques for reducing accident occurrence. Miners apparently realize that their own behaviors and the behaviors of others around them do have an impact on consequences and outcomes which they experience. They realize that their own carelessness and attitudes can cause accidents. With this orientation among miners, behavioral techniques such as training to ensure that the knowledge and skills requisite for safe job performance are among the repertoire of each miner, and the establishment of programs providing positive reinforcement for appropriate job behaviors should be maximally beneficial.

PHYSICAL AND STRESS-RELATED PSYCHOLOGICAL PROBLEMS

Perhaps related to some extent to the personality and attitudinal factors discussed above are psychological and physical problems reported to be prevalent among underground miners. Most information in this area was gathered from the survey of miners' wives. Wives were asked to indicate not only their own physical ailments, but also those which troubled their husbands. They were also asked to give a brief medical history for their husbands and to indicate how frequently certain medicines were used.

Physical, Psychological Ailments

Wives were asked to indicate on a five-point scale ranging from "Almost never" (1.0) to "Almost always" (5.0) how often they were bothered by each of nine different ailments. Mean ratings are presented in Table 26.

Table 26
Mean Ratings of
Wives' Physical and Psychological Ailments

Ailment	Low-Accident Mines	High-Accident Mines	Overall
Nervous Stomach	2.19	2.42	2.30
Sleeping trouble	2.24	2.39	2.31
Worries	2.50	2.87	2.68
Being tired and rundown	3.02*	2.45	2.75
Being unhappy a lot	1.98	1.71	1.85
Headaches	2.53	2.61	2.56
Backaches	2.79	2.71	2.75
Trouble breathing	2.10	1.63	1.88
Female troubles	1.76	1.63	1.70

1. Rating scale used:

- 1 = Almost never
- 2 = Seldom
- 3 = Sometimes
- 4 = Often
- 5 = Almost always

* Significantly different($p < .05$) from the mean for high-accident mines

Wives had few complaints of physical or stress-related illness. All overall means were less than 3.0, the mid-point of the scale. The most frequent complaints were being tired and rundown, backaches, and worries. Least frequent complaints were female troubles, being unhappy a lot, and trouble breathing.

Wives in low-accident mines reported being tired and rundown significantly ($p < .05$) more frequently than did wives in high-accident mines.

Wives were also asked to indicate, using the same five-point scale, how often their husbands were bothered by various physical ailments. Mean ratings are shown in Table 27. As with the item asking about wives' own ailments, all overall means were less than the mid-point of the scale (3.0). Wives reported that their husbands suffered most from backaches, being tired and rundown, worries, and colds or flu. Wives reported that their husbands suffered least from shaking, skin rashes, bad scrapes or burns, trouble seeing, trouble with teeth, trouble hearing, and being unhappy a lot. There were no significant differences between mean responses in high versus low-accident mines.

Table 27
Mean Ratings of
Husbands' Physical Ailments

Ailment	Low-accident Mines	High-accident Mines	Overall
Skin rashes	1.62	1.34	1.49
Shaking of any kind	1.38	1.32	1.35
Backaches	2.62	2.97	2.79
Colds or flu	2.69	2.32	2.51
Trouble seeing	1.71	1.74	1.73
Trouble hearing	2.00	1.71	1.86
Trouble with teeth	1.83	1.79	1.81
Breathing trouble	2.50	2.45	2.48
Coughing problems	2.38	2.37	2.38
Bad scrapes and burns	1.62	1.82	1.71
Trouble sleeping	2.17	2.37	2.26
Headaches	2.21	2.58	2.39
Being tired and rundown	2.64	2.71	2.68
Worries	2.36	2.74	2.54
Being unhappy a lot	1.81	1.89	1.85

1. Rating scale used:

1 = Almost never	4 = Often
2 = Seldom	5 = Almost always
3 = Sometimes	

In addition to asking about the ailments listed in Table 27, wives were asked to complete a brief medical history of their husbands. They were asked to check off which of 14 diseases or physical maladies their husbands had had in the past year, and to indicate whether the malady was diagnosed by a doctor, whether it was caused or made more severe by his job, and whether he had taken any medication for the illness in the past year. Table 28 presents the percentage of wives who answered in the affirmative for each item for the overall sample, including both low- and high-accident mines. The illnesses reported most frequently were rheumatism or trouble with joints (reported by more than 26% of the wives) and high blood pressure (reported by more than 18%). In each of the cases where these two diseases were reported, wives indicated that the trouble had been diagnosed by a doctor. Approximately half of the time these two disorders were reported, wives indicated that their husband's job had made the trouble more severe and that their husband had taken medication for the disorder. Maladies reported least frequently were gallbladder trouble (reported by none of the wives), stroke and epilepsy (both reported by one individual). Each of the other disorders was reported by between 3% and 10% of the wives. In most instances the disorders had been diagnosed by a doctor. Where sudden weight gain, stroke, hernia or rupture, heart trouble, and nervous trouble were reported, they were more often than not judged to have been caused or made more severe by the husband's job. Where hay fever, stomach trouble (ulcers), stroke, cancer (tumors), and nervous trouble were reported, the husband more often than not was reported to have taken medication for the disorder. Two disorders were reported significantly ($p < .05$) more often by wives whose husbands worked in high-accident mines. High blood pressure was reported by 29% of wives in high-accident mines compared to 10% of wives in low-accident mines. "Nervous trouble" was reported by 16% of wives in high-accident mines compared to only 2% of wives in low-accident mines.

Wives were asked to indicate on a three-point scale ranging from "better" (1.0) through "has no effect" (2.0), to "worse" (3.0), the way in which their husbands' job affects both his physical health, and his nerves or outlook. In both low-accident and high-accident mines wives reported that their husband's job makes his physical health worse. The mean response in high-accident mines (2.50) was, however, significantly ($p < .05$) higher than the mean in low-accident mines (2.21). Wives in low-accident mines indicated that their husband's job had no effect on his nerves or outlook (mean rating of 2.00), while wives in high-accident mines felt that the job made their husbands nerves or outlook worse (mean rating of 2.18). The difference between the means of the two groups was not statistically significant, however.

Finally, wives were asked to indicate if their husbands were missing any fingers, arms, or legs. One person whose husband worked in a high-accident mine reported that her husband was missing some fingers. No one indicated the loss of any arms or legs.

Use of Medicines, Tobacco, and Alcohol

Wives were asked to indicate on a four-point scale ranging from "less than once a week" (1.0) to "everyday" (4.0) how often their husbands used each of eleven varieties of medicine, tobacco, and alcohol. Results are summarized in Table 29.

Table 28

History of Husbands' Illnesses

(Number below indicates the percentage of respondents answering in the affirmative.)

Physical Condition	Has your husband had this illness in the past year?	Was this diagnosed by a doctor?	Was this caused or made more severe by his job?	Has he taken any medication for this in the past year?
Hay Fever	3.75%	3.75%	1.25%	3.75%
Swelling in the throat or sudden weight gain (thyroid trouble or goiter)	3.75%	1.25%	2.50%	1.25%
Rheumatism (trouble with joints)	26.25%	26.25%	13.75%	15.00%
High blood pressure	18.75%	22.50% ¹	7.5%	10.0%
Diabetes (sugar)	7.5%	6.25%	2.50%	5.0%
Stomach trouble (ulcers)	10.0%	8.75%	2.50%	6.25%
A stroke	1.25%	1.25%	1.25%	1.25%
Cancer (tumors)	5.0%	5.0%	1.25%	2.5%
Hernia or rupture	8.75%	6.25%	7.50%	0%
Heart trouble	3.75%	3.75%	2.50%	1.25%
Gallbladder trouble	0%	0%	0%	0%
Kidney trouble	6.25%	6.25%	1.25%	2.50%
Fits (epilepsy)	1.25%	0%	0%	0%
Nerves	8.75%	7.50%	6.25%	6.25%

¹A greater number of wives reported high blood pressure as having been diagnosed by a doctor than reported their husbands as having had high blood pressure in the past year.

Table 29
Mean Responses Indicating
Use of Medicines, Tobacco, and Alcohol

	Low-Accident Mines	High-Accident Mines	Overall
Aspirin or headache medicine. . .	1.71	1.84	1.78
Antacids.	1.86	1.71	1.79
Laxatives.	1.00	1.00	1.00
Cough and cold medicine.	1.52*	1.16	1.35
Medication to give him pep. . . .	1.07	1.00	1.01
Throat lozenges and cough drops .	1.14	1.16	1.15
Sleeping pills.	1.07	1.03	1.05
Tranquilizers.	1.07	1.00	1.04
Cigarettes.	2.90**	2.00	2.48
Other tobacco.	2.05	2.13	2.09
Alcohol (e.g. beer, wine, liquor). .	2.02	1.87	1.95

1. Rating scale used: 1 = Less than once a week
 2 = Once a week
 3 = More than once a week
 4 = Every day

* Significantly different ($p \leq .05$) from the mean for high-accident mines.

** Significantly different ($p \leq .01$) from the mean for high-accident mines.

Of the eleven items listed in Table 29, cigarettes are by far the most widely used. Following cigarettes, other tobacco products are next most widely used, followed closely by alcohol (beer, wine, or liquor). Laxatives, medication for pep, sleeping pills, and tranquilizers were reportedly used by miners very

infrequently. Wives in low-accident mines reported that their husbands smoked cigarettes significantly more than those in high-accident mines ($p < .01$) and also that their husbands took cough and cold medicine significantly more often ($p < .05$). Table 29 also shows that there is fairly regular usage of aspirin or headache medicine and of antacids in both high- and low-accident mines.

Wives' Problems of Living

Seven different problems of wives were explored, which could be caused as a result of having a husband working as a miner. Wives were asked to indicate whether these were a "big problem" (scale value of 3.0), "somewhat of a problem" (scale value of 2.0), or "not much of a problem at all" (scale value of 1.0). Responses are summarized in Table 30.

Table 30
Mean Responses Indicating Wives' Problems

Problem	Low-Accident Mines	High-Accident Mines	Overall
Worry about husband's safety.	2.36	2.16	2.26
Worry about husband losing his job. .	1.29	1.16	1.23
Husband having health problems	2.07	1.97	2.03
Dirt and grime on the job.	1.81	1.71	1.76
Wife having to take lots of responsibility for house and children.	1.60	1.61	1.60
Living conditions in a mining area. . .	1.31	1.24	1.28
The ideas other people have about miners.	1.21	1.24	1.23

The major problems for wives caused by their husband's job was worry about their husband's safety, and the health problems created by the job. Other factors which created somewhat of a problem were dirt and grime on the job, and wives themselves having to take lots of responsibility for house and children. Relatively minor problems were worry about their husband losing his job, the ideas other people have about miners, and living conditions in the mining area. There were no significant differences between the means in high-accident mines versus those in low-accident mines.

Summary

Miners' wives generally indicated that physical and psychological problems were not very prevalent with them. Wives of miners in low-accident mines reported being tired and rundown more frequently than the wives of miners in high-accident mines. For their husbands, they reported that backaches, being tired and rundown, worries, and cold and flu occurred most often. In addition, a high percentage of wives reported that their husbands had been diagnosed by a physician as having rheumatism or joint problems (more than 26%) and high blood pressure (more than 18%). For both of these disorders, the wives felt that their husband's job made it more severe. In fact, the wives generally felt that their husband's job made his physical health worse, especially in high-accident mines.

In comparing high- with low-accident mines, two disorders were significantly ($p < .05$) more prevalent in miners working in high-accident mines -- high blood pressure (29% versus 10% respectively) and "nervous trouble" (16% versus 2%, respectively). Even though the diagnosis for the specific type of hypertension was not elicited, the vast majority of high blood pressure is unknown etiology and often is related to emotional stress. Coupled with the substantially higher incidence of "nervous trouble" reported of miners employed in high-accident mines, the role of emotional stress becomes more prominent.

Wives reported most frequently that their husbands used cigarettes, other tobacco products, alcohol, antacids, and aspirin or other headache medicine. Cigarettes and cough or cold medicines were found to be used more frequently in low-accident mines.

With regard to problems of living, miners' wives were most concerned about their husband's job safety and health. No differences were found for these concerns between low- and high-accident mines.

SAFETY AND HEALTH EQUIPMENT

Another primary area of investigation was miner utilization of safety and health equipment. Subsumed under this topic was the question of actual necessity of various pieces of equipment, as well as an investigation of why miners might not use equipment. Safety directors were further queried with regard to disciplinary actions taken against workers who do not use required protective devices, and the frequency with which personal protective devices are inspected. Foremen were asked the open ended question: "How do you get miners to use safety and health equipment?"

Need for Safety and Health Equipment

Respondents were asked to rate the necessity of 13 different pieces of safety and health equipment on a three-point scale ranging from "not necessary" (1.0) to "very necessary" (3.0). Hard hats were viewed as very necessary by virtually all underground miners, foremen and managers Table 31. These were recognized as the single most important piece of equipment itemized. Hard-toe shoes, fire extinguishers, self-rescuers, and methane detectors were also listed as being quite necessary. Ear protectors were rated as being least necessary of the 13 pieces of equipment by foremen and underground miners while more lighting equipment was rated as least necessary by management.

An interesting trend appeared in comparison of responses of underground miners in low-accident mines with responses of miners in high-accident mines. Five of the 13 pieces of equipment were rated as being significantly less necessary (at at least the .05 level) by miners in low-accident mines: gloves, safety glasses, ear protectors, dust sampler, and garters for pants legs.

A second topic in the area of safety and health equipment was miners' reasons for not using equipment which is available. Respondents were asked to rate on a three-point scale ranging from "not much" (1.0) to "great extent" (3.0) the extent to which eleven different items was a reason why miners might not use safety and health equipment. Mean responses for five different categories of mine personnel are presented in Table 32.

As a group, underground miners felt that the two primary reasons for not using equipment were that it is uncomfortable, and that it gets in the way of working. Above-ground miners, foremen, safety directors, and union officials all concurred with underground miners that these two reasons were more important than any others in keeping miners from using safety and health equipment. Underground miners did not feel that other miners making fun of persons wearing equipment was a reason for equipment not being used. Of the eleven different reasons cited in the question, this was viewed as the least important reason by not only underground miners, but by above-ground miners, and union officials as well.

Foremen and safety directors apparently feel that safety and health equipment is maintained in good condition, since poor equipment maintenance was rated by those two groups as being the least important reason for its lack of use. Underground miners, on the other hand, ascribed relatively greater importance to poor maintenance as a reason for not using equipment.

Table 31
Mean Responses Indicating
Need for Safety and Health Equipment¹

<u>Equipment</u>	<u>Underground Mines</u>				<u>Foremen</u>		<u>Management</u>	
	Low-acc. Mines	High-acc. Mines	Overall	Low-acc. Mines	High-acc. Mines	Overall	Low-acc. Mines	High-acc. Mines
Hard Hat	2.99	2.98	2.99	3.00	3.00	3.00	3.00	3.00
Gloves	2.20**	2.40	2.29	2.28	2.37	2.32	2.27	2.35
Hard-toe shoes	2.93	2.95	2.94	2.90	2.96	2.93	2.93	2.94
Safety Glasses	2.45*	2.56	2.50	2.48	2.50	2.49	2.73	2.59
Respirator	2.49	2.52	2.50	2.36	2.19	2.27	2.33	2.59
Ear protectors	1.83**	2.03	1.92	1.78	1.87	1.82	1.87	1.82
Methane detector	2.83	2.82	2.82	2.84	2.83	2.83	2.47	2.76
Dust sampler	2.35*	2.47	2.40	2.10	2.10	2.10	2.53	2.71
Fire extinguishers	2.92	2.90	2.91	2.86	2.77	2.81	3.00	3.06
Self rescuers	2.91	2.92	2.92	2.92	2.77	2.84	2.93	3.06
More lighting equip.	2.28	2.35	2.32	1.96	2.13	2.05	1.87	1.76
Garter for pants legs	2.35**	2.52	2.43	2.40	2.60	2.50	2.67	2.94
Sounding device to test roof	2.65	2.80	2.72	2.68	2.81	2.75	2.80	2.65
								2.72

¹Rating scale used:

- 1 = not necessary
- 2 = somewhat necessary
- 3 = very necessary

* Significantly different ($p < .05$) from the mean for high accident mines
 ** Significantly different ($p < .01$) from the mean for high accident mines

Table 32
Mean Scores Indicating
Reasons for Not Using Safety and Health Equipment¹

Reason	Underground Miners			Above-Ground Miners			Foremen			Safety Directors			Union Officials		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall
It is difficult to get	1.48*	1.37	1.43	1.37	1.44	1.40	1.26	1.23	1.25	1.15	1.14	1.15	1.39	1.54	1.46
It is poorly maintained	1.52*	1.63	1.57	1.37	1.40	1.38	1.18	1.23	1.21	1.08	1.07	1.07	1.39*	1.73	1.56
It is uncomfortable	1.85	1.93	1.89	1.87	1.90	1.89	1.88	1.96	1.92	2.00	2.07	2.04	1.93	1.81	1.87
Lack of training	1.60**	1.77	1.68	1.55	1.61	1.58	1.50	1.37	1.43	1.31	1.57	1.44	1.75	1.85	1.80
Ailments from use (such as rashes from respirators)	1.33	1.30	1.32	1.29	1.26	1.27	1.38	1.29	1.33	1.15	1.21	1.19	1.25	1.19	1.22
Other miners make fun of you	1.13	1.12	1.13	1.07	1.09	1.08	1.28	1.15	1.22	1.31	1.43	1.37	1.14	1.04	1.09
It isn't any good	1.37**	1.56	1.46	1.34	1.39	1.36	1.24	1.35	1.29	1.39	1.29	1.33	1.39	1.65	1.52
It gets in the way of working	1.86	1.94	1.89	1.78*	1.99	1.87	2.00	1.83	1.91	2.15	2.14	2.15	1.82	1.96	1.89
Company or foremen attitudes	1.35	1.32	1.33	1.33*	1.60	1.48	1.28	1.23	1.25	1.31	1.50	1.41	1.54	1.69	1.61
It makes the job more dangerous than before	1.52	1.60	1.56	1.57*	1.37	1.48	1.54	1.62	1.58	1.31	1.57	1.44	1.46	1.50	1.48
No need for it	1.58*	1.71	1.64	1.83	1.61	1.73	1.54	1.50	1.52	1.54	1.79	1.66	1.50	1.38	1.44

¹Rating scale used
1 = Not much
2 = Some extent
3 = Great extent

*Significantly different ($p < .05$) from the mean for high-accident mines.
**Significantly different ($p < .01$) from the mean for high-accident mines.

Significant differences were found in several instances between mean responses of personnel in low-accident mines and responses of personnel in high-accident mines. Poor maintenance, lack of training, and the fact that equipment isn't any good were cited as being more important as reasons for not using equipment by underground miners in high-accident mines. On the other hand, the fact that there is no need for it, and that it is difficult to get were cited as being more important as reasons for not using equipment by underground miners in low-accident mines. Above-ground miners in high-accident mines felt that company or foreman attitudes and the fact that equipment gets in the way of working were more important as reasons for not using equipment than did above-ground miners in low-accident mines. On the other hand, above-ground miners in low-accident mines felt more strongly that safety and health equipment makes the job more dangerous than before. Union officials in high-accident mines felt (as did underground miners) that poor maintenance was more important as a reason for not using equipment than did union officials in low-accident mines.

Frequency of Inspection of Personal Protective Devices

Most safety directors (67%) indicated that personal protective devices were inspected at specified intervals. Twenty-six percent of the safety directors stated that the devices were inspected "occasionally", while seven percent indicated that they were never inspected. In addition, one-third of the sample reported that personal protective devices were inspected at the request of workers. There were no significant differences between the responses given in low-versus high-accident mines.

Getting Miners to Use Safety Equipment

Seventy-nine foremen responded to the open-ended question: "How do you get miners to use safety equipment?" By far the single most prevalent response (48%) was that they showed the equipment to miners and tried to convince them of its importance and its potential benefit. The second most frequent response (10%) was that they used force and their authority to make miners use the equipment. A number of other responses were given, but the two main themes discussed above were present in almost all responses. For example, a number of foremen indicated that they got miners to use safety equipment by continually telling them to use it, by demonstrating its use, by training miners in its use, by weekly safety talks, etc. All of these answers seem related to the most prevalent response category "showing the equipment to miners and convincing them of its importance." Other foremen indicated that they got miners to use safety equipment by strict enforcement of company policy, or by not letting miners go underground without it. These answers seem related to the category of responses indicating "use of force". It is interesting that only six percent of the foremen answered that they used the equipment themselves as a means of getting miners to use it. There were no substantial differences in responses given in high-accident mines and low-accident mines.

Disciplinary Actions Taken Against Workers Not Using Required Equipment

Foremen, safety directors, and managers were asked what disciplinary actions were taken against workers who do not use required protective devices. Results, summarized in Table 33, indicate that verbal reprimands and

Table 33

Disciplinary Actions Taken

Disciplinary Action	Foremen			Safety Directors			Management		
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=102)	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Verbal Reprimand	38 (76%)	39 (75%)	77 (75%)	9 (69%)	13 (93%)	22 (81%)	14 (93%)	16 (94%)	30 (94%)
Written Reprimand	13 (26%)	16 (31%)	29 (28%)	8 (62%)	10 (71%)	18 (67%)	8 (53%)	8 (47%)	16 (50%)
Fines	2 (4%)	1 (2%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Demerits applied toward dismissal	4 (8%)	12 (23%)	16 (16%)	1 (8%)	5 (36%)	6 (22%)	2 (13%)	4 (24%)	6 (19%)
Demerits hindering raises	2 (4%)	2 (4%)	4 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Demerits leading to denial of rewards	3 (6%)	2 (4%)	5 (5%)	1 (8%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)
Reassignment to a less desirable job	9 (18%)	6 (12%)	15 (15%)	1 (8%)	2 (14%)	3 (11%)	1 (7%)	3 (18%)	4 (13%)
None	6 (6%)	3 (6%)	9 (9%)	0 (0%)	1 (7%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)

written reprimands are by far the more frequently used form of disciplinary action. The use of verbal reprimands was indicated by 75% of the foremen, 81% of the safety directors, and 94% of the managers. The use of written reprimands was indicated by 28% of the foremen, 67% of the safety directors, and 50% of the managers. Responses from all three samples indicate that fines, demerits hindering raises, and demerits leading to denial of rewards are hardly ever used. The pattern of responses in high-accident mines is not significantly different from that in low-accident mines.

Safety directors were further asked to indicate the effectiveness of the alternative disciplinary actions. They indicated that a verbal reprimand was most effective, followed by a written reprimand.

Summary of Items Related to Safety and Health Equipment

In general, there is high agreement across all groups surveyed that safety and health equipment is necessary, and that hard-hats in particular, are indispensable. Ear protectors and more lighting equipment, it is agreed, are relatively the least important pieces of equipment.

Discomfort and bulkiness (i.e., equipment getting in the way of working) appear to be the most important reasons why safety and health equipment is not used. The idea that use of safety and health equipment is unmasculine and consequently social pressure is exerted to prevent its use is apparently not valid, since "other workers make fun of you" was not viewed by any group as an important reason for not using equipment. It appears, therefore, that engineering advances in the design of safety equipment are required in order to increase the frequency of usage.

It appears that management (in particular, foremen and safety directors) may be over-confident with regard to the condition of safety and health equipment. Underground miners, above-ground miners, and union officials cited poor maintenance as relatively more important as a reason for not using equipment than did either of the two management groups. Furthermore, poor maintenance of safety and health equipment appears to be a significantly greater problem in high-accident mines, judging from responses of underground miners and union officials. A periodic inspection of safety equipment appears necessary.

USE OF AVAILABLE HEALTH PROGRAMS

Somewhat related to the use of safety and health equipment is the use of health programs such as the Federal X-ray program. One major topic explored with regard to equipment was alternative reasons why equipment might not be used. Similarly, the major topic explored with regard to health programs was the reasons why health programs might not be used.

Underground miners, above-ground miners, management, and miner's wives were asked which of nine alternative statements might be reasons why miners might not use available health programs. Table 34 presents a summary of the responses. All four groups stated most often that having to wait too long to see doctors was a reason for not using available health programs. The second most frequently checked reason in all samples except miners' wives was that X-rays may be used to get rid of miners with black lung. Wives indicated second most often that doctors are too hard to get to. Of relatively minor importance was the cost of health care and the feeling that doctors don't know what they're doing.

Significant differences were found in the number of responses between high-and low-accident mines in four instances. A significantly ($p < .01$) greater number of underground miners in low-accident mines reported that X-rays may be used to get rid of miners with black lung when compared to responses of underground miners in high-accident mines. On the other hand, a significantly greater number of underground miners in high-accident mines felt that reasons for not using available health programs included the expense of health care ($p < .05$) and the fact that doctors might put you in the hospital ($p < .05$). A significantly greater number of wives in low-accident mines felt that you have to wait too long to see doctors ($p < .01$).

TRAINING

One major area of concern is training. Two important questions were explored in this area. One is the adequacy of training which is given to miners. The second is the amount which miners have learned about safety and health practices from each of a number of different sources including training programs sponsored by several different groups. In addition, safety directors were asked a number of questions about what training was made available in their mines and what training techniques were utilized.

Adequacy of training

The first question dealt with adequacy of training in each of eleven different areas. Respondents were asked to use a 4-point scale: "poor" (1.0), "fair" (2), "good" (3), and "excellent" (4.0) to rate the quality of training they had received. For each of the eleven different areas, miners rated their training as being only in the fair to good range. Mean responses are presented in Table 35. The lowest rating (2.14) was received by training in mine rescue procedures and techniques; the highest rating (2.65) was received by training in using safety and health equipment. Training in how the electrical power system works and training in dealing with hazards such as gases, coal dust, and noise were rated significantly higher ($p < .01$) in low-accident mines. In nine out of the eleven areas, in fact, training was rated as better in low-accident mines, although the difference was significant in only the two instances mentioned above. Management also rated training in ten of the eleven areas as being in the fair-to-good

Table 34

Reasons for Not Using Health Programs

	Underground Miners				Above-Ground Miners				Management				Miners' Wives	
	Number of responses in low-acc. mines (N=327)	Number of responses in high-acc. mines (N=282)	Total number of responses (N=612)	Number of responses in low-acc. mines (N=87)	Number of responses in high-acc. mines (N=70)	Total number of responses (N=157)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)	Number of responses in low-acc. mines (N=42)	Number of responses in high-acc. mines (N=33)	Total number of responses (N=80)		
Doctors are too hard to get to	59 (18%)	59 (21%)	118 (19%)	18 (21%)	14 (20%)	32 (20%)	1 (7%)	2 (12%)	3 (9%)	11 (26%)	11 (29%)	22 (28%)		
You have to wait too long to see doctors	165 (50%)	159 (56%)	324 (53%)	38 (44%)	32 (46%)	70 (45%)	7 (47%)	9 (53%)	16 (50%)	32** (76%)	17 (45%)	49 (61%)		
X-Rays may be used to get rid of miners with black lung	141** (43%)	92 (33%)	233 (38%)	25 (29%)	17 (24%)	42 (27%)	4 (27%)	2 (12%)	6 (19%)	12 (29%)	9 (24%)	21 (26%)		
Doctors talk so you cannot understand them	58 (18%)	57 (20%)	115 (19%)	14 (16%)	11 (16%)	25 (16%)	1 (7%)	1 (6%)	2 (6%)	13 (31%)	6 (16%)	19 (24%)		
Health care is too expensive	20* (6%)	33 (12%)	53 (9%)	6 (7%)	6 (9%)	12 (8%)	0 (0%)	0 (0%)	0 (0%)	6 (14%)	3 (8%)	9 (11%)		
Doctors might put you in the hospital	34* (10%)	51 (18%)	85 (14%)	6 (7%)	5 (7%)	11 (7%)	2 (14%)	2 (12%)	4 (13%)	8 (19%)	5 (13%)	13 (16%)		
Government x-ray programs aren't any good	68 (21%)	50 (18%)	118 (19%)	20 (23%)	12 (17%)	32 (20%)	0 (0%)	3 (18%)	3 (9%)	5 (12%)	3 (8%)	8 (10%)		
Hospital facilities aren't adequate	40 (12%)	34 (12%)	74 (12%)	7 (8%)	6 (9%)	13 (8%)	0 (0%)	1 (6%)	1 (3%)	7 (17%)	2 (5%)	9 (11%)		
Doctors don't know what they're doing anyway	30 (9%)	16 (6%)	46 (8%)	3 (3%)	4 (6%)	7 (4%)	0 (0%)	0 (0%)	0 (0%)	2 (5%)	0 (0%)	2 (3%)		

* Significantly different ($p < .05$) from the number of responses in high-accident mines.** Significantly different ($p < .01$) from the number of responses in high-accident mines.

range (means of individual items ranging from 2.19 for training in mine rescue procedures and techniques to 3.09 for training in locating escape routes). For each of the eleven areas management ratings of training were slightly higher than ratings given by underground miners. None of the management ratings were significantly different when comparing means of responses in high-accident mines to means in low-accident mines.

Training was viewed in a more positive light by foremen. In four of the eleven areas training was rated as being fair-to-good, while in the remaining seven areas training was rated in the good-to-excellent range. Mean responses to individual items ranged from 2.65 for mine rescue procedures and techniques to 3.22 for locating escape routes. Training in how to use tools and equipment was rated as significantly better ($p < .05$) by foremen in high-accident mines. In nine out of the eleven areas, in fact, training was rated as better in high-accident mines, although the difference was significant in only one instance.

Above-ground miners' ratings of training conformed more closely to ratings of underground miners than did ratings of management or foremen. Mean responses for all eleven items were in the fair-to-good range, ranging from a low of 2.18 for training in mine rescue procedures and techniques to a high of 2.70 for training in how to use tools and equipment. Ratings for two areas of training (using safety and health equipment, and locating escape routes) were significantly higher ($p < .05$) in high-accident mines. Ratings of training were also higher for all nine remaining areas in high-accident mines, although the differences were not significant.

Table 35 summarizes responses to the question dealing with adequacy of training. The interesting trend reflected in Table 35 is for training in all areas to be rated as better in low-accident mines by underground miners, while training is rated as better in high-accident mines by the other three groups.

Source of Knowledge about Safety and Health Practices

Another question which is relevant to the training miners receive asks how much miners learned about safety and health practices from each of 13 different sources. Respondents were asked to rate how much was learned on a three-point scale ranging from "not much" (1.0) to "a lot" (3.0). Responses of underground miners, above-ground miners and safety directors are summarized in Table 36.

Underground miners felt that, of the thirteen different sources of information, they learned the most about safety and health practices from on-the-job experience (a rating of 2.69) and second most from other miners (a rating of 2.34). They felt that they had learned least from doctors or public health medics and Black Lung Association workers. The only significant difference found between responses of miners in high-accident mines versus low-accident mines was with regard to union-sponsored programs. Miners in high-accident mines felt that they had learned significantly more ($p < .05$) from union-sponsored programs than had miners in low-accident mines.

Table 35
Mean Ratings of Adequacy of Miner Training¹

Training Area	Underground Miners				Management			Foremen			Above-Ground Miners		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines
How the mining machinery works	2.39	2.30	2.35	2.80	2.35	2.56	2.66	2.77	2.72	2.22	2.27	2.24	
How the electrical power system works	2.38**	2.19	2.29	2.67	2.18	2.41	2.56	2.65	2.61	2.25	2.34	2.29	
Using safety and health equipment	2.69	2.61	2.65	2.93	3.00	2.97	3.10	3.08	3.09	2.39*	2.67	2.52	
Handling physical features of the mine (such as type of top, general layout, etc.)	2.57	2.46	2.52	2.80	3.00	2.91	3.08	3.04	3.06	2.20	2.21	2.20	
Dealing with hazards such as gases, coal dust, noise, etc.	2.56**	2.35	2.46	2.67	2.94	2.81	3.00	3.17	3.09	2.22	2.30	2.25	
How to use the tools and equipment	2.65	2.63	2.64	2.67	2.65	2.66	2.86*	3.13	3.00	2.64	2.77	2.70	
Requirements of the Federal Coal Mine Health and Safety Act	2.31	2.32	2.31	2.53	2.65	2.59	2.82	3.06	2.94	2.30	2.37	2.33	
First aid procedures and techniques	2.40	2.52	2.45	2.67	2.76	2.72	2.94	3.17	3.06	2.38	2.60	2.48	
Locating escape routes	2.61	2.57	2.59	3.20	3.00	3.09	3.16	3.27	3.22	2.39*	2.71	2.54	
Mine rescue procedures and techniques	2.19	2.10	2.14	2.13	2.24	2.19	2.56	2.73	2.65	2.13	2.26	2.18	
How to report potential dangers and hazards	2.64	2.58	2.61	2.80	2.88	2.84	3.04	3.08	3.06	2.45	2.61	2.52	

¹Rating scale utilized:

- 1 = Poor
- 2 = Fair
- 3 = Good
- 4 = Excellent

*Significantly different ($p < .05$) from the mean for high-accident mines.
 **Significantly different ($p < .01$) from the mean for high-accident mines.

Table 36
Mean Ratings of the Adequacy of Alternative
Sources of Knowledge About Safety and Health Practices

Source	Underground Miner			Above-Ground Miner			Safety Director		
	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall	Low-Acc. Mines	High-Acc. Mines	Overall
On-the-job experience	2.72	2.66	2.69	2.64	2.57	2.61	2.92	2.86	2.88
Practice emergency drills	1.57	1.60	1.58	1.43	1.57	1.49	2.77*	2.21	2.48
Company training programs	1.91	1.87	1.89	1.77	1.91	1.83	2.62	2.21	2.41
Other miners	2.34	2.33	2.34	2.14	2.23	2.18	2.38*	1.93	2.15
Foremen	2.08	1.99	2.04	1.91	1.93	1.92	2.62	2.50	2.56
Operating manuals or books	1.63	1.65	1.64	1.57	1.79	1.67	1.46	1.43	1.44
Union-sponsored programs	1.51*	1.64	1.57	1.41	1.60	1.50	1.23	1.00	1.11
Bureau of Mines training	1.83	1.87	1.85	1.80	1.80	1.80	2.00	1.71	1.85
Government inspectors	1.89	1.89	1.89	1.76	1.86	1.80	1.92	1.71	1.81
State mining training	1.66	1.68	1.67	1.57	1.64	1.61	1.69	1.64	1.67
Doctors or public health medics	1.19	1.16	1.18	1.17	1.29	1.22	1.00	1.07	1.04
Black Lung Assoc. workers	1.20	1.16	1.18	1.21	1.36	1.27	1.08	1.00	1.04
Relatives or friends	1.89	1.87	1.88	1.72	1.87	1.79	1.54	1.29	1.41

* Significantly different ($p < .05$) from the mean for high-accident mines

¹Rating scale utilized

1 = Not much

2 = Some

3 = A lot

Responses of above-ground miners and safety directors were quite similar to those of underground miners. All three groups felt on-the-job experience, other miners, and foremen were the greatest source of knowledge about safety and health practices. Safety directors in low-accident mines felt that miners learned more from practice emergency drills and from other miners than did safety directors in high-accident mines ($p < .05$).

Safety directors had a tendency to report that more was learned from practice emergency drills and company training programs than did underground miners. This tendency is consistent with the fact that underground miners reported the training they had received to be of lesser quality than did management and foremen. Apparently management personnel put more faith in existing training programs than does the labor force.

Training Techniques Currently Employed

Safety directors were asked which of 10 different training techniques were employed in their mine. Results, present in Table 37 show that lecture, demonstration, and instruction by safety personnel were used most frequently, followed closely by posters, group discussion, and instruction by supervisors. All of the remaining techniques (including circulars, literature/pamphlets, movies/slides, and instruction by fellow workers) were also heavily utilized. There were no major differences in utilization of alternative techniques in high-versus low-accident mines.

When asked about the effectiveness of the ten alternative techniques, safety directors most often reported that group discussions were most effective, followed closely by instruction by supervisors. Demonstrations were viewed as third most effective.

Availability of Safety Training

Another topic explored with safety directors was the categories of employees to whom initial safety training is made available and those to whom continuing safety training is made available. Results presented in Tables 38 and 39 show that in virtually all mines all employees are offered both initial safety training and continuing safety training. No substantial differences were observed in responses of safety directors from high-versus low-accident mines.

More often than not company training procedures were reported by safety directors to be tailored for specific jobs. In sixteen mines (eight high-accident mines and eight low-accident mines) tailoring for specific jobs was reported, whereas in eleven mines (six high-accident mines and five low-accident mines) it was not.

Summary of Items Related to Training

To summarize results related to training, it could be said that underground miners appear to view training as less effective than does management. There is a heavy reliance on on-the-job training and other miners as a source of knowledge about safety and health practices. Although safety training (both initial and continuing) is reportedly offered to all employees, and a variety of training techniques are used, it apparently

Table 37

Use of Alternative Safety Training Techniques

	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)
Lecture	12 (92%)	13 (93%)	25 (93%)
Demonstrations	12 (92%)	13 (93%)	25 (93%)
Posters	11 (85%)	13 (93%)	24 (89%)
Circulars	9 (69%)	10 (71%)	19 (70%)
Group discussions	12 (92%)	12 (86%)	24 (89%)
Literature/pamphlets	8 (62%)	7 (50%)	15 (56%)
Movies/slides	11 (85%)	9 (64%)	20 (74%)
Instruction by supervisors	12 (92%)	12 (86%)	24 (89%)
Instruction by fellow workers	9 (69%)	11 (79%)	20 (74%)
Instruction by safety personnel	12 (92%)	13 (93%)	25 (93%)

Table 38

Availability of Initial Safety Training

	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=24)
All new employes	13 (100%)	13 (93%)	26 (96%)
All new production employees	10 (77%)	13 (93%)	23 (85%)
New employees in particularly dangerous jobs	9 (69%)	13 (93%)	22 (81%)
Production employees reassigned to new jobs	11 (85%)	10 (71%)	21 (78%)
Production employees whose work procedures have changed	10 (77%)	12 (86%)	22 (81%)

Table 39

Availability of Continuing Safety Training

	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)
All employees	13 (100%)	14 (100%)	27 (100%)
Employees in jobs where accidents can occur	7 (54%)	7 (50%)	14 (52%)
Employees in high accident- risk jobs	6 (46%)	6 (43%)	12 (44%)
Employees in jobs where accidents have occurred recently	8 (62%)	8 (57%)	16 (59%)
Employees who have had accidents or near-accidents recently	5 (38%)	6 (43%)	11 (41%)
No continuing training is offered	1 (8%)	0 (0%)	1 (4%)

quite often misses the mark. Bureau of Mines training and training offered by state mining departments appear to be no more important as a source of knowledge about safety and health practices than company training programs.

In addition, results emphasize the importance of good training. Good training in how the electrical power system works, dealing with hazards (such as gases, coal dust, and noise) and how to use tools and equipment is more prevalent in mines with lower accident rates.

SAFE JOB BEHAVIOR OF MINERS AND FOREMEN

Another extensive area investigated was the job behavior of mine personnel. Several questions were asked to determine the frequency with which miners follow safe job procedures in each mine. Two questions asked how often other miners engaged in certain behaviors. One of the items dealt strictly with safety procedures such as wearing safety glasses or working under unsupported roof. The second question asked about a wider variety of behaviors such as discussing work-related issues and spending time with other miners after work. A third question asked how often the respondent himself exhibited certain job behaviors. A fourth item dealt specifically with foremen behaviors. Other items dealt with responsibility when safety practices are not followed, disciplinary action imposed on risk-takers, and the influence of personnel groups on worker's safe job behaviors.

Safety Behaviors of Miners

The first item to be discussed dealt with eight specific behaviors directly related to safety. Under-ground miners and above-ground miners were asked to indicate on a five-point scale ranging from "almost never" (1.0) to "almost always" (5.0) how often other miners engaged in each of the eight specific behaviors. Mean responses for the two groups are shown in Table 40.

Of the eight items listed, the three which underground miners reported other miners as doing most often were: clean up the work area, talk up safety within the work crew, and wear safety glasses. Each of these items received an overall mean rating of greater than 3.0, indicating the frequency of behavior to be between sometimes and often. Overall mean responses of underground miners indicate that other miners wear a respirator only sometimes; they seldom take chances, cut corners, or bridge the circuit breaker when a circuit overloads; and they almost never smoke in the mine.

In four instances significant differences were found between mean responses of underground miners in low-accident mines versus those in high-accident mines. Miners in low accident mines reported that other miners wear safety glasses and clean up the work area, more often, and they bridge the circuit breaker when a circuit overloads less often than miners in high-accident mines. Curiously, miners in low-accident mines also apparently smoke in the mine more often than miners in high-accident mines. This is consistent with the fact that wives in low-accident mines reported that their husbands smoked cigarettes significantly more often ($p < .01$) than did wives in high-accident mines.

Responses of above-ground miners indicated that the work area is cleaned-up more often by miners in high-accident mines than in low-accident mines.

Other Job Behaviors of Miners.

A second item dealt with a greater variety of job behaviors. Respondents were asked to indicate on the same five-point scale how often miners engaged in each of 12 specific behaviors. Mean responses for five different personnel groups are shown in Table 41.

The mean responses from each of the five personnel groups (underground miners, above-ground miners, union officials, foremen, and managers) were remarkably similar. In each group the item with the highest mean score was that dealing with how well miners get along with each other, and the item with the second highest mean score was that dealing with the extent to which miners can depend on each other. In other words, all groups felt that miners almost

Table 40
Mean Ratings of the Frequency of Alternative
Safety Behaviors of Miners¹

How often do other miners in your mine ...	Underground Miners			Above-Ground Miners		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall
a. Wear safety glasses	3.12*	2.90	3.01	3.47	3.30	3.39
b. Clean up the work area	3.35*	3.18	3.27	3.24*	3.59	3.39
c. Work under unsupported roof	1.98	1.88	1.94	1.89	2.09	1.97
d. Take chances or cut corners	2.19	2.14	2.17	2.54	2.34	2.45
e. Smoke in the mine	1.55**	1.22	1.40	1.66	1.34	1.52
f. Wear a respirator	2.91	2.86	2.89	3.31	3.19	3.25
g. Bridge the circuit breaker when a circuit overloads	1.82*	2.00	1.90	1.94	1.87	1.91
h. Talk up safety within the work crew	3.15	3.09	3.12	3.10	3.19	3.14

¹Rating scale used:

- 1 = almost never
- 2 = seldom
- 3 = sometimes
- 4 = often
- 5 = almost always

* Significantly different ($p < .05$) from the mean for high-accident mines

** Significantly different ($p < .01$) from the mean for high-accident mines.

Table 41
Mean Ratings of the Frequency of
Other Job Behaviors of Miners

	Underground Miners					Above-Ground Miners					Union Officials					Foremen					Management				
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall				
In this mine ...																									
a. do miners get along with each other?	4.54*	4.38	4.47	4.33	4.39	4.36	4.50	4.42	4.46	4.46	4.50	4.48	4.40	4.59	4.50	4.48	4.40	4.59	4.50	4.46	4.59	4.50			
b. do miners discuss work-related issues?	3.98	3.99	3.99	3.86	3.91	3.89	3.96	4.12	4.04	4.04	4.08	4.01	3.67	4.06	3.88	4.01	3.67	4.06	3.88	4.01	3.67	4.06			
c. are miners able to depend on each other?	4.28**	4.09	4.19	4.03	4.14	4.08	4.18	4.23	4.20	4.20	4.28	4.23	4.00	4.06	4.03	4.23	4.00	4.06	4.03	4.23	4.00	4.06			
d. do miners horse around?	3.04	3.16	3.09	3.22	3.03	3.13	3.07	3.42	3.24	3.24	3.34	3.19	3.20	3.35	3.28	3.19	3.20	3.35	3.28	3.19	3.20	3.35			
e. do miners leave the work place ready for the next crew?	3.46	3.56	3.51	3.07**	3.57	3.29	3.11	2.85	2.98	2.98	3.62	3.62	3.53	3.35	3.44	3.62	3.53	3.35	3.44	3.62	3.53	3.35			
f. do work crews try to outdo other crews?	3.09**	3.37	3.22	2.97	3.23	3.08	3.04	3.54	3.28	3.28	3.20	3.36	3.13	3.24	3.19	3.36	3.13	3.24	3.19	3.36	3.13	3.24			
g. do miners get mad if a miner takes risks?	3.56	3.53	3.55	3.39	3.51	3.45	3.79	3.23	3.52	3.52	3.74	3.70	3.87	3.41	3.63	3.70	3.87	3.41	3.63	3.70	3.87	3.41			
h. do miners spend time with each other after work?	3.04	3.09	3.06	3.01	2.97	2.99	3.18	2.65	2.93	2.93	3.24	3.32	3.13	3.53	3.34	3.32	3.13	3.53	3.34	3.32	3.13	3.53			
i. do miners get mad if a miner works too slow?	2.66**	2.89	2.77	2.61	2.93	2.75	2.79	3.08	2.93	2.93	2.88	2.85	2.40	2.53	2.47	2.85	2.40	2.53	2.47	2.85	2.40	2.53			
j. do miners get mad if a miner works too fast?	2.68*	2.89	2.78	2.89	3.11	2.99	2.79	2.58	2.69	2.69	2.56	2.63	3.27*	2.53	2.88	2.63	3.27*	2.53	2.88	2.63	3.27*	2.53			
k. do miners complain about safety?	3.83	3.77	3.80	3.93	3.86	3.90	3.89	4.15	4.02	4.02	3.04	3.23	3.40	3.24	3.31	3.23	3.40	3.24	3.31	3.23	3.40	3.24			
l. do miners report small accidents?	3.50**	3.13	3.33	3.52	3.71	3.61	3.57	3.28	3.41	3.41	3.90	4.00	4.07	4.18	4.13	4.00	4.07	4.18	4.13	4.00	4.07	4.18			
l. do miners report small accidents?																									

Rating scale used:

- 1 = Almost never
- 2 = Seldom
- 3 = Sometimes
- 4 = Often
- 5 = Almost always

* Significantly ($p < .05$) different from the mean for high-accident mines.
 ** Significantly ($p < .01$) different from the mean for high-accident mines.

always got along with each other and very often could depend on each other. Each of the five groups also indicated that the least frequent behaviors on the list were miners getting mad if other miners worked too slow or too fast. Each group also indicated that miners only sometimes spend time with each other after work. With regard to other items on the list, each group indicated that miners often discuss work-related issues, and they often leave the work place ready for the next crew. Each of the remaining items received an overall mean rating of between 3.0 and 4.0 from each of the five groups. These behaviors included horsing around, work crews trying to outdo other crews, getting mad if a miner takes risks, complaining about safety, and reporting small accidents.

In the underground miner group, significant differences were observed between mean responses in high-accident mines and mean responses in low-accident mines on six of the twelve items. Miners in low-accident mines reported that miners get along with each other ($p < .05$), can depend on each other, and report small accidents ($p < .01$) more often than did miners in high-accident mines. On the other hand, work crews apparently try to outdo other crews ($p < .01$), and miners get mad if another miner works too fast ($p < .05$) or too slow ($p < .01$) more often in high-accident mines.

Only two other significant differences were observed between high- and low-accident mines. Above-ground miners in low-accident mines reported that miners leave the work place ready for the next crew less frequently than did above-ground miners in high-accident mines ($p < .01$). Managers in low-accident mines reported that miners get mad more often if a miner works too fast ($p < .05$).

Personal Safety Behaviors

The first two questions concerning miner behavior were asked in terms of how often other miners exhibited certain behaviors. The third question asked underground miners, above-ground miners, and foremen how often they themselves followed certain safety practices. Managers were asked the same question in terms of how often miners followed the safety practices. All respondents used a five-point scale ranging from "almost never" (1.0) to "almost always" (5.0). Mean responses are shown in Table 40.

Of the 17 items listed in Table 42, five could be considered unsafe behaviors and 12 could be considered safe behaviors. The pattern of mean responses of underground miners tended to follow this division fairly closely. Underground miners reported that they followed safe practices fairly often (mean responses ranging between 3.0 and 4.0), and that they followed unsafe practices very seldom (mean responses ranging between 1.0 and 2.0). Only two exceptions to this pattern emerged. Miners reported that they go to work even when they are feeling bad fairly often (mean rating of 3.61). While this item isn't as specific and task-related as other unsafe practices (which included working under unsupported roof, taking chances on cutting corners, smoking in the mine, and bridging the circuit breaker when a circuit overloads) it could be potentially dangerous. Miners also reported that they wear a respirator only sometimes (mean rating of 2.61).

Table 42
Mean Rating of the Frequency of
Personal Safety Behaviors

How often do you ...	Underground Miners			Above-Ground Miners			Foremen			Management		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall
wear safety glasses?	3.51*	3.26	3.39	3.43	3.34	3.39	3.62	3.73	3.68	3.80	3.29	3.53
stop other miners from doing unsafe things?	3.55	3.41	3.49	3.21	3.24	3.22	4.12	4.23	4.18	3.87	3.53	3.69
talk up safety within the work crew?	3.39	3.36	3.37	3.24	3.23	3.24	4.06	4.21	4.14	3.33	3.41	3.38
clean up the work area?	3.69	3.70	3.70	3.90**	4.26	4.06	3.98	4.25	4.12	3.53	3.47	3.50
work under unsupported roof?	1.66	1.61	1.64	--	--	--	1.42	1.37	1.39	2.00	1.47	1.72
take chances or cut corners?	1.80*	1.66	1.74	2.05	1.99	2.01	1.60	1.48	1.54	2.80	2.35	2.56
report safety and health hazards to the safety committee?	3.55	3.49	3.53	3.45	3.43	3.44	2.74	3.06	2.90	4.33	3.71	4.00
report safety and health hazards to the foreman?	3.96*	3.76	3.87	3.74	3.96	3.83	4.00	4.21	4.11	3.87	4.06	3.97
refuse to work under unsafe conditions?	3.78	3.87	3.82	3.76	3.94	3.84	3.66	4.00	3.83	3.53	3.71	3.63
smoke in the mine?	1.26**	1.09	1.18	--	--	--	1.12	1.02	1.09	1.53	1.18	1.34
wear a respirator?	2.54	2.70	2.61	2.14	2.39	2.25	1.80**	2.48	2.15	3.47	3.53	3.50
take part in the government chest x-ray program?	3.14	3.20	3.17	3.34	3.66	3.48	3.12**	4.00	3.57	4.00	4.06	4.03
go to the doctor when sick?	3.58*	3.37	3.49	3.36*	3.76	3.54	3.10	3.35	3.23	4.20	4.18	4.19
go to work even when feeling bad?	3.65	3.57	3.61	3.87	3.60	3.75	3.60	3.52	3.56	2.40*	3.06	2.75
bridge the circuit breaker when a circuit overloads?	1.55	1.61	1.58	1.66	1.64	1.65	1.72	1.37	1.54	1.80	1.65	1.72
report safety and health hazards to the next shift?	4.01	3.83	3.92	3.95	4.04	3.99	4.58	4.65	4.62	4.13	3.88	4.00
check to see whether reported safety hazards have been improved?	3.91	3.82	3.87	3.97	4.10	4.03	4.48	4.54	4.51	4.40	3.88	4.13

¹Rating scale used:

- 1 = Almost never
- 2 = Seldom
- 3 = Sometimes
- 4 = Often
- 5 = Almost always

* Significantly ($p < .05$) different from the mean for high-accident mines.

** Significantly ($p < .01$) different from the mean for high-accident mines.

Table 43
Mean Ratings of the Frequency of Foreman Behavior¹

	Underground Miners			Union Officials			Foremen			Management		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall
How often do foremen in this company ...												
get angry when miners have job problems or questions?	2.72	2.89	2.80	3.04	3.23	3.13	2.32	2.38	2.35	2.20	2.35	2.28
allow miners to work at their own speed?	3.69**	3.30	3.51	3.75	3.58	3.67	3.90	3.96	3.93	4.20*	3.65	3.91
ask miners to do things which are against miners' better judgment?	2.32**	2.58	2.44	2.75	2.92	2.83	1.84	1.58	1.71	1.80	1.88	1.84
make mistakes?	2.94	2.93	2.94	3.36	3.23	3.30	2.80	2.67	2.74	2.73	3.06	2.91
have disagreements with miners about safety procedures?	2.68	2.73	2.70	2.86	3.27	3.06	2.12	1.98	2.05	2.33	2.18	2.25
make miners afraid to point out hazards to the safety committee?	1.87	2.02	1.94	2.39	2.42	2.41	1.50	1.27	1.38	1.27	1.24	1.25
give miners a pat on the back when they follow safety procedures?	2.42*	2.20	2.31	2.43	2.27	2.35	3.80	3.71	3.66	3.27	3.76	3.53
allow men to work in unsafe conditions?	2.12	2.22	2.17	2.75	2.54	2.65	1.68*	1.31	1.49	1.33	1.24	1.28
turn in an inaccurate safety report (such as dust levels)?	2.50*	2.27	2.39	2.25	2.92	2.57	1.86	1.73	1.79	1.53	1.53	1.53
play favorites?	3.04	3.00	3.02	3.54	3.58	3.56	2.00	1.83	1.91	1.87	2.24	2.06
review each accident with individual miners?	2.81	2.66	2.74	3.00	2.46	2.74	3.40	3.52	3.46	3.20	3.41	3.31
wear their respirators in dusty conditions?	2.30*	2.08	2.20	2.25	2.42	2.33	2.98*	3.56	3.27	3.13	2.76	2.94
remind miners of safety and health practices?	3.17**	2.85	3.02	2.75	2.96	2.85	4.28	4.27	4.27	4.33	4.18	4.25
get mad when workers miss too many days?	3.34	3.51	3.42	3.82	3.81	3.81	3.56	3.60	3.58	3.07*	3.88	3.50
check closely to make sure that the men are working?	3.64	3.78	3.70	4.00	4.08	4.04	3.84	4.08	3.96	3.80	4.06	3.94
allow miners to work on their own?	3.06	3.02	3.04	3.11	3.42	3.26	2.94	2.75	2.84	2.60	2.65	2.63
cut corners on safety?	2.51**	2.76	2.62	3.21	3.15	3.19	1.54	1.48	1.51	1.87	1.53	1.69
let miners know what's expected of them?	3.53	3.63	3.57	3.57	3.96	3.76	3.90	4.21	4.06	3.60	3.76	3.69
plan work poorly?	2.86	2.86	2.86	3.18	3.31	3.24	2.56	2.23	2.39	2.67	2.76	2.72
give a pat on the back to the man who cuts corners?	2.06	2.17	2.11	2.69*	2.27	2.59	1.62	1.69	1.66	1.40	1.35	1.38
push hard for production?	3.54**	3.95	3.73	3.79	4.15	3.96	3.34	3.62	3.48	2.40*	3.29	2.88
show real concern for worker's welfare?	3.11*	2.92	3.02	3.00	2.50	2.76	4.32*	3.92	4.12	4.20	4.18	4.19
lie to crews?	2.62	2.62	2.62	3.36	2.81	3.09	1.62	1.52	1.57	2.00	1.35	1.66
not use safety procedures because production is slowed up (such as water slowing down continuous mining process)?	2.53	2.61	2.57	3.21	3.23	3.22	1.74*	1.29	1.51	1.27	1.47	1.38

¹Rating scale used:
*Significantly ($p < .05$) different from the mean for high-accident mines.
**Significantly ($p < .01$) different from the mean for high-accident mines.

1 = Almost never
2 = Seldom
3 = Sometimes
4 = Often
5 = Almost always

Reproduced from
best available copy.



Miners in low-accident mines reported that they wear safety glasses, report safety and health hazards to the foreman, and go to the doctor when they are sick significantly more often than miners in high-accident mines. Surprisingly, miners in low-accident mines also reported that they take chances or cut corners and smoke in the mine significantly more often than miners in high-accident mines.

Responses of the other three groups asked the same question (above-ground miners, foremen, and management) were similar to responses of underground miners, although safe practices tended to be reported as more frequent. Whereas no single item received an overall mean rating greater than 4.0 in the underground miner sample, two items received an overall mean rating greater than 4.0 in the above-ground miner sample; six had a mean greater than 4.0 in the foreman sample; and five had a mean greater than 4.0 in the management sample. Responses in these three samples indicated that going to work even when feeling bad was the most frequent unsafe behavior, and wearing a respirator was the least frequent safe behavior. It is interesting that managers feel that respirators are worn more often than underground miners, above-ground miners, and foremen report actually wearing them. Similarly, managers feel that miners take chances or cut corners, report safety and health hazards to the foreman, go to the doctor when sick, and take part in the government chest X-ray program more often than the other three groups report these behaviors as actually occurring.

Significant differences were found between responses in low-and high-accident mines in each sample. Above-ground miners in high-accident mines reported that they clean up the work area and go to the doctor when sick significantly more often than above-ground miners in low-accident mines. Foremen in high-accident mines report that they wear a respirator and take part in the government chest X-ray program significantly more often than foremen in low-accident mines. Finally, managers in high-accident mines report that miners go to work when feeling bad significantly more often than managers in low-accident mines.

Foreman Behavior

A final item dealing specifically with job behaviors asked about the frequency with which foremen exhibited each of 24 different behaviors. Respondents were asked to use the same 5-point frequency scale as was used in previous questions. Responses are summarized in Table 43.

Overall mean responses of underground miners to each of the 24 items indicate that both safe job behaviors and unsafe job behaviors occur with somewhat regular frequency, since means for all items tended to cluster about the mid-point of the scale. Thirteen of the twenty-four means fell between 2.5 and 3.5, while all but one fell between 2.0 and 4.0. The single item with a mean of less than 2.0 was the item asking if foremen made miners afraid to point out hazards to the safety committee.

Significant differences between responses of miners in high-and low-accident mines were found for 9 of the 24 items. Underground miners in low-accident mines generally reported that foremen more often followed safe

job procedures, and generally placed less emphasis on production. Foremen in low-accident mines were reported to allow miners to work at their own speed, to give miners a pat on the back when they follow safety procedures, to wear respirators in dusty conditions, to remind miners of safety and health practices and to show real concern for workers' welfare more often than foremen in high-accident mines. On the other hand, foremen in high-accident mines were reported to ask miners to do things which are against miners' better judgment, to cut corners on safety, and to push hard for production more often than foremen in low-accident mines. Surprisingly, foremen in low-accident mines were reported to turn in inaccurate safety reports more often than foremen in high-accident mines.

In general, union officials appeared more critical of foremen than underground miners were. They reported good safety and job procedures to be followed less often and bad safety and job procedures to be followed more often. Foremen and managers, on the other hand, appeared far less critical of foreman behavior than were underground miners. Eight items describing unsafe procedures received an overall mean rating of less than 2.0 in the foreman sample, and seven of the eight items received an overall mean rating of less than 2.0 in the management sample. Similarly, three items describing safe procedures received an overall mean rating of greater than 4.0 in the foreman sample, and two of the three items received a mean rating of greater than 4.0 in the management sample.

Significant differences between responses of personnel in high-versus low-accident mines were found in all samples. Surprisingly, union officials in low-accident mines reported that foremen give a pat on the back to the man who cuts corners more often than did union officials in high-accident mines. Foremen in low-accident mines reported that other foremen showed real concern for workers' welfare more often than in high-accident mines, but also that they allowed men to work in unsafe conditions and that they did not use safety procedures because production is slowed up more often than foremen in high-accident mines. In addition, foremen in high-accident mines reported that other foremen wore their respirators in dusty conditions more often than foremen in low-accident mines. Managers in low-accident mines reported that foremen allow miners to work at their own speed more often, and that foremen get mad when workers miss too many days, and push hard for production less often than in high-accident mines.

Responsibility When Safety Procedures and Policies Are Not Followed

Respondents in all six mine personnel groups were asked who they thought was most responsible and who they thought was second most responsible when safety procedures and policies are not followed. Table 44 summarizes the number of votes received by each of seven different categories of mine personnel.

In each sample except for union officials, most respondents indicated that workers themselves were most responsible when safety procedures and policies were not followed. Foremen were generally viewed as second most responsible. Union officials, on the other hand, felt that foremen were primarily responsible, and that workers shared secondary responsibility.

Table 44
Responsibility When Safety Procedures and Policies Are Not Followed

	Underground Miners			Above-Ground Miners			Union Officials			Foremen			Safety Directors			Management		
	Number of responses in low-acc. mines (N=238)	Total number of responses in high-acc. mines (N=612)	Number of responses in low-acc. mines (N=238)	Number of responses in low-acc. mines (N=238)	Total number of responses in high-acc. mines (N=612)	Number of responses in low-acc. mines (N=238)	Number of responses in low-acc. mines (N=18)	Total number of responses in high-acc. mines (N=137)	Number of responses in low-acc. mines (N=16)	Number of responses in low-acc. mines (N=54)	Total number of responses in high-acc. mines (N=52)	Number of responses in low-acc. mines (N=30)	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses in high-acc. mines (N=27)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses in high-acc. mines (N=32)
Foremen	102 (312)	92 (322)	194 (322)	31 (362)	22 (312)	53 (342)	13 (462)	10 (382)	23 (432)	18 (362)	22 (422)	40 (392)	8 (622)	9 (642)	17 (632)	7 (472)	9 (532)	16 (502)
Mine management	76 (232)	70 (252)	146 (242)	26 (302)	20 (292)	46 (292)	10 (362)	7 (272)	17 (312)	10 (202)	6 (122)	16 (162)	2 (152)	4 (292)	6 (222)	6 (402)	4 (242)	10 (312)
Work crew	45 (142)	39 (162)	84 (142)	7 (82)	6 (92)	13 (82)	3 (112)	1 (42)	4 (72)	13 (362)	10 (192)	23 (232)	3 (232)	3 (232)	3 (112)	0 (02)	4 (242)	4 (132)
Worker	105 (322)	94 (312)	199 (332)	29 (332)	25 (362)	54 (342)	11 (392)	8 (312)	19 (352)	24 (482)	27 (522)	51 (502)	12 (922)	10 (712)	22 (812)	8 (532)	11 (652)	19 (592)
Safety committee	19 (62)	14 (52)	33 (52)	7 (82)	5 (72)	12 (82)	0 (02)	1 (42)	1 (22)	1 (22)	4 (82)	5 (52)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)
Company engineers	3 (12)	6 (22)	9 (12)	0 (02)	1 (12)	1 (12)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)	0 (02)
Safety director	14 (42)	12 (42)	26 (42)	6 (72)	2 (32)	8 (52)	2 (72)	3 (122)	5 (92)	1 (22)	1 (22)	2 (22)	1 (82)	2 (142)	3 (112)	1 (72)	0 (02)	1 (32)

Reproduced from
best available copy.

Mine management received the third largest number of votes, and the influence of the work crew on the worker the fourth largest number of votes in all samples except the sample of foremen. Foremen felt that the work crew had a greater responsibility than did mine management. Comparatively few individuals in all samples indicated that either the safety committee, company engineers, or the safety director were responsible when safety procedures and policies are not followed. In none of the samples was there a significant difference in the pattern of responses in high-versus low-accident mines.

Influence of Personnel on a Worker's Safety Behavior

Respondents were asked who they thought had the most influence on a worker's safety behavior. The question was asked in a multiple-choice format, with respondents being asked to check one of six possible alternatives. Results are summarized in Table 45.

The largest number of underground miners felt that the work crew itself had the biggest influence on a miner's safe job behavior. The largest number of individuals in each of the three management groups (foremen, safety directors, and managers) felt, on the other hand, that foremen had the greatest influence on workers' safety behavior. In management groups, the work crew was relegated to secondary and, in one sample, tertiary importance. Only 98 underground miners out of 612 indicated the foreman to have the most influence. Comparatively few individuals in all four samples indicated that either mine management, the safety committee, or the company engineers had the most influence on a worker's safety behavior.

Summary

To summarize results of the four questions dealing specifically with behaviors of mine personnel, it appears that certain job behaviors of miners and foremen are related to accident records of the mine. In general, according to responses of underground miners, the following behaviors of underground miners appear to occur more often in low-accident mines:

1. Wearing safety glasses
2. Cleaning up the work area
3. Getting along with other miners
4. Being able to depend on other miners
5. Reporting small accidents
6. Reporting safety and health hazards to the foreman
7. Going to the doctor when sick.

On the other hand, underground miners in low-accident mines refrain from the following activities more than miners in high-accident mines:

1. Bridging the circuit breakers when a circuit overloads
2. Trying to outdo other work crews
3. Getting mad if other miners work too slow or too fast.

It should also be noted that smoking and taking chances or cutting corners

Table 45
Influence of Personnel on a Worker's Safety Behavior

	Underground miner			Foremen			Safety Director			Management		
	Number of responses in low-acc. mines (N=328)	Number of responses in high-acc. mines (N=284)	Overall (N=612)	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Overall (N=102)	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Overall (N=27)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Overall (N=32)
Foreman	50 (15%)	48 (17%)	98 (16%)	22 (44%)	22 (42%)	44 (43%)	8 (62%)	7 (50%)	15 (56%)	8 (5%)	12 (71%)	20 (63%)
Mine management	22 (7%)	22 (8%)	44 (7%)	7 (14%)	4 (8%)	11 (11%)	2 (15%)	1 (7%)	3 (11%)	3 (20%)	2 (12%)	5 (16%)
The work crew	108 (33%)	104 (37%)	212 (35%)	9 (18%)	16 (31%)	25 (25%)	2 (15%)	5 (36%)	7 (26%)	1 (7%)	2 (12%)	3 (9%)
The worker	88 (27%)	66 (23%)	154 (25%)	8 (16%)	3 (6%)	11 (11%)	1 (8%)	1 (7%)	2 (7%)	2 (13%)	1 (6%)	3 (9%)
The safety committee	26 (8%)	17 (6%)	43 (7%)	0 (0%)	3 (6%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
The company engineers	1 (4%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

were also reported to occur more frequently in low-accident mines, perhaps because the consequences of these behaviors are not so severe as in high-accident mines.

Also, according to responses of underground miners, the following behaviors of foremen occur more often in low-accident mines:

1. Allowing miners to work at their own speed
2. Giving miners a pat on the back when they follow safety procedures
3. Wearing respirators in dusty conditions
4. Reminding miners of safety and health practices
5. Showing real concern for workers' welfare.

Foremen in low-accident mines also refrain from the following activities:

1. Asking miners to do things which are against miners' better judgment
2. Cutting corners on safety
3. Pushing hard for production.

It should also be noted that turning in inaccurate safety reports was also reported more frequently of foremen in low-accident mines.

There was a consensus among most samples that workers themselves were primarily responsible when safety procedures and policies were not followed, and that foremen were second most responsible. Union officials reversed the order of importance.

Finally, underground miners felt that the work crew itself had the biggest influence on a miner's safe job behavior. Management groups tended to respond that it was the foreman who had the greatest influence. Many of the discrepancies in responses which occurred among the various groups seem to be consistent with the logical prediction of their biases.

JOB SATISFACTION

Another major topic area investigated was the intrinsic rewards and satisfaction which miners' jobs provide them. Two questions were asked to determine the characteristics which miners' jobs possess which could lead to either satisfaction or dissatisfaction. The first question asks about 13 specific work pressures and characteristics. The second question asks directly how much miners' jobs give them a chance to experience activities which generally provide intrinsic rewards and job satisfaction.

In addition to the two questions mentioned above, managers and foremen were asked who had the most decision-making responsibility for several operational areas. Since decision-making responsibility can lead to the feeling of having a meaningful and rewarding job, results are reviewed under this general heading of job satisfaction.

Finally, miners' wives were asked several questions dealing with job satisfaction. Wives were asked about their husbands' overall job satisfaction, about their own satisfaction with seven different aspects of the job, about the things their husbands particularly liked about their job, and about the kind of job their husbands would really like to have and the factors that keep their husbands from obtaining them.

Job Characteristics of Miners

Respondents were asked to indicate on a 5-point scale ranging from "almost never" (1.0) to "almost always" (5.0), how often miners had to do certain activities or experienced certain pressures. Results are presented in Table 46.

Underground miners indicated that very often they must do the same things many times a day, and that often they must look out for the safety of other miners, and think a lot. In addition, underground miners indicated that it is not very often that they must work without clear-cut duties. Mean responses for each of the remaining 9 items were very close to the mid-point of the scale (between 2.5 and 3.5). Underground miners in low-accident mines indicated that they had to do three activities significantly less frequently than miners in high-accident mines: doing a lot of things at the same time, working without clear-cut duties, and taking care of absentees' jobs.

Foremen and managers agreed with underground miners that doing the same things many times a day, and looking out for the safety of other miners were the two items on the list which miners had to do most frequently, and that working without clear-cut duties was seldom required. Both groups felt that, in addition, it was seldom that miners had to do a lot of things at the same time and had to work alone. Foremen in low-accident mines felt that miners had to take care of absentees' jobs significantly less often than in high-accident mines. Similarly, managers in low-accident mines felt that miners had to answer to more than one person significantly less often than in high-accident mines.

Opportunities for Intrinsic Reward

Respondents were asked to indicate on a three-point scale ranging from "not much" (1.0) to "a lot" (3.0) how much miners' jobs give them a chance to experience activities which generally provide intrinsic rewards and job satisfaction. Mean responses are presented in Table 47.

Underground miners felt that of the nine items listed in Table 47 their jobs gave them least chance to make important decisions and to advance or get ahead. They also felt that their jobs gave quite a bit of opportunity to use their ability, to feel that they are getting things done, and to do important work. There were no significant differences in mean responses between high-and low-accident mines.

Foremen and managers agreed with underground miners that of the nine items listed, miners' jobs gave them little opportunity to make important

Table 46
Mean Ratings of
Job Characteristics of Miners¹

	Underground Miners		Foremen		Management	
	Low-Acc. Mines	High-Acc. Overall Mines	Low-Acc. Mines	High-Acc. Overall Mines	Low-Acc. Mines	High-Acc. Overall Mines
How often do miners have to.....						
do the same things many times a day?	4.14	4.06	4.11	4.08	4.12	4.10
work very fast?	3.24	3.24	3.24	2.66	2.58	2.62
work very hard?	3.50	3.41	3.46	2.60	2.77	2.69
think a lot?	3.91	3.88	3.90	2.98	3.06	3.02
do a lot of things at the same time?	2.60*	2.80	2.69	1.96	2.02	1.99
work alone?	2.68	2.57	2.63	1.78	2.06	1.92
work with new inexperienced men?	2.68	2.78	2.73	3.16	3.15	3.16
look out for the safety of other miners?	4.03	3.98	4.00	4.10	3.90	4.00
answer to more than one person?	3.01	3.03	3.02	2.76	2.75	2.75
do a lot of different kinds of work?	3.21	3.20	3.20	3.14	3.12	3.13
work without clear-cut duties?	2.35*	2.59	2.46	2.32	2.06	2.19
take care of absentees' jobs?	2.50*	2.74	2.62	3.08**	3.60	3.34
work at jobs they do not like?	2.55	2.60	2.57	2.90	3.08	2.99

¹Rating scale used:

- 1 = Almost never
- 2 = Seldom
- 3 = Sometimes
- 4 = Often
- 5 = Almost always

*Significantly ($p < .05$) different from the mean for high-accident mines

**Significantly ($p < .01$) different from the mean for high-accident mines

Table 47
Mean Ratings of the Opportunities for Intrinsic Reward¹

How often do miners' jobs give them a chance to...	Underground Miners			Foremen			Management		
	Low-Acc Mines	High-Acc Mines	Overall	Low-Acc Mines	High-Acc Mines	Overall	Low-Acc Mines	High-Acc Mines	Overall
use your ability?	2.31	2.31	2.31	2.38	2.56	2.47	3.00**	2.53	2.75
do challenging work?	2.03	2.10	2.06	2.28	2.35	2.31	2.40	2.29	2.34
do interesting work?	2.16	2.13	2.15	2.22	2.37	2.29	2.47	2.29	2.38
do a variety of things?	2.14	2.12	2.13	2.48	2.58	2.53	2.33	2.18	2.25
feel that you are getting things done?	2.35	2.36	2.36	2.26	2.31	2.28	2.47	2.47	2.47
learn new things?	2.09	2.07	2.08	2.36	2.38	2.37	2.53	2.65	2.59
do important work?	2.43	2.35	2.39	2.42*	2.65	2.54	2.67	2.41	2.53
make important decisions?	1.92	1.93	1.93	1.82*	2.17	2.00	1.87	1.94	1.91
advance or get ahead?	1.77	1.74	1.76	2.14	2.31	2.23	2.67	2.35	2.50

¹ Rating scale used:

1=Not much

2=Some

3=A lot

* Significantly ($p < .05$) different from the mean for high-accident mines

** Significantly ($p < .01$) different from the mean for high-accident mines

decisions. Chances for miners to advance or get ahead tended to be viewed more favorably by these management groups than by miners themselves. Both groups felt that miners' jobs gave them quite a bit of opportunity to use their ability, do challenging work, do interesting work, do a variety of things, feel that they are getting things done, learn new things, and do important work. Foremen in high-accident mines felt that miners had a greater opportunity to do important work and to make important decisions than did foremen in low-accident mines. On the other hand, managers in low-accident mines felt that miners had a greater opportunity to use their ability than did managers in high-accident mines.

Job Satisfaction as Reported by Wives

Miners' wives were asked several questions to determine how satisfied they were with various aspects of their husbands' jobs, as well as how satisfied their husbands were with their jobs.

Table 48 summarizes responses of wives with regard to how satisfied they were with seven different aspects of their husband's job. The rating scale used ranged from "dissatisfied" (1.0) through "neither satisfied nor dissatisfied" (2.0), to "satisfied" (3.0). Of the seven items listed, wives were most satisfied with pay (overall mean of 2.79), and least satisfied with the job's effect on their husband's health (overall mean of 1.86). Wives also indicated that they were fairly well satisfied with vacation, benefits, and future family security. One significant difference was found between means in high-versus low-accident mines. Wives in high-accident mines were significantly more satisfied with future family security.

Wives in both high-and low-accident mines indicated that their husbands were generally satisfied with their jobs. On a five-point scale ranging from "extremely dissatisfied" (1.0) to "extremely satisfied" (5.0), the mean in low-accident mines was 3.88, while the mean in high-accident mines was 3.87.

Wives were also asked to check off the specific aspects which their husbands liked about their jobs. Responses in high-and low-accident mines were quite similar (See Table 49). In no instances was there a significant difference in the number of responses given by the two groups. The aspects of the job which wives reported their husbands as liking most often were wages, steadiness of the work, and benefits such as vacation and medical care. Cited next most frequently as aspects which their husbands liked were the type of work, the chance to work with friends, security, having a good boss to work for, having friendly people to work with, the hours of work, the trust shown by the boss, and holding a responsible position. Fewer than half of the wives reported that their husbands liked the physical conditions of work, the independence their jobs provided, the chance to get ahead, the lack of pressure to get things done, the chance to do things a person really knows well, or the status provided by the type of work done.

Wives were also asked which aspects of the job their husbands liked the most. Approaching the issue in this slightly different manner provided much the same results. Wives stated that the things their husbands liked most were the good benefits (e.g. vacation and medical care), wages and the

Table 48
Mean Ratings of
Wives' Satisfaction with Husband's Job¹

Aspect	Low-accident mines	High-accident mines	Overall
Pay	2.83	2.74	2.79
Husband's safety in the mine	2.17	1.97	2.08
Effects on husband's health	1.83	1.89	1.86
Vacation	2.36	2.55	2.45
Other benefits	2.36	2.37	2.36
Future family security	2.24*	2.58	2.40
The social life the job provides	2.14	2.16	2.15

¹Rating scale used:

- 1 = Dissatisfied
- 2 = Neither satisfied nor dissatisfied
- 3 = Satisfied

*Significantly different ($p < .05$) from the mean in high-accident mines.

Table 49

Husbands' Likes With Regard to Job

Aspect of Job	Number of responses in low-acc. mines (N=42)	Number of responses in high-acc. mines (N=38)	Total number of responses (N=80)
type of work	28 (67%)	28 (74%)	56 (70%)
chance to work with friends.....	27 (64%)	29 (76%)	56 (70%)
wages	38 (90%)	32 (84%)	70 (88%)
steady work	36 (86%)	33 (87%)	69 (86%)
hours of work	23 (55%)	23 (61%)	46 (58%)
physical conditions of work	17 (40%)	11 (29%)	28 (35%)
independence	18 (43%)	13 (34%)	31 (39%)
chance to get ahead	18 (43%)	15 (39%)	33 (41%)
security	28 (67%)	25 (66%)	53 (66%)
what people think of persons doing this type of work	7 (17%)	8 (21%)	15 (19%)
not too much pressure to get things done	15 (36%)	15 (39%)	30 (38%)
good benefits like vacation and medical care	34 (81%)	33 (87%)	67 (84%)
trust shown by boss	22 (52%)	21 (55%)	43 (54%)
good boss to work for	29 (69%)	19 (50%)	48 (60%)
holding a responsible position	17 (40%)	23 (61%)	40 (50%)
chance to do things a person really knows well	20 (48%)	14 (37%)	34 (43%)
friendly people to work with	23 (55%)	23 (61%)	46 (58%)

steady work, followed by: a good boss to work for, the type of work, and friendly people to work with.

When wives were asked to list one or two things that their husbands disliked most about their job, there were almost as many different responses as there were respondents. Several categories of responses were cited more than once, however. The most frequent responses given by eight wives was the risks or danger involved. Other responses given by several wives included dust, dirt, rotating shift work, distance to travel to work, noise, general working conditions (such as being underground), bad top, and water.

As an indicator of how satisfied miners' wives were with their husband's job and with their life as a miner's wife, respondents were asked to indicate if they would like for their sons to work in the mining industry, or for their daughters to marry miners. Seventy-nine percent of the wives in low-accident mines, and 74% of the wives in high-accident mines stated that they would prefer it if their sons did not work in the mining industry. The majority of respondents also felt that their sons would, in fact, end up working outside of mining (64% of the wives in low-accident mines and 61% of the wives in high-accident mines). Similarly, the majority of respondents stated that they would not like for their children to marry miners (64% of the wives in low-accident mines and 61% of the wives in high-accident mines).

One final question dealing with their husbands' jobs asked about how often there is a lot of pressure or tension involved in the job. Wives indicated their answers on a 5-point scale ranging from "all the time" (1.0) to "never" (5.0). The mean response in low-accident mines was 2.98, while the mean in high-accident mines was 2.71 indicating that wives in both samples felt that their husbands' jobs sometimes involved pressure or tension. The difference between the means of the two samples was not significant.

Husband's Career

Wives were asked several questions related to their husbands' career. First, they were asked to indicate the particular job he was currently working at in the mine. Next, they were asked the kind of work he really wanted to do if he had his choice of jobs. Finally, they were asked about possible impediments their husbands faced in achieving the desired job.

Wives reported their husbands to be currently working at a variety of different jobs. Twenty-seven different jobs were reported. The job categories which were best represented included roof bolter (N=5), shuttle car operator (N=5), general inside laborer (N=5), mechanic (N=4), faceman (N=4), beltman (N=4), tippie attendant (N=3), continuous miner operator (N=3), and fireboss (N=3).

Similarly, there was a variety of different jobs which wives reported that their husbands would really want to do if they had their choice. These jobs included sports coach (N=3), lawyer (N=3), carpenter (N=3), mine superintendent (N=3), photographer (N=2), state policeman (N=2), and a variety

of others. Still, 25 wives indicated that given complete freedom of choice, their husbands would choose to be coal miners.

Wives were then asked the reasons why their husbands could not get the jobs they truly wanted. The reason most often cited was lack of education, mentioned by 25% of the wives surveyed. Other factors mentioned relatively frequently included a need for additional training or skills, present job security, financial reasons and family responsibilities. Factors mentioned less frequently were health, racial prejudice, friendship with current co-workers, and there being too few jobs. For none of the items were the number of responses significantly different between high-and low-accident mines (See Table 50).

Decision-Making Responsibility

Managers and foremen were asked who had the most decision-making responsibility for each of six different areas. Respondents were asked to write in their answers. Responses were then coded as belonging to one of 14 categories. The fourteen categories together with the specific jobs comprising each are listed in Appendix I. Tables 51-56 summarize the answers given.

In general, there was a high degree of consistency between the responses of foremen and management. In addition, responses of individuals in high-accident mines were very similar to those given by individuals in low-accident mines. In no instances were there significant differences in the pattern of responses in high-versus low-accident mines.

Most foremen and managers agreed that mine management had the most important decision-making responsibility for setting production goals. Upper management was cited second most frequently and first-line supervision received 11 votes from foremen. Responsibility for making safety inspections, on the other hand, was viewed as belonging primarily to the safety department. The second largest number of individuals cited first-line supervision as having the most important decision-making responsibility for making safety inspections. Responsibility for approving or disapproving equipment purchases was viewed as in the domain primarily of mine management, although upper management received a considerable number of votes as well. It was also felt that mine management was responsible for shifting workers to less hazardous or healthier jobs. Most individuals indicated that first-line supervision has the most important decision-making responsibility for work crew safety. The only area where there was a discrepancy between the responses of foremen and managers was in the area of planning and organizing work. Foremen felt that the most important responsibility lay with first-line supervision, while managers felt that it lay with mine management.

Summary

It appears that on the whole, underground miners, foremen, and managers feel that miners' jobs offer some intrinsic rewards. There are, however, some indications of potential problem areas. First of all, it is possible that a better job procedure could be developed in high-accident mines. Underground miners in high-accident mines reported that they had to do a lot of

Table 50

Impediments to Husbands' Obtaining Desired Jobs

<u>Impediment</u>	Number of responses in low-acc. mines (N=42)	Number of responses in high-acc. mines (N=38)	Total Number of responses _____ (N=80)
Lack of education	12(29%)	8(21%)	20(25%)
Family responsibilities	3(7%)	6(16%)	9(11%)
Health	0(0%)	1(3%)	1(1%)
Racial prejudice	0(0%)	2(5%)	2(3%)
Need training/skills	7(17%)	7(18%)	14(18%)
Not enough jobs	2(5%)	5(13%)	7(9%)
Present job security	5(12%)	7(18%)	12(15%)
Friendship with the people he works with	2(5%)	2(5%)	4(5%)
Financial reasons	6(14%)	4(11%)	10(13%)

Table 51

Decision-making Responsibility for Setting Production Goals

Personnel Category	Foremen		Management	
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)
Upper management	8 (16%)	8 (15%)	0 (0%)	4 (24%)
Mine management	27 (54%)	32 (62%)	13 (87%)	11 (65%)
First-line supervision	7 (14%)	4 (8%)	1 (7%)	0 (0%)
Engineering department	1 (2%)	0 (0%)	0 (0%)	0 (0%)
Other	1 (2%)	1 (2%)	1 (7%)	1 (6%)
				2 (6%)
				4 (13%)
				24 (75%)
				1 (3%)
				0 (0%)
				2 (6%)

Table 52

Decision-Making Responsibility for Making Safety Inspections

<u>Personnel Category</u>	<u>Foremen</u>		<u>Management</u>			
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=103)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Upper management	2 (4%)	0 (0%)	2 (2%)	0 (0%)	1 (6%)	1 (3%)
Mine management	7 (14%)	4 (8%)	11 (11%)	0 (0%)	3 (18%)	3 (9%)
First-line supervision	11 (22%)	10 (19%)	21 (21%)	1 (7%)	2 (12%)	3 (9%)
Safety department	18 (36%)	21 (40%)	39 (38%)	12 (80%)	8 (47%)	20 (63%)
Union	0 (0%)	3 (6%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)
Federal bureau of mines	2 (4%)	3 (6%)	5 (5%)	1 (7%)	0 (0%)	1 (3%)
Combination Management and Union	2 (4%)	1 (2%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)
Combination middle management and first-line supervisors	0 (0%)	1 (2%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)
Other	1 (2%)	1 (2%)	2 (2%)	1 (7%)	2 (12%)	3 (9%)

Table 53.

Decision- Making Responsibility for Approving or Disapproving Equipment Purchases

<u>Personnel Category</u>	<u>Foremen</u>		<u>Management</u>			
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=102)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Upper management	16 (32%)	8 (15%)	24 (24%)	6 (40%)	4 (24%)	10 (31%)
Mine management	20 (40%)	26 (50%)	46 (45%)	9 (60%)	10 (59%)	19 (59%)
First-line supervision	1 (2%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)
Engineering department	1 (2%)	1 (2%)	2 (2%)	0 (0%)	0 (0%)	0 (0%)
Federal Bureau of Mines	2 (4%)	0 (0%)	2 (2%)	0 (0%)	0 (0%)	0 (0%)
Other	1 (2%)	1 (2%)	2 (2%)	0 (0%)	2 (12%)	2 (6%)

Table 54

Decision-Making Responsibility for Shifting Workers to Less Hazardous or Healthier Jobs

<u>Personnel Category</u>	<u>Foremen</u>		<u>Management</u>			
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=102)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Upper management	6 (12%)	4 (8%)	10 (10%)	0 (0%)	1 (6%)	1 (3%)
Mine management	28 (56%)	27 (52%)	55 (54%)	11 (73%)	8 (47%)	19 (59%)
First-line supervision	3 (6%)	8 (15%)	11 (11%)	0 (0%)	2 (12%)	2 (6%)
Safety department	1 (2%)	2 (4%)	3 (3%)	0 (0%)	1 (6%)	1 (3%)
Industrial relations	1 (2%)	0 (0)	1 (1%)	0 (0%)	0 (0%)	0 (0%)
Union	0 (0%)	1 (2%)	1 (1%)	1 (7%)	0 (0%)	1 (3%)
Combination management and Union	1 (2%)	2 (4%)	3 (3%)	1 (7%)	0 (0%)	1 (3%)
Combination upper management and middle management	1 (2%)	0 (0%)	1 (1%)	1 (7%)	1 (6%)	2 (6%)
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 55

Decision-Making Responsibility for Planning and Organizing Work

<u>Personnel Category</u>	<u>Foremen</u>		<u>Management</u>			
	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=102)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Upper management	4 (8%)	2 (4%)	6 (6%)	0 (0%)	2 (12%)	2 (6%)
Mine management	14 (28%)	10 (19%)	24 (24%)	12 (80%)	10 (59%)	22 (69%)
First-line supervision	21 (42%)	30 (58%)	51 (50%)	1 (7%)	2 (12%)	3 (9%)
Engineering department	0 (0%)	0 (0%)	0 (0%)	1 (7%)	1 (6%)	2 (6%)
Union	1 (2%)	2 (4%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)
Combination middle management and first-line supervisors	2 (4%)	2 (4%)	4 (4%)	1 (7%)	0 (0%)	1 (3%)

Decision-making Responsibility for Work Crew Safety

103

things at the same time, and that they had to work without clear-cut duties significantly more frequently than miners in low-accident mines. A better job procedure could help in both of these areas. Second, absenteeism appears to be more prevalent in high-accident mines since both underground miners and foremen reported that miners had to take care of absentees' jobs significantly more often than in low-accident mines. It would also appear that greater opportunities for advancement could be afforded miners, or at least existing opportunities for advancement could be more clearly explained.

Wives responses indicated that they and their husbands were generally satisfied with extrinsic rewards afforded by the job. Factors such as pay, vacation, benefits, job security, steadiness of work, etc. Both wives and miners were generally less satisfied with intrinsic factors such as independence afforded by job tasks, the chance to get ahead, and the pressure to get things done. Wives also indicated that they were least satisfied with the effect of the job on their husbands' health. In spite of the fact that wives were generally satisfied with many aspects of the job, they did not want their sons to be miners, and they did not want their daughters to marry miners.

COMPANY SAFETY PROGRAMS

Many questions were asked of safety directors and managers in an attempt to define the type of safety programs which were currently being used, and to define the responsibilities and requirements for the job of safety director. Specific factors which were investigated included the safety budget, the percentage of time which safety directors spent in the mine; the extent to which safety is considered in the approval of work processes and equipment purchase, and many others. Safety directors were also asked for suggested changes for making their jobs more effective and union officials were asked for suggested changes which would make the mines safer.

Percentage of Safety Director's Time Spent in the Mine

Both safety directors and management were asked to indicate on a scale ranging from 0 to 100 (with 5-point increments marked) the percentage of time which the safety director spends in the mine. In low-accident mines, both samples indicated that about half of the safety director's time was spent underground. The mean in the safety-director sample was 54% and the mean in the management sample was 57%. In high-accident mines, safety directors indicated that they spent 70% of their time underground. Managers in high-accident mines indicated that 55% of the safety director's time was spent in the mine.

Safety Budget

Safety directors and management were asked to indicate the approximate percentage of the total operational budget that is ear-marked for safety on a six-point scale ranging from "no money specifically ear-marked for safety" (0.0) to "more than ten percent" (5.0).

Mean responses of safety directors in both high-accident and low-accident mines indicated that about 5% to 10% of the total operational budget in their mines was ear-marked for safety. The mean response in low-accident

mines was 4.08, and the mean response in high-accident mines was 4.14. Similarly, managers' responses indicated that approximately 5% to 10% of the total operational budget was earmarked for safety. The mean responses in the management sample were 4.33 in low-accident mines and 3.88 in high-accident mines. Although managers in low-accident mines did indicate that a large percentage of the budget was designated for safety than did managers in high-accident mines, the difference was not significant.

Approval of Work Processes

Safety directors were asked to indicate on a 4-point scale ranging from "always" (1.0) to "never" (4.0) how often safety personnel have to approve new or modified work processes before they are put in operation. The mean in low-accident mines was 2.00, and the mean in high-accident mines was 1.86, indicating that safety personnel are very often consulted before new or modified work processes are instituted. The difference between means was not significant.

Consideration of Safety in Purchasing Equipment

On the same four-point frequency scale safety directors were asked to indicate how often safety features were included in the specifications for new equipment purchases. The mean in low-accident mines was 1.31 and the mean in high-accident mines was 1.07, indicating that safety features are almost always included in specifications for new equipment. The difference between means was not significant.

Approval of Newly Installed Equipment

A final question using the four-point frequency scale asked how often safety personnel had to approve newly installed equipment before it is used. The mean in low-accident mines was 1.85, and the mean in high-accident mines was 1.86, indicating that safety personnel very often do approve new equipment before it is used. The difference between means was not significant.

Sources of New Ideas About Safety and Health

Safety directors were asked to use a three-point scale to indicate the extent to which each of fifteen different sources contributed new ideas about safety and health. The scale ranged from "not much" (1.0) to "to a great extent" (3.0). Mean responses of safety directors are given in Table 55.

Mean responses shown in Table 57 indicate that management's suggestions are the greatest source for new ideas about safety and health, followed

Table 57
Mean Ratings of the Contribution of Alternative
Sources of New Ideas About Safety and Health¹

	Low-Acc.	High-Acc.	Overall
Miners' suggestions	2.15	1.93	2.04
Management's suggestions	2.69	2.57	2.63
Publications and safety literature	2.15	1.93	2.04
Union	1.92	1.93	1.93
Bureau of Mines Inspectors	2.23	2.36	2.30
Other safety directors	2.31	2.21	2.26
The Federal Coal Mine Health and Safety Act	2.23	2.21	2.22
State mining bureaus	2.31	2.14	2.22
Insurance company reports	1.38	1.57	1.48
Bureau of Mines safety education program	2.15	1.79	1.96
Other companies' safety programs	1.92	1.86	1.88
Manufacturer's safety ideas	1.85	1.79	1.81
Accident investigations in this mine	2.46	2.71	2.59
Accident reports from other mines	1.85	1.86	1.85
Foremen suggestions	2.46	2.21	2.33

¹Rating scale used:

1 = Not much

2 = To some extent

3 = To a great extent

closely by accident investigations in the mine. Foremen's suggestions, Bureau of Mines inspectors, other safety directors, the Federal Coal Mine Health and Safety Act, and state mining bureaus also appear to be frequent sources for new ideas. Lowest of the 15 alternatives, in terms of utility as a source of new ideas is, insurance company reports. There were no significant differences when responses of safety directors in high-accident mines were compared with those in low-accident mines.

Hindrances to Safety Program

Using the same three-point extent scale as in the item above, safety directors were asked to indicate the extent to which each of 12 different factors hindered their safety program. Mean responses are shown in Table 58.

The greatest hindrance to safety programs was seen to be miners' resistance to change. That is the only item to receive a mean rating greater than 2.0. Factors which were seen as least encumbering among the 12 alternatives were management, shortage of money, shortage of supplies, and production goals. There were no significant differences between mean responses in high-accident mines versus those in low-accident mines.

Training Required for Safety Directors

Safety directors were asked to check off which of five different types of training were required for persons who have responsibility for designing or directing safety programs. The number of responses in low-accident mines, high-accident mines, and overall are shown in Table 59.

By far the most prevalent type of training required for safety directors is experience gained by coming up through the ranks. Specific college courses or training courses related to safety, and satisfactory completion of a training program offering a certificate in industrial safety were required in about half of the mines surveyed. None of the mines required a Master's degree, and only two mines required a bachelor's degree in a field related to safety.

Incentives Used in Promoting Worker Safety

Safety directors were asked to check off which of five different incentives they used in promoting worker safety. The number of responses in low-accident mines, high-accident mines, and overall are shown in Table 60.

The most frequently used incentive in both high- and low-accident mines is a running tally of accident-free man-hours. This incentive was used in 21 of 27 mines. Fourteen safety directors indicated that safety attitude and behavior are included in workers' performance evaluation, and a similar number stated that recognition awards were used. Thirteen safety directors used publicity of outstanding safety performance, while only six used cash awards or prizes. No great differences were observed in responses of safety directors in high-accident mines versus those in low-accident mines.

Safety directors were also asked to indicate which of the five incentives they considered to be most effective, second most effective, and third most effective. Inclusion of safety attitude and behavior in worker performance

Table 58

Mean Ratings of the Degree to which Alternative
Factors Hinder the Safety Program¹

	Low-acc. mines	High-acc. mines	Overall
Shortage of money.....	1.31	1.43	1.37
Production goals	1.38	1.43	1.41
Miners' resistance to change.....	2.31	2.14	2.22
Union	1.62	1.57	1.59
Design of work equipment	1.92	1.71	1.81
Management	1.15	1.21	1.19
Foremen's resistance to change	1.85	1.64	1.74
The Federal Coal Mine Health and Safety Act	1.62	1.50	1.56
Your not having enough authority	1.38	1.57	1.48
Shortage of supplies	1.23	1.50	1.37
Miner turnover	1.85	1.93	1.89
Too many different rules to follow	1.85	1.50	1.67

¹Rating scale used:

1 = not much

2 = To some extent

3 = To a great extent

Table 59

Training Required for Safety Directors

<u>Type of Training</u>	Number of responses in low-acc. <u>mines</u> (N=13)	Number of responses in high-acc. <u>mines</u> (N=14)	Total number of <u>responses</u> (N=27)
Experience gained by coming up through the ranks	11 (85%)	14 (100%)	25 (93%)
Specific college or training courses related to safety	8 (62%)	6 (43%)	14 (52%)
Satisfactory completion of training program offering certificate in industrial safety	7 (54%)	6 (43%)	13 (48%)
Bachelor's degree in a field related to safety	1 (8%)	1 (7%)	2 (7%)
Master's degree in a field related to safety	0 (0%)	0 (0%)	0 (0%)
No special training	1 (8%)	4 (29%)	5 (19%)

Table 60

Incentives Used in Promoting Safety

Incentive	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)
Safety attitude and behavior included in worker performance evaluation	9 (69%)	5 (36%)	14 (52%)
Running tally of accident-free man-hours	9 (69%)	12 (86%)	21 (78%)
Recognition awards (e.g. certificates, medals, etc.)	7 (54%)	7 (50%)	14 (52%)
Cash awards or prizes	2 (16%)	4 (29%)	6 (22%)
Publicity of outstanding safety performance	6 (46%)	7 (50%)	13 (48%)

evaluation was viewed as the most effective incentive in promoting worker safety, followed by publicity of outstanding safety performance. A running tally of accident-free man-hours and recognition awards however, were also viewed as effective incentives. Cash awards or prizes were not thought to be as effective as other incentives.

Family or Community Efforts for Safety

Safety directors were asked if their company had initiated or aided family or community efforts to instill miner safety consciousness. Responses were fairly evenly divided in both high-and low-accident mines. Overall, 12 safety directors indicated that their companies had attempted some form of family or community program, and 15 indicated that their companies had not.

Family or community programs which had been tried varied greatly. In three mines, a periodic bulletin or safety newsletter was published and distributed in the community. Two mines provided first-aid training to community members. Others had such varied programs as community effort contests; showings of safety films; providing speakers for local civic organization meetings; family day programs (including underground tours for miners' wives and children; and a "miner of the day" program which was organized with the cooperation of a local radio station, in which the name of the miner with the most years of service without a lost-time injury was announced on the air.

Disciplinary Actions Imposed on Unsafe Miners

Safety directors were asked to check off which of seven different disciplinary actions were imposed against miners who habitually fail to follow safe work practices or who are known risk-takers. The number of responses in low-accident mines, high-accident mines, and overall are shown in Table 61.

By far the most widely used disciplinary action in both high- and low-accident mines is the verbal reprimand, which was used in 26 out of 27 mines. Written reprimands, and suspension followed verbal reprimands, in order of frequency. Fines, and the requirement of participating in special safety training were not reported by any safety directors, and transfer to a less hazardous job was reported by only three. There were no major differences in the responses of safety directors in high-accident mines when compared with those in low-accident mines.

When asked which of the seven disciplinary actions they had found most effective, safety directors replied that the verbal reprimand was most effective, and the written reprimand was second most effective. Suspension and dismissal were also viewed as moderately effective.

Hazard Reporting Systems

All safety directors reported that there was an established system in their mines to report suspected hazards. When asked about how a worker reports accident hazards, all safety directors replied that one mechanism

was by informing one's supervisor. In 20 of 27 mines, safety directors said that telling maintenance or safety personnel was another means by which workers could report hazards. In only two mines (both of them low-accident mines) was it stated that workers reported hazards in writing.

Responsibility for Accident Investigation

In addition to a hazard reporting system, a good safety program should include an accident investigation system. Table 62 shows responses of safety directors when asked about who investigates accidents or near accidents.

In all but one mine accident investigation was reported to be the responsibility of safety personnel, and in 23 of 27 mines management personnel were also reported to take part in investigations of accidents or near misses. First-line supervisors were involved in 19 mines, and union officials were involved in 14 mines. In 9 mines worker representatives and the employee(s) involved also took part in the investigation. In only one mine did medical personnel take part. There were no great differences in the responses given in high-versus low-accident mines.

Special Programs for Increasing Safety

Safety directors reported a number of special precautions or programs which their mines had instituted to help increase miner safety and health. One of the most frequently mentioned items was training. Training for inexperienced men, training foremen, training specifically designed to address current accident prevention problems, retraining programs for miners moving to new jobs, and management training were all mentioned. Regular safety meetings, and safety classes utilizing films and group discussions were held in several mines. Personal contact with each miner, including constant reminders to be safe and correction of unsafe practices on the spot, were also mentioned. Other special programs included monthly safety letters, development of company safety standards, collection of accurate injury data, and an eye protection program.

Suggested Changes by Safety Directors

Safety directors were asked what changes they would suggest to make their positions more effective. The most frequent response, given by eight safety directors, was that they should be given more authority in safety matters. The second most frequent response was that safety directors need to be able to spend more time on safety matters. Many safety directors apparently have all of their time consumed in paper work or in accompanying MESA inspectors. Perhaps related to the fact that safety directors feel much of their time to be used for non-essential matters, was a call for more trained safety personnel. Other factors mentioned included a call for closer contact with first-line supervisors; a better attitude toward safety on the part of management; cooperation from the union in penalizing unsafe workers; more and better training for new employees and safety directors, and retraining for older employees; stricter safety rules; and an increase in pay to put safety directors on the same level as section foremen.

Table 61

Disciplinary Actions Imposed on Unsafe Miners

Disciplinary action	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)
Verbal reprimand	12 (92%)	14 (100%)	26 (96%)
Written reprimand	6 (46%)	10 (71%)	16 (59%)
Transfer to less hazardous job	1 (8%)	2 (14%)	3 (11%)
Fines	0 (0%)	0 (0%)	0 (0%)
Required to participate in special safety training	0 (0%)	0 (0%)	0 (0%)
Suspension	5 (38%)	8 (57%)	13 (48%)
Dismissal	4 (31%)	7 (50%)	11 (41%)

Table 62

Responsibility for Accident Investigation

Personnel	Number of responses of low-acc. mines (N=13)	Number of responses of high-acc. mines (N=14)	Total number of responses (N=27)
Medical personnel	1 (8%)	0 (0%)	1 (4%)
Safety personnel	13 (100%)	13 (93%)	26 (96%)
Management personnel	12 (92%)	11 (79%)	23 (85%)
Union officials	7 (54%)	7 (50%)	14 (52%)
Worker representatives	6 (46%)	3 (21%)	9 (33%)
Involved employee	5 (38%)	4 (29%)	9 (33%)
First-line supervisor	9 (69%)	10 (71%)	19 (70%)

Changes Suggested by Union Officials for a Safer Mine

When asked what needed to be done to make their mines safer, two categories of responses were given by union officials more frequently than any others. The first category can be described as a need for better labor-management relations. Eighteen union officials gave responses which indicated that greater cooperation is needed among management, union and workers. Typical responses were: "Miners and management should strive to work together in the total safety program," and "I feel better relations between management and the UMWA as a whole would make this mine much better and safer." The second most frequent category of responses can be described as a need for greater interest and participation in safety meetings. Typical responses in this category were: for the company to take more time on safety meetings, hold safety meetings more regularly, more interest from management concerning safety, report accidents back to workers. Other responses indicated a need for more and better training; reduction in noise and dust levels; and better inspections by federal, state and company inspectors (e.g. foremen).

Summary

Safety programs appear to be very similar in both high- and low-accident mines. A number of incentives are used to promote safe job behaviors, the most effective of which are including safety as an integral part of worker performance evaluation, and publicity of outstanding safety performance. The most frequently used disciplinary actions for unsafe workers are a verbal reprimand, written reprimand, and suspension. Hazards are usually reported verbally to the supervisor or safety personnel, and accident investigations are usually performed by safety personnel or management. Safety personnel are very often consulted on changes in work processes, new equipment purchases, and approval of newly installed equipment. New ideas about safety are generally a result of management's suggestions and accident investigations. The prime requirement for the job of safety director is experience gained by coming up through the ranks, although many safety directors have attended special safety courses. In general 5-19% of the total operational budget is spent on safety, and safety directors almost always stated that shortage of money or supplies was not a problem. The most frequently used special safety programs included training and regular safety meetings.

Several problems were also noted. Safety directors tend to feel that too much of their time is absorbed in paper work and accompanying MESA inspectors. They feel that they need more time to spend on developing safety programs for their company. It is interesting to note that safety directors in high-accident mines spend more time underground than their counterparts in low-accident mines. Safety directors stated that they need to have more authority in the safety area. They also stated that miners' resistance to change was one of the greatest hindrances to safety programs. Union officials stated that better labor-management relations were needed, as well as a greater interest and participation in safety meetings.

PERCEPTIONS OF OUTSIDE ORGANIZATIONS

Questions were asked about three organizations outside the mining company itself, which could have an impact on safety and health conditions in the mine. These were the union, the U.S. Bureau of Mines (with reference to inspectors from the Mine Enforcement Safety Administration)¹, and state mining bureaus. Each of the six personnel groups were asked about these organizations. In addition, questions were asked about the impact of the family and the community on safety.

Unions

Respondents were asked to indicate on a three-point scale ranging from "not much" (1.0) to "great extent" (3.0), the extent to which the union participates in certain activities. Responses are shown in Table 63.

Responses of all six samples were very similar. All groups felt that the thing which unions do to the greatest extent is to put pressure on the company to provide a safe mine, followed closely by bargaining with management for safer and healthier mines. The thing which unions do to the least extent according to all groups, is to set up safety and health training programs. Other activities which unions apparently engage in relatively infrequently include having the safety committee recheck after the foreman's safety inspection, encouraging men with health problems to shift to less dusty jobs, and providing legal help in black lung and compensation claims.

Underground miners in low-accident mines reported that the union bargained with management for safer and healthier mines and discussed safety and health topics in union meetings to a significantly greater extent than underground miners in high-accident mines. Union officials in low-accident mines felt that the union took care of injured miners and their families to a significantly greater extent than union officials in high-accident mines. Just the reverse was the case in the above-ground miner sample, where above-ground miners in high-accident mines felt that the union took better care of injured miners and their families. Finally, safety directors in low-accident mines felt that the union put greater pressure on the company to provide a safe mine than did safety directors in high-accident mines.

Length of Unionization

Union officials were asked to fill in the length of time their mines had been unionized. Responses were then coded into ten categories ranging

¹ During the course of the study the Mine Enforcement Safety Administration was formed as an agency independent of the U. S. Bureau of Mines. The survey instruments, referencing the U. S. Bureau of Mines, had already been developed when this occurred. However, in the conduct of the field survey it was clearly recognized that personnel from the Mine Enforcement Safety Administration performed the inspections.

Table 63
Mean Ratings of the Extent of Alternative Union Activities¹

	Underground Miners			Above-Ground Miners			Union Officials			Foremen			Safety Directors			Management		
	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall	Low-acc. mines	High-acc. mines	Overall
To what extent does the Union ...																		
set up safety and health training programs?	1.63	1.66	1.64	1.72	1.84	1.78	1.71	1.62	1.67	1.46	1.62	1.54	1.38	1.14	1.26	1.47	1.24	1.34
take care of injured miners and their families?	2.13	2.09	2.11	2.02*	2.27	2.13	2.54**	1.96	2.26	2.02	1.96	1.96	2.31	2.07	2.19	1.67	2.06	1.88
bargain with management for safer and healthier mines?	2.39*	2.26	2.33	2.45	2.40	2.43	2.64	2.35	2.50	2.24	2.19	2.22	2.31	2.14	2.22	2.40	2.06	2.22
provide safety and health information to the miners?	2.12	2.05	2.09	2.15	2.19	2.17	2.39	2.19	2.30	1.84	2.02	1.93	1.54	1.57	1.56	1.87	1.76	1.81
check to see if miners and their families receive adequate medical care?	2.02	1.94	1.98	1.85	1.99	1.91	2.21	2.12	2.17	2.02	2.04	2.03	2.46	1.86	2.15	2.27	2.06	2.16
discuss safety and health topics in union meetings?	2.26*	2.15	2.21	2.36	2.23	2.30	2.50	2.31	2.41	1.98	2.02	2.00	2.08	2.07	2.07	2.00	1.82	1.91
encourage men with health problems to shift to less dusty jobs?	1.89	1.80	1.85	2.02	2.07	2.04	2.32	2.08	2.20	1.92	2.08	2.00	2.00	1.79	1.89	1.87	1.41	1.63
provide legal help in black lung and compensation claims?	1.93	1.90	1.92	2.00	2.03	2.01	2.39	2.08	2.24	1.70	1.77	1.74	2.00	1.93	1.96	2.07	2.18	2.13
put pressure on the company to provide a safe mine?	2.38	2.34	2.36	2.56	2.44	2.51	2.64	2.50	2.57	2.20	2.40	2.30	2.46	2.50	2.48	2.60	2.35	2.47
have the safety committee recheck after the foreman's safety inspection?	--	--	--	2.08	2.13	2.10	1.93	1.73	1.83	1.72	1.87	1.79	1.85**	1.21	1.52	1.73	1.71	1.72

*Significantly ($p < .05$) different from high-accident mines.
**Significantly ($p < .01$) different from high-accident mines.

¹ Rating scale used:

- 1 = Not much
- 2 = Some extent
- 3 = Great extent

from "less than one year" to "greater than 75 years". Responses indicated that both high-and low-accident mines had been unionized for approximately 20 years. The difference between the two groups was not statistically significant.

Activity of Rank and File Members

Union officials were asked to indicate on a three-point scale how many union members were active in each of five different areas. Table 64 summarizes the responses.

At all mines surveyed, it appears that participation in union activities by rank and file members is weak. No single mean response shown in Table 64 is greater than 1.54. Of the five activities listed, participation appears to be greatest in safety meetings and safety committee work. None of the mean differences between low-and high-accident mines were significant.

Safety as a Bargaining Tool

The final open-ended question asked managers if they believed that miners were really interested in safety, or if they just used safety as a bargaining tool. Only six managers were willing to say conclusively that miners were not really interested in safety. One went so far as to say that union men try to get safety veto power so they can blackmail the company. The majority of managers straddled the fence by saying that some miners are truly interested in safety and some are not really interested in safety but use it as a bargaining tool. There were quite a few managers, however, (12 in number) who stated that most miners, or "the average miner", was in fact truly interested in safety.

Bureau of Mines

The second organization of interest outside the mining company was the Bureau of Mines. The item asked which of seven different behaviors were exhibited by Bureau of Mines (MESA) inspectors. Results are summarized in Table 65. There was quite a bit of agreement among the five samples with regard to the activities of the inspectors. A majority of individuals in each sample indicated that inspectors made careful, thorough inspections; made enough inspections; enforced regulations and penalized violations; and did not ignore dangerous conditions. There were some items, however, to which labor and management groups responded differently. Labor groups (including underground miners and union officials) tended to answer that Bureau of Mines (MESA) inspectors forewarned mines of their inspection schedules. Management groups (including foremen, safety directors, and managers) answered that inspectors did not forewarn of inspection schedules. Managers showed a slight tendency to state that inspectors did not have enough experience or training to be good inspectors. Other groups felt that inspectors' training and experience was sufficient. Finally all three management groups tended to state that inspectors worry too much about things that do not matter. Labor groups were pretty much undecided about inspectors' concerns for unimportant details, with approximately equal numbers answering in the affirmative and the negative.

Table 64
Mean Ratings of the
Activity of Rank and File Union Members¹

Activity	Low-acc. mines	High-acc. mines	Overall
Local meetings	1.32	1.19	1.26
Safety meetings	1.39	1.54	1.46
National union affairs	1.18	1.19	1.19
Social activities sponsored by the union	1.39	1.35	1.37
Safety committee work	1.54	1.38	1.46

¹
Rating scale used:

- 1 = Not many (less than 25%)
- 2 = Some (25% - 50%)
- 3 = A lot (greater than 50%)

State Mining Bureaus

Each of the five samples asked about characteristics of Bureau of Mines (MESA) inspectors were asked to go back through the list of characteristics and indicate which items of the list were descriptive of state mining inspectors. Results are summarized in Table 66.

The largest number of responses to any item of the list were given to the first item. One hundred eighty-six underground miners, and a proportionately large number of individuals from other samples indicated that state mining inspectors make careful, thorough inspections. A large number of individuals in each sample also indicated that state mining inspectors make enough inspections, that they have enough experience or training to be good inspectors and that they enforce regulations and penalize violations. Relatively fewer individuals indicated that state mining inspectors worry too much about things that do not matter, forewarn mines of their inspection schedules, or ignore dangerous conditions. Significantly more foremen in low-accident mines indicated that state mining inspectors enforce regulations and penalize violations.

Frequency of Inspections

Finally, each of the five samples was asked to indicate whether the state government or the federal government made the most inspections. An overwhelming majority of respondents in each sample indicated that the federal government made the most inspections. In fact, every safety director and manager responding indicated that the federal government makes the most inspections. Results are summarized in Table 67.

Government Pressure

Managers were asked to indicate on a three-point scale ranging from "not much pressure" (1.0) to "great deal of pressure" (3.0) the amount of which their company received concerning compliance with the Federal Coal Mine Health and Safety Act of 1969 in each of six different areas. Government pressure was defined as both state and Federal pressure. Responses are summarized in Table 68.

Managers felt that most pressure from the government was in the form of inspections, and that least pressure was received in the area of training. Quite a bit of pressure was felt, however, in all six areas, and in both high-accident and low-accident mines. There were no significant differences between mean responses in high-accident versus low-accident mines. There was unanimous agreement among all managers that the Federal government exerts the greatest pressure as compared to the state government.

Family and Community Effects on Safety

Safety directors and managers were asked to indicate if they felt that the miner's family or the outside community could have a beneficial effect on worker safety performance. All managers in low-accident mines and all but two managers in high-accident mines indicated that they felt the family or community could have a beneficial effect. Similarly all safety directors but one felt that the family or community could have a beneficial effect on worker safety performance.

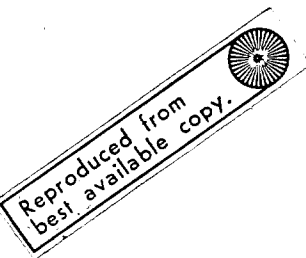


Table 65
Characteristics of Bureau of Mines Inspectors

Do Bureau of Mines inspectors ...	Underground Miners				Union Officials				Foremen				Safety Directors				Management			
	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall	Number of responses in low-acc. mines	Number of responses in high-acc. mines	Overall		
Yes	211	160	371	19	18	37	45	46	91	13	13	26	13	17	30					
make careful, thorough inspections?	Unsure	70	139	4	6	10	4	1	5	0	1	1	1	0	1					
No	44	48	92	5	1	6	1	2	3	0	0	0	0	1	0					
Yes	214	148	362	11	18	29	47	46	93	13	13	26	15	17	32					
make enough inspections in your mine?	Unsure	53	112	9	2	11	2	2	4	0	1	1	0	0	0					
No	57	68	125	7	6	13	1	0	1	0	0	0	0	0	0					
Yes	107	73	180	9	5	14	17	17	34	6	6	12	9	10	19					
worry too much about things that do not matter?	Unsure	114	206	9	11	20	18	12	30	4	4	8	1	4	3					
No	103	86	189	9	9	18	14	19	33	3	4	7	5	4	9					
Yes	50	27	77	3	3	6	3	1	4	1	1	2	0	0	0					
Ignore dangerous conditions?	Unsure	66	121	7	5	12	1	1	2	1	1	2	1	0	0					
No	207	166	373	18	18	36	45	46	91	11	12	23	14	17	31					
Yes	139	124	263	14	16	30	20	33	53	5	6	11	3	3	6					
have enough experience or training to be good inspectors?	Unsure	143	259	8	10	18	27	12	39	6	5	11	8	7	15					
No	41	25	55	4	0	4	3	4	7	2	3	5	4	4	8					
Yes	180	126	306	16	14	30	44	44	88	13	13	26	15	17	32					
enforce regulations and penalize violations?	Unsure	91	173	7	7	14	6	2	8	1	1	1	0	0	0					
No	49	56	105	5	5	10	0	2	2	0	0	0	0	0	0					
Yes	91	86	177	11	10	21	4	4	9	1	1	2	0	0	0					
forewarn mines of their inspection schedules?	Unsure	157	288	8	8	16	10	13	23	0	0	0	0	0	0					
No	70	46	116	8	8	16	35	31	66	12	13	25	15	17	32					

Table 66
Characteristics of State Mining Inspectors

	Underground Miners			Union Officials			Foremen			Safety Directors			Management		
	Number of responses in low-acc. mines (N=327)	Number of responses in high-acc. mines (N=282)	Total number of responses (N=609)	Number of responses in low-acc. mines (N=28)	Number of responses in high-acc. mines (N=26)	Total number of responses (N=54)	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=102)	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
Do state mining inspectors ...															
make careful, thorough inspections?	96 (29%)	90 (32%)	186 (31%)	8 (29%)	7 (27%)	15 (28%)	33 (66%)	26 (50%)	59 (58%)	11 (85%)	11 (79%)	22 (81%)	10 (67%)	11 (65%)	21 (66%)
make enough inspections in your mine?	75 (23%)	52 (18%)	127 (21%)	5 (18%)	6 (23%)	11 (20%)	18 (36%)	16 (31%)	34 (33%)	12 (92%)	12 (86%)	24 (89%)	11 (73%)	10 (59%)	21 (66%)
worry too much about things that do not matter?	61 (19%)	51 (18%)	112 (18%)	1 (4%)	3 (12%)	4 (7%)	7 (14%)	5 (10%)	12 (12%)	3 (23%)	5 (36%)	8 (30%)	1 (7%)	3 (18%)	4 (13%)
ignore dangerous conditions?	30 (9%)	28 (10%)	58 (10%)	4 (14%)	3 (12%)	7 (13%)	5 (10%)	2 (4%)	7 (7%)	4 (31%)	5 (36%)	9 (33%)	3 (20%)	1 (6%)	4 (13%)
have enough experience or training to be good inspectors?	67 (20%)	67 (24%)	134 (22%)	4 (14%)	5 (7%)	9 (17%)	20 (38%)	20 (38%)	39 (38%)	6 (62%)	10 (71%)	18 (67%)	10 (67%)	9 (53%)	19 (59%)
enforce regulations and penalize violations?	85 (26%)	65 (23%)	150 (25%)	5 (18%)	7 (27%)	12 (22%)	28** (56%)	12 (23%)	40 (39%)	9 (69%)	8 (57%)	17 (63%)	6 (40%)	6 (29%)	12 (38%)
forewarn mines of their inspection schedules?	53 (16%)	54 (19%)	107 (18%)	3 (11%)	3 (12%)	6 (11%)	5 (10%)	5 (10%)	10 (10%)	3 (23%)	6 (43%)	9 (33%)	1 (7%)	1 (6%)	2 (7%)

** Number of responses significantly different ($p < .01$) from the number of responses in high-accident mines.

Table 67
Frequency of Inspections

Who makes the most inspections?	Underground miner			Union Officials			Foremen			Safety Director			Management		
	Number of responses in low-acc. mines (N=327)	Number of responses in high-acc. mines (N=282)	Total number of responses (N=609)	Number of responses in low-acc. mines (N=28)	Number of responses in high-acc. mines (N=26)	Total number of responses (N=54)	Number of responses in low-acc. mines (N=50)	Number of responses in high-acc. mines (N=52)	Total number of responses (N=100)	Number of responses in low-acc. mines (N=13)	Number of responses in high-acc. mines (N=14)	Total number of responses (N=27)	Number of responses in low-acc. mines (N=15)	Number of responses in high-acc. mines (N=17)	Total number of responses (N=32)
State govt.	38 (12%)	54 (19%)	92 (15%)	1 (4%)	4 (15%)	5 (9%)	6 (2%)	0 (0%)	6 (16%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Federal Govt.	258 (79%)	190 (67%)	448 (74%)	27 (96%)	22 (85%)	49 (91%)	44 (88%)	52 (100%)	96 (94%)	13 (100%)	14 (100%)	27 (100%)	15 (100%)	17 (100%)	32 (100%)

Summary

Results indicate that unions are probably effective in making the mines a safer place to work. Most respondents agreed that unions do put pressure on the company to provide a safer mine, and do bargain with management for a safer and healthier mine. That unions can be effective in these activities is evidenced by the fact that these activities were reported more frequently in low-accident mines. Unions apparently achieve results in spite of the fact that most rank and file members are not very active in union activities. Unions are apparently most effective as a result of their interactions with management, as they were not reported to be active in activities such as setting up training programs independently of management.

Similarly, Bureau of Mines inspectors and inspectors of state mining bureaus apparently make a contribution to safety. Although labor groups tended to view inspectors more positively than did management groups, it was generally agreed that inspectors do make careful, thorough inspections, do enforce regulations and penalize violations, and do not ignore dangerous conditions. Most government pressure is in the form of mine inspections, and the Federal government is responsible for most of the pressure.

Table 68
Mean Ratings of the
Amount of Government Pressure in Alternative Areas¹

How much government pressure does this company receive concerning compliance with the Coal Mine Safety Act in the following areas?	<u>Managment</u>		
	Low-acc. mines	High-acc. mines	Overall
Training	2.20	2.24	2.22
Protective equipment (personal)	2.47	2.41	2.44
Safety procedures and precautions	2.60	2.59	2.59
Equipment design and safeguards	2.67	2.65	2.66
Inspections	2.80	3.00	2.91
Updating certifications	2.33	2.35	2.34

¹Rating scale used:

1 = not much pressure

2 = some pressure

3 = great deal of pressure

SUMMARY AND RECOMMENDATIONS

Survey results have been presented and discussed in the preceding sections according to major topic areas explored by the survey instruments. These results indicate that a number of alternative strategies are worth exploring in an attempt to further reduce accidents and illness in the coal industry by addressing psychological, motivational, and organizational factors which are currently contributing to the poor safety and health record.

A final summary of results is presented below, organized around each of several strategies which appear likely to succeed in reducing accidents and illness. Results from each of several different topic areas are thus drawn together and summarized from the point of view of their implication for particular intervention strategies.

ORGANIZATIONAL DEVELOPMENT TECHNIQUES

Many survey results indicate that the use of various organizational development techniques could have a substantial beneficial impact on safety records in the coal industry. Techniques aimed at the establishment of better organizational communications, the establishment of appropriate organizational goals, the establishment of a better organizational climate (including a feeling of trust between labor and management) and the greater involvement of miners in the establishment of safety procedures, all appear to be needed.

It appears that coal companies, especially high-accident mines, need to formalize safety as an organizational goal, and subsequently communicate to workers both verbally and through the behavior of management the relative importance of safety. That this has not occurred in the past is evident from the fact that labor groups tended to feel that slightly more emphasis is put on production, whereas managerial groups felt that more emphasis was placed on safety. If coal companies truly do value safety over production, the message is apparently not reaching miners. If coal companies do not, in fact, value safety over production, then a more fundamental problem exists in terms of overall goals and orientation of the organization.

Results indicate that in high-accident mines, problems stem from safety never having been adopted as an organizational goal. Personnel in high-accident mines consistently rated safety practices as less important to the company than did personnel in low-accident mines. In other words, the data indicate that differences in concern for safety from mine to mine are perceived by personnel working at the mines and, in general, companies which are viewed as having a greater concern for safety do in fact have better safety records. Further evidence that high-accident mines have not adopted safety as an organizational goal is provided by responses of above-ground miners. Above-ground miners in high-accident mines indicated that company or foremen attitudes were significantly more important as a reason for not using safety and health equipment than did above-ground miners in low-accident mines. In addition, underground miners in low-accident mines reported that keeping good safety records

and upholding the company safety record were significantly more important to their companies.

There are further indications that management is not effectively communicating its concern for miners' and their well-being to personnel working in the mines. Although all groups felt that both management and foremen attitudes toward miners were good, there was a tendency for managerial groups to view management attitude toward miners as better than labor groups perceived it to be.

Communication within an organization should be a two-way phenomenon, but there is evidence that in addition to management's failure to communicate with workers, workers are not effectively communicating with management. Foremen and safety directors, for example, appear to be over-confident with regard to the condition of safety and health equipment. Underground miners, above-ground miners, and union officials cited poor maintenance as relatively more important as a reason for not using safety equipment than did either of the two management groups. Again there is indication that the situation is worse in high-accident mines. Judging from responses of underground miners and union officials, maintenance of safety and health equipment appears to be a significantly greater problem in high-accident mines.

Another organizational development technique which needs to be employed is the involvement of miners in the establishment of new company safety procedures. Many managers, when asked if they believed that miners were resistant to new safety procedures and ideas, felt that there was a resistance to new ideas. These same managers, however, felt that miners would accept new procedures if the reasons for the new procedures were properly explained, and they felt that better ways of introducing new procedures through training or safety talks could do much to overcome the resistance. It has been demonstrated in the past that worker involvement in decision-making leads to greater acceptance of decisions and policies as a result of feelings of shared responsibility for the final decision (Tuttle et al., 1973).

Finally, there is an indication that the sense of trust and cooperation which develops between labor and management as a result of open communications is absent in the companies surveyed. When asked why miners might not use available health programs, the second most frequent response in all samples except miners' wives (including underground miners, above-ground miners, and management) was that X-rays may be used to get rid of miners with black lung.

It appears, therefore, that more effort needs to be devoted to establishing safety as a prime organizational objective, and subsequently communicating that fact to workers. Tuttle et al. (1973) suggest that this can be done in a number of ways including stressing safety in initial preemployment interviews, stressing safety in training, and ensuring that new workers have contacts with experienced workers who follow recommended safety procedures. They also suggest various methods for improving organizational communication. Regardless of the particular method used, establishment of better communications appears necessary.

WORK ORGANIZATION

Survey results indicate that a second area which deserves consideration in the coal industry is work organization and job design. It has been established in the literature that jobs which are designed with an awareness of worker needs for recognition, responsibility, and variety tend to contribute to higher worker satisfaction and improved work quality, including safety performance (Tuttle et al., 1973). These worker needs have been referred to as intrinsic, or job content, factors as opposed to extrinsic, or job context, factors such as pay, benefits, and vacation.

With regard to extrinsic job factors, survey results indicate few problems. Wives responses indicated that they and their husbands were generally satisfied with extrinsic rewards afforded by the job. Factors such as pay, vacation, benefits, job security, steadiness of work, etc., were rated very high. However, both wives and miners were generally less satisfied with intrinsic factors such as independence afforded by job tasks, the chance to get ahead, and the pressure to get things done. Wives also indicated that they were least satisfied with the effect of the job on their husbands' health. In spite of the fact that wives were generally satisfied with many aspects of the job, they did not want their sons to be miners, and they did not want their daughters to marry miners.

It appears that on the whole, underground miners, foremen, and managers feel that miners' jobs offer some intrinsic rewards. There are, however, indications of potential problem areas. For example, it appears that a better job procedure could be developed in high-accident mines. Underground miners in high-accident mines reported that they had to do a lot of things at the same time, and that they had to work without clear-cut duties significantly more frequently than miners in low-accident mines. In addition, fewer than half of the wives surveyed reported that their husbands were happy about the opportunity to get ahead which their jobs provided. A better job procedure would reduce the frequency with which miners had to do a lot of things at the same time and work without clear-cut duties, and coupled with expanded job responsibilities should make opportunities for advancement more evident to miners.

One final factor which should be considered under the heading of work organization is the effect of rotating versus fixed work shifts. In the underground miner sample, low-accident mines had a significantly ($p < .01$) greater percentage of individuals on rotating shift work than did high-accident mines. This same tendency was observed in the sample of foremen, although in that sample the difference between low- and high-accident mines did not reach statistical significance (at the .05 level or better). Only in the above-ground miner sample was this relationship reversed. It appears, therefore, that rotating shift work, with the accompanying disturbances in miners' biological rhythm, does not have an adverse effect on accident record, and may, in fact, have a beneficial effect. However, the fact that results did not reach significance in the foreman sample, and results were in the opposite direction in the above-ground miner sample, make further investigation in the area imperative.

TRAINING

In summarizing respondents' perceptions of the causes of accidents, it is safe to say that human error was the most widely recognized cause. All six mine personnel groups stated that human error was the single factor most related to accidents in their mine. When asked an open-ended question about the causes of accidents, safety directors specifically stated human error more frequently than anything else. Wives stated that most accidents were the result of a person's mistakes. Even when factors other than human error were mentioned as causes of accidents, they were generally worker-oriented factors, or factors under human control. For example, managers cited worker attitude as second only to human error as a cause of accidents. Safety directors mentioned improper lifting and materials handling as a cause of accidents. Faulty equipment or improperly maintained equipment, the correction of which is certainly under human control, were mentioned by underground miners in high-accident mines, above-ground miners in high-accident mines, and miners' wives. And underground miners in high-accident mines even felt that foremen were a recognizable cause of accidents.

The fact that most accidents are caused by human error suggests that training of miners to insure that all personnel possess the requisite knowledge and skills to perform their jobs safely is essential. Survey results substantiate the need for training by providing empirical evidence that good training is related to a low-accident record. Underground miners in low-accident mines indicated that their training in how the electrical power system works and their training in dealing with hazards such as gas, dust, and noise was significantly ($p < .01$) better than the training in high-accident mines.

Unfortunately, survey results also indicate that existing training is not adequate. Wives indicated that lack of training was a primary factor causing their husbands' jobs to be dangerous, and they felt that more and better training was a way of making mines safer. Union officials stated that both poor job training and poor safety training were major problem areas. Responses of underground miners, above-ground miners, and safety directors indicate a heavy reliance on on-the-job training and other miners as a source of knowledge about safety and health practices. Although safety training (both initial and continuing) is reportedly offered to all employees, and a variety of training techniques are used, it was rated much lower as a source of knowledge than on-the-job training or other miners. Bureau of Mines training and training offered by state mining departments appear to be no more important as a source of knowledge about safety and health practices than company training programs.

The need for adequate training programs is apparently not restricted to underground miners. Underground miners, above-ground miners, and union officials felt that lack of management training was very often a problem. The fact that foremen could use additional training is evident from the fact that many foremen do not use safety equipment when necessary. In high-accident mines, for example, foremen were reported to wear respirators in dusty conditions significantly ($p < .05$) less frequently than foremen in low-accident mines. When foremen themselves were asked how they got miners to use safety equipment, only six percent of the foremen answered that they used the equipment themselves as a means of getting miners to use it.

PROGRAMS TO INCREASE THE FREQUENCY OF SAFE JOB BEHAVIORS

The fact that mine personnel recognize human error as the single factor most related to accidents in their mine is encouraging in terms of the application of behavioral techniques for increasing the frequency of safe job behaviors and decreasing the frequency of unsafe behaviors. Underground miners appear to be much less fatalistic than has been assumed in the past. Responses to several independent questions confirm that miners do feel that they have some control over their destiny. Instead of fatalism, attitudes which were reported as leading to accidents included just being careless and not following safety rules, just not giving a damn, and not using good common sense and judgement. With this orientation among miners behavioral techniques such as the establishment of programs providing positive reinforcement for appropriate job behaviors should be maximally beneficial.

Results of the current study do provide an indication of the types of behaviors which are found significantly more frequently in low-accident mines and which consequently should be focused upon in applying behavioral techniques. In general, according to responses of underground miners, the following behaviors of underground miners appear to occur more often in low-accident mines:

1. Wearing safety glasses
2. Cleaning up the work area
3. Getting along with other miners
4. Being able to depend on other miners
5. Reporting small accidents
6. Reporting safety and health hazards to the foreman
7. Going to the doctor when sick.

On the other hand, underground miners in low-accident mines refrain from the following activities more than miners in high-accident mines:

1. Bridging the circuit breakers when a circuit overloads
2. Trying to outdo other work crews
3. Getting mad if other miners work too slow or too fast.

It should also be noted that smoking and taking chances or cutting corners were also reported to occur more frequently in low-accident mines, perhaps because the consequences of these behaviors are not so severe as in high-accident mines.

Also, according to responses of underground miners, the following behaviors of foremen occur more often in low-accident mines:

1. Allowing miners to work at their own speed
2. Giving miners a pat on the back when they follow safety procedures
3. Wearing respirators in dusty conditions
4. Reminding miners of safety and health practices
5. Showing real concern for workers' welfare.

Foremen in low-accident mines also refrain from the following activities:

1. Asking miners to do things which are against miners' better judgement
2. Cutting corners on safety
3. Pushing hard for production.

It should also be noted that turning in inaccurate safety reports was also reported more frequently of foremen in low-accident mines.

Survey results also provide some insight into the types of incentives and disciplinary actions which have been effective in the coal industry in the past in programs geared toward increasing safe job behaviors and decreasing unsafe behaviors. Incentives which have been most effective are as follows: including safety as an integral part of worker performance evaluation, and publicity of outstanding safety performance. The most frequently used disciplinary actions for unsafe workers are a verbal reprimand, written reprimand, and suspension.

In employing behavioral programs to increase the frequency of safe job behaviors, consideration must be given not only to individual miners, but also to the work crew as a whole. It has been found that social reinforcement from peers can be used to increase the frequency of safe behavior (Tuttle et al., 1973). If the desired behaviors are at variance with group values and norms, then those behaviors will be hard to strengthen. Results of the current survey emphasize the importance of the work crew. When asked who they thought had the most influence on a worker's safety behavior, the largest number of underground miners stated that it was the work crew itself.

Another group factor to consider is competition among work crews. Competition can perhaps be used to advantage, but only if safety is included in the competition (Tuttle et al., 1973). Current survey results indicate that having competition among work crews is significantly ($p < .05$) less important to companies with good accident records. Presumably, respondents were thinking of competition only in terms of coal production. If competition is to be used, care must be taken to include safety behaviors as a criterion of performance.

IMPROVEMENTS IN COMPANY SAFETY PROGRAMS

Survey results can be used not only to characterize the nature of existing safety programs in the coal industry, but also to highlight some common problems in safety programs and make recommendations for changes. It appears that at the current time safety personnel are very often consulted on changes in work processes, new equipment purchases, and approval of newly installed equipment. New ideas about safety are generally a result of management's suggestions and accident investigations. The prime requirement for the job of safety director is experience gained by coming up through the ranks, although many safety directors have attended special safety courses. In general 5-19% of the total operational budget is spent on safety, and safety directors almost always stated that shortage of money or supplies was not a problem. The most frequently used special safety programs included training and regular safety meetings.

Several problems were also noted. Safety directors tend to feel that too much of their time is absorbed in paper work and accompanying MESA inspectors. They feel that they need more time to spend on developing safety programs for their company. It is interesting to note that safety directors in high-accident mines spend more time underground than their counterparts in low-accident mines. Safety directors stated that they need to have more authority in the safety area. They also stated that miners' resistance to change was one of the greatest hindrances to safety programs. Union officials stated that better labor-management relations were needed, as well as a greater interest and participation in safety meetings.

In addition, survey results provide some guidelines for the future focus of safety programs aimed at improving miners' safety attitudes. Underground miner responses indicated that miners in low-accident mines have a greater number of dependents. This fact was confirmed by responses of miners' wives, although the difference between means in the wives' sample did not reach statistical significance. One interpretation of this result is that miners who have a greater family responsibility (in terms of the number of individuals dependent on them for support) are more cautious than those with less family responsibility. If family responsibility does, in fact, play an important role in determining miners' safe job behaviors, then posters and future safety campaigns in the coal industry should emphasize that being safe on the job leads to a more secure financial future for all family members.

REDESIGN OF SAFETY EQUIPMENT

In general, there is high agreement across all groups surveyed that safety and health equipment is necessary, and that hard-hats in particular, are indispensable. Ear protectors and more lighting equipment, it is agreed, are relatively the least important pieces of equipment.

Discomfort and bulkiness (i.e., equipment getting in the way of working) appear to be the most important reasons why safety and health equipment is not used. The idea that use of safety and health equipment is unmasculine and consequently social pressure is exerted to prevent its use is apparently not valid, since "other workers make fun of you" was not viewed by any group as an important reason for not using equipment.

It appears, therefore, that to further increase the frequency of usage of personal protective equipment further engineering advances in equipment design are necessary in order to increase comfort and decrease bulkiness. Behavioral programs geared toward providing positive reinforcement for the use of such equipment are not likely to succeed, when miners using the equipment receive immediate and strong negative reinforcement in the form of discomfort and restricted movement.

PROGRAMS TO REDUCE OCCUPATIONAL STRESS

In comparing high- with low-accident mines, two disorders were significantly more prevalent in miners working in high-accident mines -- high blood pressure (29% versus 10% respectively) and "nervous trouble" (16% versus 2%, respectively). Even though the diagnosis for the specific type of hyperten-

sion was not elicited, high blood pressure is often related to emotional stress. Coupled with the substantially higher incidence of "nervous trouble" reported of miners employed in high-accident mines, the role of emotional stress becomes more prominent.

In addition to these physical reactions, other survey results indicate that miners in high-accident mines experience quite a bit of occupational stress. Miners' wives in high-accident mines indicated that their husbands take significantly ($p < .05$) more time off work. Underground miners in high-accident mines reported other miners as talking about accidents they have had significantly ($p < .05$) less frequently, indicating that perhaps they are suppressing their anxieties. Union officials in high-accident mines felt that significantly fewer ($p < .01$) miners really enjoyed working in the mines. Foremen in high-accident mines stated that a significantly greater ($p < .05$) number of miners had warnings or premonitions of accidents and fatalities.

Overall, it would seem that a program designed to reduce occupational stress could have a significant impact on the safety, health, and well-being of coal mining personnel.

FINAL NOTE

Results of the survey seem to underline the fact that future improvements in accident records are dependent mainly on behavioral techniques. Although there are many physical dangers involved in mining, human error is the most widely recognized cause of accidents. It appears that training is the behavioral technique considered most often by miners and management alike as a way of dealing with human error. However, other behavioral techniques as well appear promising on the basis of survey results. These techniques include organizational development techniques, work organization, programs to increase the frequency of safe job behaviors, improvements in company safety programs, redesign of safety equipment, and programs to reduce occupational stress. As a means of summarizing the discussion in each of these areas which is presented above, a list of specific recommendations is provided:

1. Coal companies need to formalize safety as an organizational goal.
2. Coal companies should communicate to workers both verbally and through the behavior of management the importance of safety as an organizational goal.
3. Coal companies need to place more emphasis on keeping good safety records and upholding the company safety record.
4. Miners need to be able to better communicate to management problems affecting their health and safety.
5. Coal companies should establish better programs for maintenance of equipment.
6. Miners should be given a hand in the establishment of new company safety procedures, or, at a minimum, the reasons for new safety procedures should be better explained to miners.

7. An organizational climate must be developed within coal companies which exhibits a spirit of trust and cooperation between labor and management.
8. Miners' jobs need to be redesigned in order to provide for satisfaction of miners' intrinsic needs such as recognition, responsibility, and variety of job tasks.
9. Miners' jobs need to be redesigned so that they do not have to do many things at the same time, they do not have to work without clear-cut duties, and they do not have to answer to more than one person.
10. Opportunities for miner advancement should be made clearer to miners.
11. Better training must be developed, particularly in such areas as the functioning of the mine's electrical power system, and dealing with hazards such as gas, dust, and noise.
12. In addition to better training for miners, better training is needed for mine management beginning at the level of foreman.
13. Foremen must be made aware that they serve as models for the men working under them, and, consequently, they must follow all safety procedures.
14. Programs providing positive reinforcement for a variety of identifiable safe job behaviors need to be established for both underground miners and foremen.
15. Techniques which should be used in providing incentives for safe job behavior include building in safety as an integral part of worker performance evaluation and publicizing outstanding safety performance.
16. Safety must be established as a group norm among the work crew itself.
17. Care must be taken in employing competition among work crews to be sure that safety is included in the criteria of good job performance.
18. Safety directors' jobs should be redesigned to provide for more time in developing company safety programs.
19. Safety directors should be given more authority in the area of safety.
20. Greater interest and participation in union safety meetings is needed.
21. Future safety campaigns should emphasize that being safe on the job leads to a more secure financial future for all family members.

22. Further engineering advances are necessary in order to increase comfort and decrease bulkiness of personal protective equipment.

Hopefully, future work will consist of trial programs in each of the above areas, with careful experimental design being employed in order to provide a valid measure of the impact of the trial programs on safe job behaviors and, ultimately, accident statistics.

References

- Blanz, F., & Ghiselli, E. E. The mixed standard scale: A new rating system. Personnel Psychology, 1972, 25, 185-199.
- International Labor Office, ILO Information, 1976, 4, No. 3, 3.
- Livingston, J. S. Pygmalion in management. Harvard Business Review, 1969, 47, 81-89.
- National Safety Council. Accident Facts. Chicago, Ill.: National Safety Council, 1974.
- National Safety Council. Accident Facts. Chicago, Ill.: National Safety Council, 1975.
- Petersen, D. C. Techniques of Safety Management. New York: McGraw-Hill, 1971.
- Pfeifer, C. M., Jr., Schaeffer, M., H., Grether, C. B., Stefanski, J. L., & Tuttle, T. C. An evaluation of policy related research on effectiveness of alternative methods to reduce occupational illness and accidents. Final Report to National Science Foundation, Contract No. C-829. Columbia, Maryland: Westinghouse Behavioral Services Center, 1974.
- Schneider, B. The perceived environment: Organizational climate. Working paper, University of Maryland, 1973.
- Shoub, E. P., & Kroes, W. H. NIOSH and the coal mine industry. Coal Age, 1973, 144-146.
- Theodore Barry & Associates. Industrial engineering study of hazards associated with underground coal mine production. Volume III: Analysis of underground hazards and fatal accidents. United States Bureau of Mines Contract Report S00110601, 1972.
- Tuttle, T. C., Grether, C. B., Liggett, W. T., & Killian, N. E. Psychological behavioral strategy for accident control: I. Development of behavioral safety guidelines. Final Report to the National Institute for Occupational Safety and Health, Contract No. HSM-99-72-27. Columbia, Maryland: Westinghouse Behavioral Services Center, 1973.
- Tuttle, T. C., Wood, G. D., Grether, C. B., & Reed, D. E. Psychological-behavioral strategies for accident control: A system for diagnosis and intervention. Final Report to the National Institute for Occupational Safety and Health, Contract No. HSM-99-73-61. Columbia, Maryland: Westinghouse Behavioral Services Center, 1974.
- Vandenput, M. A. Unsafe habits and social pressure. Psychologica, Belgia, 1970, 10, 99-107. (Psychological Abstracts, 1971).

APPENDIX A
UNDERGROUND MINER SURVEY

OMB No. 68-S 72047
Expires 6-30-75

NATIONAL SAFETY AND HEALTH SURVEY

Underground Miner Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much as all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How good has your training been in....
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Poor</u>	<u>Fair</u>	<u>Good</u>	<u>Excel-</u> <u>lent</u>	
a. how the mining machinery works? . . .	x	x	x	x	(1;9)
b. how the electrical power system works?	x	x	x	x	(10)
c. using safety and health equip- ment?	x	x	x	x	(11)
d. handling physical features of the mine (such as type of top, general layout, etc.)?	x	x	x	x	(12)
e. dealing with hazards such as gases, coal dust, noise, etc.? . .	x	x	x	x	(13)
f. how to use the tools and equipment?	x	x	x	x	(14)
g. requirements of the coal mine safety act?	x	x	x	x	(15)
h. first aid procedures and techniques?	x	x	x	x	(16)
i. locating escape routes?	x	x	x	x	(17)
j. mine rescue procedures and techniques?	x	x	x	x	(18)
k. how to report potential dangers and hazards?	x	x	x	x	(19)

Now go back through question 1 and circle the letters of the three statements that you think describe the most important things a miner should know.

Value

(20-21)

(22-23)

(24-25)

2. How necessary is each of the following for a miner's personal well-being on the job?

(Circle ONE "X" for EACH statement)

	(1) Not Neces- sary	(2) Some- what Neces- sary	(3) Very Neces- sary	
a. hard hat	x	x	x	(26)
b. gloves	x	x	x	(27)
c. hard toe shoes	x	x	x	(28)
d. safety glasses	x	x	x	(29)
e. respirator	x	x	x	(30)
f. ear protectors	x	x	x	(31)
g. methane detector	x	x	x	(32)
h. dust sampler	x	x	x	(33)
i. fire extinguishers	x	x	x	(34)
j. self rescuer	x	x	x	(35)
k. more lighting equipment	x	x	x	(36)
l. garters for pants legs	x	x	x	(37)
m. sounding device to test roof	x	x	x	(38)
n. other (specify) _____	x	x	x	(39)

3. How important from the company's point of view are each of the following in your mine?

(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Important</u>	(2) <u>Slight-</u> <u>ly</u> <u>Important</u>	(3) <u>Moder-</u> <u>ately</u> <u>Important</u>	(4) <u>Very</u> <u>Important</u>	
a. keeping good safety records . . .	x	x	x	x	(40)
b. correcting safety hazards in the mine	x	x	x	x	(41)
c. having miners not take chances	x	x	x	x	(42)
d. having miners participate in decisions involving safety	x	x	x	x	(43)
e. having miners wear pro- tective equipment	x	x	x	x	(44)
f. having miners get physical examinations	x	x	x	x	(45)
g. checking for gas in the mine . .	x	x	x	x	(46)
h. making sure mine walls are rock dusted	x	x	x	x	(47)
i. keeping miners' satisfied in their jobs	x	x	x	x	(48)
j. assuring miners' security . . .	x	x	x	x	(49)
k. having competition among work crews	x	x	x	x	(50)
l. having miners report safety hazards	x	x	x	x	(51)
m. getting coal out regardless of safety	x	x	x	x	(52)
n. having miners get black lung examinations	x	x	x	x	(53)
o. upholding the company safety record	x	x	x	x	(54)

4. In this mine...
(Circle ONE "X" for EACH Statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do miners get along with each other?	x	x	x	x	x	(53)
b. do miners discuss work- related issues?	x	x	x	x	x	(56)
c. are miners able to de- pend on each other?	x	x	x	x	x	(57)
d. do miners horse around? .	x	x	x	x	x	(58)
e. do miners leave the work- place ready ("shaped up") for the next crew?	x	x	x	x	x	(59)
f. do work crews try to outdo other crews?	x	x	x	x	x	(60)
g. do miners get mad if a miner takes risks?	x	x	x	x	x	(61)
h. do miners spend time with each other after work?	x	x	x	x	x	(62)
i. do miners get mad if a miner works too slow? .	x	x	x	x	x	(63)
j. do miners get mad if a miner works too fast? .	x	x	x	x	x	(64)
k. do miners complain about safety?	x	x	x	x	x	(65)
l. do miners report small accidents?	x	x	x	x	x	(66)

5. While working in this mine how much did you learn about safety and health practices from...
(Circle ONE "X" for EACH statement)

	(1) Not <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. on the job experience?	X	X	X	(67)
b. practice emergency drills?	X	X	X	(68)
c. company training programs?	X	X	X	(69)
d. other miners?	X	X	X	(70)
e. foremen?	X	X	X	(71)
f. operating manuals or books?	X	X	X	(72)
g. union sponsored programs?	X	X	X	(73)
h. Bureau of Mines training?	X	X	X	(74)
i. government inspectors?	X	X	X	(75)
j. state mining training?	X	X	X	(76)
k. doctors or public health medics?	X	X	X	(77)
l. Black Lung Association workers?	X	X	X	(78)
m. relatives or friends?	X	X	X	(79)
n. other (specify)? _____	X	X	X	(80)

6. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. too much absenteeism	X	X	X	(2;9)
b. too high job turnover	X	X	X	(10)
c. too low worker productivity	X	X	X	(11)
d. poor safety training	X	X	X	(12)
e. poor job training	X	X	X	(13)
f. lack of management training	X	X	X	(14)
g. too many labor problems	X	X	X	(15)
h. trouble with safety and health laws . . .	X	X	X	(16)
i. too many accidents	X	X	X	(17)
j. poor equipment maintenance	X	X	X	(18)
k. bad public image	X	X	X	(19)
l. other (specify) _____	X	X	X	(20)

Now go back through question #6 and circle the letters in front of the 2 statements which you feel describe the most serious problems facing your mine.

Value

(21-22)

(23-24)

7. IF YOUR MINE IS UNIONIZED, to what extent does the union...
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u> <u>Extent</u>	(3) <u>Great</u> <u>Extent</u>	
a. set up safety and health training programs?	x	x	x	(26)
b. take care of injured miners and their families?	x	x	x	(27)
c. bargain with management for safer and healthier mines?	x	x	x	(28)
d. provide safety and health information to the miners?	x	x	x	(29)
e. check to see if miners and their families receive adequate medical care? . .	x	x	x	(30)
f. discuss safety and health topics in union meetings?	x	x	x	(31)
g. encourage men with health problems to shift to less dusty jobs?	x	x	x	(32)
h. provide legal help in black lung and compensation claims?	x	x	x	(33)
i. put pressure on the company to provide a safe mine?	x	x	x	(34)

8. Do Bureau of Mines inspectors...
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. make careful, thorough inspections? . .	☒	☒	☒	(35)
b. make enough inspections in your mine?	☒	☒	☒	(36)
c. worry too much about things that do not matter?	☒	☒	☒	(37)
d. ignore dangerous conditions?	☒	☒	☒	(38)
e. have enough experience or training to be good inspectors?	☒	☒	☒	(39)
f. enforce regulations and penalize violations?	☒	☒	☒	(40)
g. forewarn mines of their inspection schedules?	☒	☒	☒	(41)

(42-48)

Now go back through question #8 and circle the letters of statements that describe state mining inspectors.

9. Who makes the most inspections? (Check ONE)

- a. state government ☐ (49)
- b. federal government ☐

10. How often do you...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. wear safety glasses?	x	x	x	x	x	(50)
b. stop other miners from doing unsafe things?	x	x	x	x	x	(51)
c. talk up safety within the work crew?	x	x	x	x	x	(52)
d. clean up the work area?	x	x	x	x	x	(53)
e. work under unsupported roof?	x	x	x	x	x	(54)
f. take chances or cut corners?	x	x	x	x	x	(55)
g. report safety and health hazards to the safety committee?	x	x	x	x	x	(56)
h. report safety and health hazards to the foreman?	x	x	x	x	x	(57)
i. refuse to work under unsafe conditions?	x	x	x	x	x	(58)
j. smoke in the mine?	x	x	x	x	x	(59)
k. wear a respirator?	x	x	x	x	x	(60)
l. take part in the government chest x-ray program?	x	x	x	x	x	(61)
m. go to the doctor when sick?	x	x	x	x	x	(62)
n. go to work even when feeling bad?	x	x	x	x	x	(63)
o. bridge the circuit breaker when a circuit overloads?	x	x	x	x	x	(64)
p. report safety and health hazards to the next shift?	x	x	x	x	x	(65)
q. check to see whether re- ported safety hazards have been improved?	x	x	x	x	x	(66)

11. In your job, how often do you have to...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do the same things many times a day?	x	x	x	x	x	(67)
b. work very fast?	x	x	x	x	x	(68)
c. work very hard?	x	x	x	x	x	(69)
d. think a lot?	x	x	x	x	x	(70)
e. do a lot of things at the same time?	x	x	x	x	x	(71)
f. work alone?	x	x	x	x	x	(72)
g. work with new inexper- ienced men?	x	x	x	x	x	(73)
h. look out for the safety of other miners?	x	x	x	x	x	(74)
i. answer to more than one person?	x	x	x	x	x	(75)
j. do a lot of different kinds of work?	x	x	x	x	x	(76)
k. work without clear-cut duties?	x	x	x	x	x	(77)
l. take care of absentees' jobs?	x	x	x	x	x	(78)
m. work at jobs you do not like?	x	x	x	x	x	(79)

12. How much do you feel that your job gives you a chance to...
(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. use your ability?	x	x	x	(80)
b. do challenging work?	x	x	x	(3;9)
c. do interesting work?	x	x	x	(10)
d. do a variety of things?	x	x	x	(11)
e. feel that you are getting things done? . . .	x	x	x	(12)
f. learn new things?	x	x	x	(13)
g. do important work?	x	x	x	(14)
h. make important decisions?	x	x	x	(15)
i. advance or get ahead?	x	x	x	(16)

13. How often do foremen in this company...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. get angry when miners have job problems or questions?	X	X	X	X	X	(17)
b. allow miners to work at their own speed?	X	X	X	X	X	(18)
c. ask miners to do things which are against miners' better judgements?	X	X	X	X	X	(19)
d. make mistakes?	X	X	X	X	X	(20)
e. have disagreements with miners about safety procedures?	X	X	X	X	X	(21)
f. make miners afraid to point out hazards to the safety committee?	X	X	X	X	X	(22)
g. give miners a pat on the back when they follow safety procedures?	X	X	X	X	X	(23)
h. allow men to work in unsafe conditions?	X	X	X	X	X	(24)
i. turn in an inaccurate safety report (such as dust levels)?	X	X	X	X	X	(25)
j. play favorites?	X	X	X	X	X	(26)
k. review each accident with individual miners?	X	X	X	X	X	(27)
l. wear their respirators in dusty conditions?	X	X	X	X	X	(28)
m. remind miners of safety and health practices?	X	X	X	X	X	(29)
n. get mad when workers miss too many days?	X	X	X	X	X	(30)
o. check closely to make sure that the men are working?	X	X	X	X	X	(31)
p. allow miners to work on their own?	X	X	X	X	X	(32)

13. (Continued)

How often do foremen in this company...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
q. cut corners on safety? . .	x	x	x	x	x	(33)
r. let miners know what's expected of them?	x	x	x	x	x	(34)
s. plan work poorly?	x	x	x	x	x	(35)
t. give a pat on the back to the man who cuts corners?	x	x	x	x	x	(36)
u. push hard for production?.	x	x	x	x	x	(37)
v. show real concern for worker's welfare?	x	x	x	x	x	(38)
w. lie to crews?	x	x	x	x	x	(39)
x. not use safety procedures because production is slowed up (such as water slowing down continuous mining process)?	x	x	x	x	x	(40)

14. To what extent is each of the following items a reason why you might not use safety and health equipment?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some Extent</u>	(3) <u>Great Extent</u>	
a. it is difficult to get	x	x	x	(41)
b. it is poorly maintained	x	x	x	(42)
c. it is uncomfortable to use	x	x	x	(43)
d. lack of training	x	x	x	(44)
e. ailments from use (such as rashes from respirators).	x	x	x	(45)
f. other miners make fun of you	x	x	x	(46)
g. it isn't any good	x	x	x	(47)
h. it gets in the way of working	x	x	x	(48)
i. company or foreman attitudes	x	x	x	(49)
j. it makes the job more dangerous than before	x	x	x	(50)
k. no need for it	x	x	x	(51)

15. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this item), who do you think is next most responsible (place a 2 by that item)?

	<u>Value</u>
a. the foreman	— (52)
b. mine management	— (53)
c. the work crew (its influence on the worker)	—
d. the worker	—
e. the safety committee	—
f. the company engineers	—
g. the safety director	—

16. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>	
a. dust	x	x	x	(54)
b. gas	x	x	x	(55)
c. noise	x	x	x	(56)
d. lighting	x	x	x	(57)
e. company policy	x	x	x	(58)
f. cramped working conditions	x	x	x	(59)
g. seam height	x	x	x	(60)
h. "Acts of God"	x	x	x	(61)
i. rib rolls	x	x	x	(62)
j. layout of the mine	x	x	x	(63)
k. worker attitude	x	x	x	(64)
l. foremen	x	x	x	(65)
m. bad top	x	x	x	(66)
n. faulty equipment	x	x	x	(67)
o. human error	x	x	x	(68)
p. water	x	x	x	(69)
q. driving in	x	x	x	(70)
r. retreating	x	x	x	(71)

17. How many accidents involving others have you seen in the last year?
(Check ONE) Value
- | | | | |
|----|--------------------------|-------|------|
| a. | none | _____ | |
| b. | one | _____ | (72) |
| c. | two | _____ | |
| d. | three | _____ | |
| e. | four | _____ | |
| f. | more than four | _____ | |

18. How often do other miners in your mine...
(Circle one "X" for EACH statement)
- | | (1)
<u>Almost
Never</u> | (2)
<u>Seldom</u> | (3)
<u>Sometimes</u> | (4)
<u>Often</u> | (5)
<u>Almost
Always</u> | |
|--|--------------------------------|----------------------|-------------------------|---------------------|---------------------------------|------|
| a. Wear safety glasses | x | x | x | x | x | (73) |
| b. Clean up the work area | x | x | x | x | x | (74) |
| c. Work under unsupported roof | x | x | x | x | x | (75) |
| d. Take chances or cut corners | x | x | x | x | x | (76) |
| e. Smoke in the mine | x | x | x | x | x | (77) |
| f. Wear a respirator | x | x | x | x | x | (78) |
| g. Bridge the circuit breaker when a circuit overloads | x | x | x | x | x | (79) |
| h. Talk up safety within the work crew | x | x | x | x | x | (80) |

19. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Almost None</u>	<u>Some</u>	<u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(4;9)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(10)
c. feel accidents are not caused they just happen?	x	x	x	(11)
d. talk a lot about accidents they have had?	x	x	x	(12)
e. are superstitious?	x	x	x	(13)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(14)
g. have dreams and nightmares about getting hurt?	x	x	x	(15)
h. worry a lot about accidents?	x	x	x	(16)
i. are nervous while they are working? . .	x	x	x	(17)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(18)
k. never talk to their families about dangers and accidents?	x	x	x	(19)
l. really enjoy working in the mines? . .	x	x	x	(20)
m. are afraid of losing their jobs? . . .	x	x	x	(21)
n. need a few drinks to relax after work?	x	x	x	(22)
o. feel they cannot trust management? . .	x	x	x	(23)
p. feel they cannot trust mine inspectors?	x	x	x	(24)
q. wish they had never gone into the mines?	x	x	x	(25)
r. do not want their sons to go into the mines?	x	x	x	(26)
s. take a lot of time off?	x	x	x	(27)

20. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(28-29)

21. In this company what is the general attitude of management toward miners?
(Circle the word which best describes their attitude)
- | | | | | | |
|-----------|------|-------------|-----|----------|------|
| (5) | (4) | (3) | (2) | (1) | |
| Very Good | Good | Indifferent | Bad | Very Bad | (30) |

22. In this company what is the general attitude of foremen toward miners?
(Circle the word which best describes their attitude)
- | | | | | | |
|-----------|------|-------------|-----|----------|------|
| (5) | (4) | (3) | (2) | (1) | |
| Very Good | Good | Indifferent | Bad | Very Bad | (31) |

23. Why do you think miners might not use available health programs (such as the Federal X-ray program)?
(Circle any letters that apply)

- a. doctors are too hard to get to
- b. you have to wait too long to see doctors
- c. X-rays may be used to get rid of miners with black lung
- d. doctors talk so you cannot understand them
- e. health care is too expensive
- f. doctors might put you in the hospital
- g. government X-ray programs aren't any good
- h. hospital facilities aren't adequate
- i. doctors don't know what they're doing anyway
- j. other (please describe) _____

(32-41)

24. Which of the following would you say describes your company best?
(Check ONE space)

- a. the company puts production over safety _____
- b. the company puts safety over production _____
- c. the company gives both safety and production equal importance _____ (42)
- d. the company pays almost no attention to safety _____
- e. the company pays almost no attention to production _____

25. Who do you think has the most influence on a worker's safety behavior?
(Check ONE space)

- a. the foreman _____
- b. mine management _____
- c. the work crew (its influence on the worker) _____ (43)
- d. the worker _____
- e. the safety committee _____
- f. the company engineers _____

For questions # 26 - 36, check the one statement of each pair (a or b) which comes closest to your opinion.

- 26. a. _____ Many of the unhappy things in people's lives are partly due to bad luck. (44)
b. _____ People's misfortunes result from the mistakes they make.
- 27. a. _____ No matter how hard some people work, they are just not recognized for their efforts. (45)
b. _____ In the long run, people do get the recognition they deserve.
- 28. a. _____ It takes the right breaks to become a leader.
b. _____ Without the proper skills and know-how, one could not become a leader. (46)
- 29. a. _____ Becoming a success is a matter of hard work, luck has little or nothing to do with it. (47)
b. _____ Getting a good job depends mainly on being in the right place at the right time.
- 30. a. _____ When I make plans, I am almost certain that I can make them work. (48)
b. _____ It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

31. a. _____ In my case getting what I want had little or nothing to do with luck. (49)
b. _____ Many times we might just as well decide what to do by flipping a coin.
32. a. _____ Who gets to be the boss often depends on who was lucky enough to be in the right place first. (50)
b. _____ Getting people to do the right thing depends on ability, luck has little or nothing to do with it.
33. a. _____ Most people don't realize the extent to which their lives are controlled by accidental happenings. (51)
b. _____ There is really no such thing as luck.
34. a. _____ In the long run, the bad things that happen to us are balanced by the good ones. (52)
b. _____ Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
35. a. _____ Many times I feel that I have little influence over the things that happen to me. (53)
b. _____ It is impossible for me to believe that chance or luck plays an important role in my life.
36. a. _____ What happens to me is my own doing. (54)
b. _____ Sometimes I feel that I don't have enough control over the direction my life is taking.

Background Information

1. What is your date of birth? Month _____ Day _____ Year _____ (55-60)

2. In your family, who has been a miner? (Check your answer (s))

a. brothers _____	<u>Value</u>	
b. father _____		(61-64)
c. grandfather _____		
d. great grandfather _____		
e. none _____		

Please check ONE space for EACH of the following questions:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	<u>Less</u> <u>than</u> <u>1 year</u>	<u>1-2</u> <u>years</u>	<u>3-5</u> <u>years</u>	<u>6-9</u> <u>years</u>	<u>10-19</u> <u>years</u>	<u>20-29</u> <u>years</u>	<u>30 or</u> <u>more</u> <u>years</u>	
3. How long have you been a coal miner?	_____	_____	_____	_____	_____	_____	_____	(65)
4. How long have you worked for this company?	_____	_____	_____	_____	_____	_____	_____	(66)
5. How long have you worked in this mine?	_____	_____	_____	_____	_____	_____	_____	(67)
6. How long have you worked on your present job?	_____	_____	_____	_____	_____	_____	_____	(68)
7. What shift are you on? (Check ONE)								
a. 1st shift _____								
b. 2nd shift _____								
c. 3rd shift _____								
d. rotating shift _____								
8. How long have you been on this shift? _____ (Fill in)								

Please check ONE space for EACH of the following questions:

9. How far is it from your home to the mine?

- a. 1 - 5 miles _____
- b. 5 - 10 miles _____ (71)
- c. 10 - 15 miles _____
- d. 15 - 20 miles _____
- e. 25 - 30 miles _____
- f. 25 - 30 miles _____
- g. more than 30 miles _____

10. Do you live at home during the work week?

- a. Yes _____ (72)
- b. No _____

11. IF YOU ARE MARRIED, how does your wife feel about your working as a coal miner?

- a. extremely pleased _____
- b. pleased _____ (73)
- c. displeased _____
- d. extremely displeased _____

12. How long does it take you to get to work?

- a. 0-10 minutes _____
- b. 10-20 minutes _____ (74)
- c. 20-30 minutes _____
- d. 30-40 minutes _____
- e. 40-50 minutes _____
- f. 50-60 minutes _____
- g. greater than one hour _____

Please check ONE space for EACH of the following questions:

13. How many mining injuries have you had in the last three years which have kept you off work?

a. none _____
 b. one _____
 c. two _____
 d. three _____
 e. four _____
 f. more than four _____

(75)

14. How many mining injuries and near misses have you had in the last year which have not kept you off work?

	<u>Injuries</u>	<u>Near Misses</u>
a. none	_____	_____
b. one	_____	_____
c. two	_____	_____
d. three	_____	_____
e. four	_____	_____
f. more than four	_____	_____

(76-77)

15. What was your total household yearly income in 1973?

a. less than \$3,000 _____
 b. \$3,000 to \$5,999 _____
 c. \$6,000 to \$8,999 _____
 d. \$9,000 to \$11,999 _____
 e. \$12,000 to \$14,999 _____
 f. \$15,000 to \$17,999 _____
 g. \$18,000 to \$20,999 _____
 h. \$21,000 to \$23,999 _____
 i. \$24,000 to \$26,999 _____
 j. \$27,000 and up _____

(78)

Please check ONE space for EACH of the following questions:

16. How many people (not including yourself) are dependent on you for support?

- a. none _____
- b. one _____
- c. two or three _____
- d. four or five _____
- e. six to eight _____
- f. nine or more _____

(79)

17. At what level did you finish school?

- a. 6th grade or less _____
- b. 7-9th grade _____
- c. 10-12th grade _____
- d. technical school (such as army training) . . . _____
- e. high school graduate _____
- f. attended college or technical school _____
- g. college or technical school graduate _____

(80)

18. What is the name of the mining job that you normally work at? (Fill in)

(5; 9-10)

APPENDIX B
ABOVE-GROUND MINER SURVEY

NATIONAL SAFETY AND HEALTH SURVEY

Above-ground Miners Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much at all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How good has your training been in....
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Poor</u>	<u>Fair</u>	<u>Good</u>	<u>Excel- lent</u>	
a. how the mining machinery works? . . .	x	x	x	x	(1;9)
b. how the electrical power system works?	x	x	x	x	(10)
c. using safety and health equip- ment?	x	x	x	x	(11)
d. handling physical features of the mine (such as type of top, general layout, etc.)?	x	x	x	x	(12)
e. dealing with hazards such as gases, coal dust, noise, etc.? . .	x	x	x	x	(13)
f. how to use the tools and equipment?	x	x	x	x	(14)
g. requirements of the coal mine safety act?	x	x	x	x	(15)
h. first aid procedures and techniques?	x	x	x	x	(16)
i. locating escape routes?	x	x	x	x	(17)
j. mine rescue procedures and techniques?	x	x	x	x	(18)
k. how to report potential dangers and hazards?	x	x	x	x	(19)

Now go back through question 1 and circle the letters of the three statements that you think describe the most important things a miner should know.

Value

(20-21)

(22-23)

(24-25)

2. How important from the company's point of view are each of the following in your mine?
(Circle ONE "X" for EACH statement)

	(1) Not Import- tant	(2) Slight- ly Import- tant	(3) Moder- ately Import- tant	(4) Very Import- tant	
a. keeping good safety records . .	x	x	x	x	(26)
b. correcting safety hazards in the mine	x	x	x	x	(27)
c. having miners not take chances	x	x	x	x	(28)
d. having miners participate in decisions involving safety	x	x	x	x	(29)
e. having miners wear pro- tective equipment	x	x	x	x	(30)
f. having miners get physical examinations	x	x	x	x	(31)
g. checking for gas in the mine . .	x	x	x	x	(32)
h. making sure mine walls are rock dusted	x	x	x	x	(33)
i. keeping miners' satisfied in their jobs	x	x	x	x	(34)
j. assuring miners' security . . .	x	x	x	x	(35)
k. having competition among work crews	x	x	x	x	(36)
l. having miners report safety hazards	x	x	x	x	(37)
m. getting coal out regardless of safety	x	x	x	x	(38)
n. having miners get black lung examinations	x	x	x	x	(39)
o. upholding the company safety record	x	x	x	x	(40)

3. In this mine...
(Circle ONE "X" for EACH Statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do miners get along with each other?	x	x	x	x	x	(41)
b. do miners discuss work- related issues?	x	x	x	x	x	(42)
c. are miners able to de- pend on each other?	x	x	x	x	x	(43)
d. do miners horse around? .	x	x	x	x	x	(44)
e. do miners leave the work- place ready ("shaped up") for the next crew?	x	x	x	x	x	(45)
f. do work crews try to outdo other crews?	x	x	x	x	x	(46)
g. do miners get mad if a miner takes risks?	x	x	x	x	x	(47)
h. do miners spend time with each other after work?	x	x	x	x	x	(48)
i. do miners get mad if a miner works too slow? .	x	x	x	x	x	(49)
j. do miners get mad if a miner works too fast? . .	x	x	x	x	x	(50)
k. do miners complain about safety?	x	x	x	x	x	(51)
l. do miners report small accidents?	x	x	x	x	x	(52)

4. While working in this mine how much did you learn about safety and health practices from...

(Circle ONE "X" for EACH statement)

	(1) Not <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. on the job experience?	x	x	x	(53)
b. practice emergency drills?	x	x	x	(54)
c. company training programs?	x	x	x	(55)
d. other miners?	x	x	x	(56)
e. foremen?	x	x	x	(57)
f. operating manuals or books?	x	x	x	(58)
g. union sponsored programs?	x	x	x	(59)
h. Bureau of Mines training?	x	x	x	(60)
i. government inspectors?	x	x	x	(61)
j. state mining training?	x	x	x	(62)
k. doctors or public health medics?	x	x	x	(63)
l. Black Lung Association workers?	x	x	x	(64)
m. relatives or friends?	x	x	x	(65)
n. other (specify)? _____	x	x	x	(66)

5. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. too much absenteeism	x	x	x	(67)
b. too high job turnover	x	x	x	(68)
c. too low worker productivity	x	x	x	(69)
d. poor safety training	x	x	x	(70)
e. poor job training	x	x	x	(71)
f. lack of management training	x	x	x	(72)
g. too many labor problems	x	x	x	(73)
h. trouble with safety and health laws . . .	x	x	x	(74)
i. too many accidents	x	x	x	(75)
j. poor equipment maintenance	x	x	x	(76)
k. bad public image	x	x	x	(77)
l. other (specify) _____	x	x	x	(78)

Now go back through question #5 and circle the letters in front of the 2 statements which you feel describe the most serious problems facing your mine.

Value

(79-80)

(2; 9-10)

6. How often do you...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. wear safety glasses?	x	x	x	x	x	(11)
b. stop other miners from doing unsafe things?	x	x	x	x	x	(12)
c. talk up safety within the work crew?	x	x	x	x	x	(13)
d. clean up the work area?	x	x	x	x	x	(14)
e. take chances or cut corners?	x	x	x	x	x	(15)
f. report safety and health hazards to the safety committee?	x	x	x	x	x	(16)
g. report safety and health hazards to the foreman?	x	x	x	x	x	(17)
h. refuse to work under unsafe conditions?	x	x	x	x	x	(18)
i. wear a respirator?	x	x	x	x	x	(19)
j. take part in the government chest x-ray program?	x	x	x	x	x	(20)
k. go to the doctor when sick?	x	x	x	x	x	(21)
l. go to work even when feeling bad?	x	x	x	x	x	(22)
m. bridge the circuit breaker when a circuit overloads?	x	x	x	x	x	(23)
n. report safety and health hazards to the next shift?	x	x	x	x	x	(24)
o. check to see whether re- ported safety hazards have been improved?	x	x	x	x	x	(25)

7. To what extent is each of the following items a reason why you might not use safety and health equipment?

(Circle ONE "X" for EACH statement)

	(1) Not <u>Much</u>	(2) Some <u>Extent</u>	(3) Great <u>Extent</u>	
a. it is difficult to get	x	x	x	(26)
b. it is poorly maintained	x	x	x	(27)
c. it is uncomfortable to use	x	x	x	(28)
d. lack of training	x	x	x	(29)
e. ailments from use (such as rashes from respirators).	x	x	x	(30)
f. other miners make fun of you	x	x	x	(31)
g. it isn't any good	x	x	x	(32)
h. it gets in the way of working	x	x	x	(33)
i. company or foreman attitudes	x	x	x	(34)
j. it makes the job more dangerous than before	x	x	x	(35)
k. no need for it	x	x	x	(36)

8. IF YOUR MINE IS UNIONIZED, to what extent does the union...
(Circle ONE "X" for EACH statement)

	(1) Not Much	(2) Some Extent	(3) Great Extent	
a. set up safety and health training programs?	x	x	x	(37)
b. take care of injured miners and their families?	x	x	x	(38)
c. have the safety committee recheck after the foreman's safety inspection? .	x	x	x	(39)
d. bargain with management for safer and healthier mines?	x	x	x	(40)
e. provide safety and health information to the miners?	x	x	x	(41)
f. check to see if miners and their families receive adequate medical care? . .	x	x	x	(42)
g. discuss safety and health topics in union meetings?	x	x	x	(43)
h. encourage men with health problems to shift to less dusty jobs?	x	x	x	(44)
i. provide legal help in black lung and compensation claims?	x	x	x	(45)
j. put pressure on the company to provide a safe mine?	x	x	x	(46)

9. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this item), who do you think is next most responsible (place a 2 by that item)?

	<u>Value</u>	
a. the foreman	—	(47)
b. mine management	—	(48)
c. the work crew (its influence on the worker)	—	
d. the worker	—	
e. the safety committee	—	
f. the company engineers	—	
g. the safety director	—	

10. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. dust	x	x	x	(49)
b. gas	x	x	x	(50)
c. noise	x	x	x	(51)
d. lighting	x	x	x	(52)
e. company policy	x	x	x	(53)
f. cramped working conditions	x	x	x	(54)
g. seam height	x	x	x	(55)
h. "Acts of God"	x	x	x	(56)
i. rib rolls	x	x	x	(57)
j. layout of the mine	x	x	x	(58)
k. worker attitude	x	x	x	(59)
l. foremen	x	x	x	(60)
m. bad top	x	x	x	(61)
n. faulty equipment	x	x	x	(62)
o. human error	x	x	x	(63)
p. water	x	x	x	(64)
q. driving in	x	x	x	(65)
r. retreating	x	x	x	(66)

11. How often do other miners in your mine...
(Circle one "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Seldom</u>	(3) <u>Sometimes</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. Wear safety glasses	x	x	x	x	x	(67)
b. Clean up the work area	x	x	x	x	x	(68)
c. Work under unsupported roof	x	x	x	x	x	(69)
d. Take chances or cut corners . .	x	x	x	x	x	(70)
e. Smoke in the mine	x	x	x	x	x	(71)
f. Wear a respirator	x	x	x	x	x	(72)
g. Bridge the circuit breaker when a circuit overloads	x	x	x	x	x	(73)
h. Talk up safety within the work crew	x	x	x	x	x	(74)

12. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost None</u>	(2) <u>Some</u>	(3) <u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(75)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(76)
c. feel accidents are not caused they just happen?	x	x	x	(77)
d. talk a lot about accidents they have had?	x	x	x	(78)
e. are superstitious?	x	x	x	(79)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(80)
g. have dreams and nightmares about getting hurt?	x	x	x	(3;9)
h. worry a lot about accidents?	x	x	x	(10)
i. are nervous while they are working? . .	x	x	x	(11)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(12)
k. never talk to their families about dangers and accidents?	x	x	x	(13)
l. really enjoy working in the mines? . .	x	x	x	(14)
m. are afraid of losing their jobs?	x	x	x	(15)
n. need a few drinks to relax after work?	x	x	x	(16)
o. feel they cannot trust management? . .	x	x	x	(17)
p. feel they cannot trust mine inspectors?	x	x	x	(18)
q. wish they had never gone into the mines?	x	x	x	(19)
r. do not want their sons to go into the mines?	x	x	x	(20)
s. take a lot of time off?	x	x	x	(21)

13. How many accidents involving others have you seen in the last year?
(Check ONE)

- a. none _____
- b. one _____
- c. two _____
- d. three _____
- e. four _____
- f. more than four _____

(22)

14. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(23-24)

15. In this company what is the general attitude of management toward miners?
(Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)
Very Good	Good	Indifferent	Bad	Very Bad

(25)

16. In this company what is the general attitude of foremen toward miners?
(Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)
Very Good	Good	Indifferent	Bad	Very Bad

(26)

17. Why do you think miners might not use available health programs (such as the Federal X-ray program)?
(Circle any letters that apply)

- a. doctors are too hard to get to
 - b. you have to wait too long to see doctors
 - c. X-rays may be used to get rid of miners with black lung
 - d. doctors talk so you cannot understand them
 - e. health care is too expensive
 - f. doctors might put you in the hospital
 - g. government X-ray programs aren't any good
 - h. hospital facilities aren't adequate
 - i. doctors don't know what they're doing anyway
 - j. other (please describe) _____
-

(27-37)

18. Which of the following would you say describes your company best?
(Check ONE space)

- a. the company puts production over safety _____
- b. the company puts safety over production _____
- c. the company gives both safety and production equal
importance _____
- d. the company pays almost no attention to safety _____
- e. the company pays almost no attention to production _____

(38)

Background Information

1. What is your date of birth? Month _____ Day _____ Year _____ (39-44)

2. In your family, who has been a miner? (Check your answer (s))

- a. brothers _____
- b. father _____
- c. grandfather _____
- d. great grandfather _____
- e. none _____

(45-48)

Please check ONE space for EACH of the following questions:

	(1) Less than <u>1 year</u>	(2) <u>1-2</u> <u>years</u>	(3) <u>3-5</u> <u>years</u>	(4) <u>6-9</u> <u>years</u>	(5) <u>10-19</u> <u>years</u>	(6) <u>20-29</u> <u>years</u>	(7) <u>30 or</u> <u>more</u> <u>years</u>	
3. How long have you been a coal miner?	_____	_____	_____	_____	_____	_____	_____	(49)
4. How long have you worked for this company?	_____	_____	_____	_____	_____	_____	_____	(50)
5. How long have you worked in this mine?	_____	_____	_____	_____	_____	_____	_____	(51)
6. How long have you worked on your present job?	_____	_____	_____	_____	_____	_____	_____	(52)

7. What shift are you on? (Check ONE)

- a. 1st shift _____
- b. 2nd shift _____
- c. 3rd shift _____
- d. rotating shift _____

(53)

8. How long have you been on this shift? (Fill in) _____ (54-55)

Please check ONE space for EACH of the following questions:

9. How far is it from your home to the mine?

- a. 1 - 5 miles _____
- b. 5 - 10 miles _____
- c. 10 - 15 miles _____
- d. 15 - 20 miles _____
- e. 25 - 30 miles _____
- f. 25 - 30 miles _____
- g. more than 30 miles _____

(56)

10. Do you live at home during the work week?

- a. Yes _____
- b. No _____

(57)

11. IF YOU ARE MARRIED, how does your wife feel about your working as a coal miner?

- a. extremely pleased _____
- b. pleased _____
- c. displeased _____
- d. extremely displeased _____

(58)

12. How long does it take you to get to work?

- a. 0-10 minutes _____
- b. 10-20 minutes _____
- c. 20-30 minutes _____
- d. 30-40 minutes _____
- e. 40-50 minutes _____
- f. 50-60 minutes _____
- g. greater than one hour _____

(59)

Please check ONE space for EACH of the following questions:

13. How many mining injuries have you had in the last three years which have kept you off work?

- a. none _____
- b. one _____
- c. two _____
- d. three _____
- e. four _____
- f. more than four _____

(60)

14. How many mining injuries and near misses have you had in the last year which have not kept you off work?

	<u>Injuries</u>	<u>Near Misses</u>	
a. none	_____	_____	
b. one	_____	_____	(61-62)
c. two	_____	_____	
d. three	_____	_____	
e. four	_____	_____	
f. more than four	_____	_____	

15. What was your total household yearly income in 1974?

- a. less than \$3,000 _____
- b. \$3,000 to \$5,999 _____
- c. \$6,000 to \$8,999 _____
- d. \$9,000 to \$11,999 _____
- e. \$12,000 to \$14,999 _____
- f. \$15,000 to \$17,999 _____
- g. \$18,000 to \$20,999 _____
- h. \$21,000 to \$23,999 _____
- i. \$24,000 to \$26,999 _____
- j. \$27,000 and up _____

(63)

Please check ONE space for EACH of the following questions:

16. How many people (not including yourself) are dependent on you for support?

- a. none _____
- b. one _____
- c. two or three _____
- d. four or five _____
- e. six to eight _____
- f. nine or more _____

(64)

17. At what level did you finish school?

- a. 6th grade or less _____
- b. 7-9th grade _____
- c. 10-12th grade _____
- d. technical school (such as army training) _____
- e. high school graduate _____
- f. attended college or technical school _____
- g. college or technical school graduate _____

(65)

18. What is the name of the mining job that you normally work at? (Fill in)

(66-67)

APPENDIX C
UNION OFFICIALS SURVEY

NATIONAL SAFETY AND HEALTH SURVEY
Union Officials Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much at all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How important from the company's point of view are each of the following in your mine?

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Not</u> <u>Impor-</u> <u>tant</u>	<u>Slight-</u> <u>ly</u> <u>Impor-</u> <u>tant</u>	<u>Moder-</u> <u>ately</u> <u>Impor-</u> <u>tant</u>	<u>Very</u> <u>Impor-</u> <u>tant</u>	
a. keeping good safety records . .	x	x	x	x	(1;9)
b. correcting safety hazards in the mine	x	x	x	x	(10)
c. having miners not take chances	x	x	x	x	(11)
d. having miners participate in decisions involving safety	x	x	x	x	(12)
e. having miners wear pro- tective equipment	x	x	x	x	(13)
f. having miners get physical examinations	x	x	x	x	(14)
g. checking for gas in the mine . .	x	x	x	x	(15)
h. making sure mine walls are rock dusted	x	x	x	x	(16)
i. keeping miners' satisfied in their jobs	x	x	x	x	(17)
j. assuring miners' security . . .	x	x	x	x	(18)
k. having competition among work crews	x	x	x	x	(19)
l. having miners report safety hazards	x	x	x	x	(20)
m. getting coal out regardless of safety	x	x	x	x	(21)
n. having miners get black lung examinations	x	x	x	x	(22)
o. upholding the company safety record	x	x	x	x	(23)

2. In this mine...
(Circle ONE "X" for EACH Statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do miners get along with each other?	x	x	x	x	x	(24)
b. do miners discuss work- related issues?	x	x	x	x	x	(25)
c. are miners able to de- pend on each other?	x	x	x	x	x	(26)
d. do miners horse around? .	x	x	x	x	x	(27)
e. do miners leave the work- place ready ("shaped up") for the next crew?	x	x	x	x	x	(28)
f. do work crews try to outdo other crews?	x	x	x	x	x	(29)
g. do miners get mad if a miner takes risks?	x	x	x	x	x	(30)
h. do miners spend time with each other after work?	x	x	x	x	x	(31)
i. do miners get mad if a miner works too slow? .	x	x	x	x	x	(32)
j. do miners get mad if a miner works too fast? ..	x	x	x	x	x	(33)
k. do miners complain about safety?	x	x	x	x	x	(34)
l. do miners report small accidents?	x	x	x	x	x	(35)

3. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>No</u>	<u>Unsure</u>	<u>Yes</u>	
a. too much absenteeism	x	x	x	(36)
b. too high job turnover	x	x	x	(37)
c. too low worker productivity	x	x	x	(38)
d. poor safety training	x	x	x	(39)
e. poor job training	x	x	x	(40)
f. lack of management training	x	x	x	(41)
g. too many labor problems	x	x	x	(42)
h. trouble with safety and health laws . . .	x	x	x	(43)
i. too many accidents	x	x	x	(44)
j. poor equipment maintenance	x	x	x	(45)
k. bad public image	x	x	x	(46)
l. other (specify) _____	x	x	x	(47)

Now go back through question #3 and circle the letters in front of the 2 statements which you feel describe the most serious problems facing your mine. (48-51)

4. To what extent does the union . . .
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Not</u> <u>Much</u>	<u>Some</u> <u>Extent</u>	<u>Great</u> <u>Extent</u>	
a. set up safety and health training programs?	x	x	x	(52)
b. take care of injured miners and their families?	x	x	x	(53)
c. have the safety committee recheck after the foreman's safety inspection?	x	x	x	(54)
d. bargain with management for safer and healthier mines?	x	x	x	(55)
e. provide safety and health information to the miners?	x	x	x	(56)
f. check to see if miners and their families receive adequate medical care?	x	x	x	(57)
g. discuss safety and health topics in union meetings?	x	x	x	(58)
h. encourage men with health problems to shift to less dusty jobs?	x	x	x	(59)
i. provide legal help in black lung and compensation claims?	x	x	x	(60)
j. put pressure on the company to provide a safe mine?	x	x	x	(61)

5. Do Bureau of Mines inspectors...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>No</u>	<u>Unsure</u>	<u>Yes</u>	
a. make careful, thorough inspections?	x	x	x	(62)
b. make enough inspections in your mine?	x	x	x	(63)
c. worry too much about things that do not matter?	x	x	x	(64)
d. ignore dangerous conditions?	x	x	x	(65)
e. have enough experience or training to be good inspectors?	x	x	x	(66)
f. enforce regulations and penalize violations?	x	x	x	(67)
g. forewarn mines of their inspection schedules?	x	x	x	(68)

Now go back through question #5 and circle the letters of the statements that describe state mining inspectors.

(69-75)

6. Who makes the most inspections? (Check ONE)

- a. state government _____
- b. federal government _____

(76)

7. How often do foremen in this company...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. get angry when miners have job problems or questions?	x	x	x	x	x	(77)
b. allow miners to work at their own speed?	x	x	x	x	x	(78)
c. ask miners to do things which are against miners' better judgements?	x	x	x	x	x	(79)
d. make mistakes?	x	x	x	x	x	(80)
e. have disagreements with miners about safety procedures?	x	x	x	x	x	(2;9)
f. make miners afraid to point out hazards to the safety committee?	x	x	x	x	x	(10)
g. give miners a pat on the back when they follow safety procedures?	x	x	x	x	x	(11)
h. allow men to work in unsafe conditions?	x	x	x	x	x	(12)
i. turn in an inaccurate safety report (such as dust levels)?	x	x	x	x	x	(13)
j. play favorites?	x	x	x	x	x	(14)
k. review each accident with individual miners?	x	x	x	x	x	(15)
l. wear their respirators in dusty conditions?	x	x	x	x	x	(16)
m. remind miners of safety and health practices?	x	x	x	x	x	(17)
n. get mad when workers iss too many days?	x	x	x	x	x	(18)
o. check closely to make sure that the men are working?	x	x	x	x	x	(19)
p. allow miners to work on th'r own?	x	x	x	x	x	(20)

7. (Continued)

How often do foremen in this company...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
q. cut corners on safety? . .	x	x	x	x	x	(21)
r. let miners know what's expected of them?	x	x	x	x	x	(22)
s. plan work poorly?	x	x	x	x	x	(23)
t. give a pat on the back to the man who cuts corners?	x	x	x	x	x	(24)
u. push hard for production?.	x	x	x	x	x	(25)
v. show real concern for worker's welfare?	x	x	x	x	x	(26)
w. lie to crews?	x	x	x	x	x	(27)
x. not use safety procedures because production is slowed up (such as water slowing down continuous mining process)?	x	x	x	x	x	(28)

8. To what extent is each of the following items a reason why you might not use safety and health equipment?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some Extent</u>	(3) <u>Great Extent</u>	
a. it is difficult to get	x	x	x	(29)
b. it is poorly maintained	x	x	x	(30)
c. it is uncomfortable to use	x	x	x	(31)
d. lack of training	x	x	x	(32)
e. ailments from use (such as rashes from respirators).	x	x	x	(33)
f. other miners make fun of you	x	x	x	(34)
g. it isn't any good	x	x	x	(35)
h. it gets in the way of working	x	x	x	(36)
i. company or foreman attitudes	x	x	x	(37)
j. it makes the job more dangerous than before	x	x	x	(38)
k. no need for it	x	x	x	(39)

9. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this item), who do you think is next most responsible (place a 2 by that item)?

a. the foreman	_____	
b. mine management	_____	
c. the work crew (its influence on the worker)	_____	
d. the worker	_____	(40-41)
e. the safety committee	_____	
f. the company engineers	_____	
g. the safety director	_____	

10. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	(1) Not <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. dust	x	x	x	(42)
b. gas	x	x	x	(43)
c. noise	x	x	x	(44)
d. lighting	x	x	x	(45)
e. company policy	x	x	x	(46)
f. cramped working conditions	x	x	x	(47)
g. seam height	x	x	x	(48)
h. "Acts of God"	x	x	x	(49)
i. rib rolls	x	x	x	(50)
j. layout of the mine	x	x	x	(51)
k. worker attitude	x	x	x	(52)
l. foremen	x	x	x	(53)
m. bad top	x	x	x	(54)
n. faulty equipment	x	x	x	(55)
o. human error	x	x	x	(56)
p. water	x	x	x	(57)
q. driving in	x	x	x	(58)
r. retreating	x	x	x	(59)

11. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost</u> <u>None</u>	(2) <u>Some</u>	(3) <u>A Great</u> <u>Many</u>	
a. are afraid of working underground . . .	x	x	x	(60)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(61)
c. feel accidents are not caused they just happen?	x	x	x	(62)
d. talk a lot about accidents they have had?	x	x	x	(63)
e. are superstitious?	x	x	x	(64)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(65)
g. have dreams and nightmares about getting hurt?	x	x	x	(66)
h. worry a lot about accidents?	x	x	x	(67)
i. are nervous while they are working? . .	x	x	x	(68)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(69)
k. never talk to their families about dangers and accidents?	x	x	x	(70)
l. really enjoy working in the mines? . .	x	x	x	(71)
m. are afraid of losing their jobs? . . .	x	x	x	(72)
n. need a few drinks to relax after work?	x	x	x	(73)
o. feel they cannot trust management? . .	x	x	x	(74)
p. feel they cannot trust mine inspectors?	x	x	x	(75)
q. wish they had never gone into the mines?	x	x	x	(76)
r. do not want their sons to go into the mines?	x	x	x	(77)
s. take a lot of time off?	x	x	x	(78)

12. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(79-80)

13. In this company what is the general attitude of management toward miners? (Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(3;9)

14. How long has this mine been unionized? (Fill in) _____ (10-11)

15. How many rank and file union members of your local are active in the following areas:

(Circle ONE "X" for EACH statement)

	(1) Not Many (Less than 25%)	(2) Some (25%-50%)	(3) A Lot (Greater than 50%)	
a. local meetings	x	x	x	(12)
b. safety meetings	x	x	x	(13)
c. national union affairs . . .	x	x	x	(14)
d. social activities sponsored by the union	x	x	x	(15)
e. safety committee work . . .	x	x	x	(16)
f. other (specify) _____	x	x	x	(17)

16. What do you feel needs to be done to make the mine you work in a safer mine? (Please write in)

Background Information

1. What is your date of birth? Month _____ Day _____ Year _____ (18-23)

Please check ONE space for EACH of the following questions:

	(1) Less than <u>1 year</u>	(2) 1-2 <u>years</u>	(3) 3-5 <u>years</u>	(4) 6-9 <u>years</u>	(5) 10-19 <u>years</u>	(6) 20-29 <u>years</u>	(7) 30 or more <u>years</u>	
2. How long have you been a coal miner?	_____	_____	_____	_____	_____	_____	_____	(24)
3. How long have you worked for this company?	_____	_____	_____	_____	_____	_____	_____	(25)
4. How long have you worked in this mine?	_____	_____	_____	_____	_____	_____	_____	(26)
5. How long have you been a union official?	_____	_____	_____	_____	_____	_____	_____	(27)
6. Are you now an active member of the union safety committee? (Check ONE)								
a. Yes	_____							(28)
b. No	_____							

APPENDIX D
FOREMAN SURVEY

NATIONAL SAFETY AND HEALTH SURVEY

Foremen Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much as all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How good has your training been in....
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Poor</u>	<u>Fair</u>	<u>Good</u>	<u>Excel- lent</u>	
a. how the mining machinery works? . . .	X	X	X	X	(1;9)
b. how the electrical power system works?	X	X	X	X	(10)
c. using safety and health equip- ment?	X	X	X	X	(11)
d. handling physical features of the mine (such as type of top, general layout, etc.)?	X	X	X	X	(12)
e. dealing with hazards such as gases, coal dust, noise, etc.? . .	X	X	X	X	(13)
f. how to use the tools and equipment?	X	X	X	X	(14)
g. requirements of the coal mine safety act?	X	X	X	X	(15)
h. first aid procedures and techniques?	X	X	X	X	(16)
i. locating escape routes?	X	X	X	X	(17)
j. mine rescue procedures and techniques?	X	X	X	X	(18)
k. how to report potential dangers and hazards?	X	X	X	X	(19)

Now go back through question 1 and circle the letters of the three statements that you think describe the most important things a miner should know.

Value

(20-2

(22-2

(24-2

2. How necessary is each of the following for a miner's personal well-being on the job?

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	Not Neces- sary	Some- what Neces- sary	Very Neces- sary	
a. hard hat	X	X	X	(26)
b. gloves	X	X	X	(27)
c. hard toe shoes	X	X	X	(28)
d. safety glasses	X	X	X	(29)
e. respirator	X	X	X	(30)
f. ear protectors	X	X	X	(31)
g. methane detector	X	X	X	(32)
h. dust sampler	X	X	X	(33)
i. fire extinguishers	X	X	X	(34)
j. self rescuer	X	X	X	(35)
k. more lighting equipment	X	X	X	(36)
l. garters for pants legs	X	X	X	(37)
m. sounding device to test roof	X	X	X	(38)
n. other (specify) _____	X	X	X	(39)

3. IF YOUR MINE IS UNIONIZED, to what extent does the union...
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u> <u>Extent</u>	(3) <u>Great</u> <u>Extent</u>	
a. set up safety and health training programs?	x	x	x	(40)
b. take care of injured miners and their families?	x	x	x	(41)
c. have the safety committee recheck after the foreman's safety inspection? .	x	x	x	(42)
d. bargain with management for safer and healthier mines?	x	x	x	(43)
e. provide safety and health information to the miners?	x	x	x	(44)
f. check to see if miners and their families receive adequate medical care? . .	x	x	x	(45)
g. discuss safety and health topics in union meetings?	x	x	x	(46)
h. encourage men with health problems to shift to less dusty jobs?	x	x	x	(47)
i. provide legal help in black lung and compensation claims?	x	x	x	(48)
j. put pressure on the company to provide a safe mine?	x	x	x	(49)

4. Do Bureau of Mines inspectors...
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. make careful, thorough inspections? . . .	x	x	x	(50)
b. make enough inspections in your mine?	x	x	x	(51)
c. worry too much about things that do not matter?	x	x	x	(52)
d. ignore dangerous conditions?	x	x	x	(53)
e. have enough experience or training to be good inspectors?	x	x	x	(54)
f. enforce regulations and penalize violations?	x	x	x	(55)
g. forewarn mines of their inspection schedules?	x	x	x	(56)

Now go back through question #4 and circle the letters of the statements that describe state mining inspectors.

(57-63)

5. Who makes the most inspections? (Check ONE)

- a. state government (64)
- b. federal government

6. How much do you feel that miners' jobs give them a chance to...
(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. use their ability?	x	x	x	(65)
b. do challenging work?	x	x	x	(66)
c. do interesting work?	x	x	x	(67)
d. do a variety of things?	x	x	x	(68)
e. feel that they are getting things done? . .	x	x	x	(69)
f. learn new things?	x	x	x	(70)
g. do important work?	x	x	x	(71)
h. make important decisions?	x	x	x	(72)
i. advance or get ahead?	x	x	x	(73)

7. How often do miners in this mine have to . . .
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	(5)	
	<u>Almost</u> <u>Never</u>	<u>Sel-</u> <u>dom</u>	<u>Some-</u> <u>times</u>	<u>Often</u>	<u>Almost</u> <u>Always</u>	
a. do the same things many times a day?	X	X	X	X	X	(74)
b. work very fast?	X	X	X	X	X	(75)
c. work very hard?	X	X	X	X	X	(76)
d. think a lot?	X	X	X	X	X	(77)
e. do a lot of things at the same time?	X	X	X	X	X	(78)
f. work alone?	X	X	X	X	X	(79)
g. work with new inexper- ienced men?	X	X	X	X	X	(80)
h. look out for the safety of other miners?	X	X	X	X	X	(2;9)
i. answer to more than one person?	X	X	X	X	X	(10)
j. do a lot of different kinds of work?	X	X	X	X	X	(11)
k. work without clear-cut duties?	X	X	X	X	X	(12)
l. take care of absentees' jobs?	X	X	X	X	X	(13)
m. work at jobs they do not like?	X	X	X	X	X	(14)

8. Who has the most important decision-making responsibility for the following things in your mine? (Fill in)

- a. setting production goals _____ (15-16)
- b. making safety inspections _____ (17-18)
- c. approving or disapproving equipment purchases _____ (19-20)
- d. shifting workers to less hazardous or healthier jobs _____ (21-22)
- e. planning and organizing miners' own work _____ (23-24)
- f. work crew safety _____ (25-26)

9. How important from the company's point of view are each of the following in your mine?

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Not</u> <u>Import-</u> <u>tant</u>	<u>Slight-</u> <u>ly</u> <u>Import-</u> <u>tant</u>	<u>Moder-</u> <u>ately</u> <u>Import-</u> <u>tant</u>	<u>Very</u> <u>Import-</u> <u>tant</u>	
a. keeping good safety records . .	x	x	x	x	(27)
b. correcting safety hazards in the mine	x	x	x	x	(28)
c. having miners not take chances	x	x	x	x	(29)
d. having miners participate in decisions involving safety	x	x	x	x	(30)
e. having miners wear pro- tective equipment	x	x	x	x	(31)
f. having miners get physical examinations	x	x	x	x	(32)
g. checking for gas in the mine . .	x	x	x	x	(33)
h. making sure mine walls are rock dusted	x	x	x	x	(34)
i. keeping miners' satisfied in their jobs	x	x	x	x	(35)
j. assuring miners' security . . .	x	x	x	x	(36)
k. having competition among work crews	x	x	x	x	(37)
l. having miners report safety hazards	x	x	x	x	(38)
m. getting coal out regardless of safety	x	x	x	x	(39)
n. having miners get black lung examinations	x	x	x	x	(40)
o. upholding the company safety record	x	x	x	x	(41)

10. How important is each of the following to miners in this mine?

(Circle ONE "X" for EACH statement) (1)

	(1)	(2)	(3)	(4)	
	<u>Not</u> <u>Import-</u> <u>tant</u>	<u>Slight-</u> <u>ly</u> <u>Import-</u> <u>tant</u>	<u>Moder-</u> <u>ately</u> <u>Import-</u> <u>tant</u>	<u>Very</u> <u>Import-</u> <u>tant</u>	
a. a good safety record for the crew	x	x	x	x	(42)
b. learning escape routes	x	x	x	x	(43)
c. the company safety record . .	x	x	x	x	(44)
d. reporting safety hazards . . .	x	x	x	x	(45)
e. not taking chances	x	x	x	x	(46)
f. correcting safety and health hazards	x	x	x	x	(47)
g. participating in decision making	x	x	x	x	(48)
h. getting coal out regardless of safety	x	x	x	x	(49)
i. moving to a less dusty job . .	x	x	x	x	(50)
j. wearing protective equip- ment	x	x	x	x	(51)
k. having black lung exami- nations	x	x	x	x	(52)
l. checking for gas in the mine .	x	x	x	x	(53)
m. making sure sections are rockdusted	x	x	x	x	(54)
n. family life	x	x	x	x	(55)
o. job security	x	x	x	x	(56)
p. satisfaction with their job	x	x	x	x	(57)
q. producing as much as other crews	x	x	x	x	(58)
r. having physical exami- nations	x	x	x	x	(59)

11. How often do foremen in this company...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. get angry when miners have job problems or questions?	X	X	X	X	X	(60)
b. allow miners to work at their own speed?	X	X	X	X	X	(61)
c. ask miners to do things which are against miners' better judgements?	X	X	X	X	X	(62)
d. make mistakes?	X	X	X	X	X	(63)
e. have disagreements with miners about safety procedures?	X	X	X	X	X	(64)
f. make miners afraid to point out hazards to the safety committee?	X	X	X	X	X	(65)
g. give miners a pat on the back when they follow safety procedures?	X	X	X	X	X	(66)
h. allow men to work in unsafe conditions?	X	X	X	X	X	(67)
i. turn in an inaccurate safety report (such as dust levels)?	X	X	X	X	X	(68)
j. play favorites?	X	X	X	X	X	(69)
k. review each accident with individual miners?	X	X	X	X	X	(70)
l. wear their respirators in dusty conditions?	X	X	X	X	X	(71)
m. remind miners of safety and health practices?	X	X	X	X	X	(72)
n. get mad when workers miss too many days?	X	X	X	X	X	(73)
o. check closely to make sure that the men are working?	X	X	X	X	X	(74)
p. allow miners to work on their own?	X	X	X	X	X	(75)
q. cut corners on safety?	X	X	X	X	X	(76)
r. let miners know what's expected of them?	X	X	X	X	X	(77)

11. (Continued)

How often do foremen in this company...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
s. plan work poorly?	x	x	x	x	x	(78)
t. give a pat on the back to the man who cuts corners?	x	x	x	x	x	(79)
u. push hard for production?.	x	x	x	x	x	(80)
v. show real concern for worker's welfare?	x	x	x	x	x	(3;9)
w. lie to crews?	x	x	x	x	x	(10)
x. not use safety procedures because production is slowed up (such as water slowing down continuous mining process)?	x	x	x	x	x	(11)

12. In this mine...

(Circle ONE "X" for EACH Statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do miners get along with each other?	X	X	X	X	X	(12)
b. do miners discuss work- related issues?	X	X	X	X	X	(13)
c. are miners able to de- pend on each other? . . .	X	X	X	X	X	(14)
d. do miners horse around? .	X	X	X	X	X	(15)
e. do miners leave the work- place ready ("shaped up") for the next crew?	X	X	X	X	X	(16)
f. do work crews try to outdo other crews?	X	X	X	X	X	(17)
g. do miners get mad if a miner takes risks?	X	X	X	X	X	(18)
h. do miners spend time with each other after work?	X	X	X	X	X	(19)
i. do miners get mad if a miner works too slow? .	X	X	X	X	X	(20)
j. do miners get mad if a miner works too fast? ..	X	X	X	X	X	(21)
k. do miners complain about safety?	X	X	X	X	X	(22)
l. do miners report small accidents?	X	X	X	X	X	(23)

13. Which of the following would you say describes your company best?
(Check ONE space)

- a. the company puts production over safety _____
- b. the company puts safety over production _____ (24)
- c. the company gives both safety and production equal
importance _____
- d. the company pays almost no attention to safety _____
- e. the company pays almost no attention to production _____

14. To what extent is each of the following items a reason why miners might not use safety and health equipment?
(Circle ONE "X" for EACH statement)

	(1) Not Much	(2) Some Extent	(3) Great Extent	
a. it is difficult to get	X	X	X	(25)
b. it is poorly maintained	X	X	X	(26)
c. it is uncomfortable to use	X	X	X	(27)
d. lack of training	X	X	X	(28)
e. ailments from use (such as rashes from respirators).	X	X	X	(29)
f. other miners make fun of them	X	X	X	(30)
g. it isn't any good	X	X	X	(31)
h. it gets in the way of working	X	X	X	(32)
i. company or foreman attitudes	X	X	X	(33)
j. it makes the job more dangerous than before	X	X	X	(34)
k. no need for it	X	X	X	(35)

15. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this item), who do you think is next most responsible (place a 2 by that item)?

a. the foreman	—	
b. mine management	—	(36)
c. the work crew (its influence on the worker)	—	(37)
d. the worker	—	
e. the safety committee	—	
f. the company engineers	—	
g. the safety director	—	

16. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. dust	X	X	X	(38)
b. gas	X	X	X	(39)
c. noise	X	X	X	(40)
d. lighting	X	X	X	(41)
e. company policy	X	X	X	(42)
f. cramped working conditions	X	X	X	(43)
g. seam height	X	X	X	(44)
h. "Acts of God"	X	X	X	(45)
i. rib rolls	X	X	X	(46)
j. layout of the mine	X	X	X	(47)
k. worker attitude	X	X	X	(48)
l. foremen	X	X	X	(49)
m. bad top	X	X	X	(50)
n. faulty equipment	X	X	X	(51)
o. human error	X	X	X	(52)
p. water	X	X	X	(53)
q. driving in	X	X	X	(54)
r. retreating	X	X	X	(55)

17. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost None</u>	(2) <u>Some</u>	(3) <u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(56)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(57)
c. feel accidents are not caused they just happen?	x	x	x	(58)
d. talk a lot about accidents they have had?	x	x	x	(59)
e. are superstitious?	x	x	x	(60)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(61)
g. have dreams and nightmares about getting hurt?	x	x	x	(62)
h. worry a lot about accidents?	x	x	x	(63)
i. are nervous while they are working? . .	x	x	x	(64)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(65)
k. never talk to their families about dangers and accidents?	x	x	x	(66)
l. really enjoy working in the mines? . .	x	x	x	(67)
m. are afraid of losing their jobs? . . .	x	x	x	(68)
n. need a few drinks to relax after work?	x	x	x	(69)
o. feel they cannot trust management? . .	x	x	x	(70)
p. feel they cannot trust mine inspectors?	x	x	x	(71)
q. wish they had never gone into the mines?	x	x	x	(72)
r. do not want their sons to go into the mines?	x	x	x	(73)
s. take a lot of time off?	x	x	x	(74)

18. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(75-76)

19. In this company what is the general attitude of management toward miners? (Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(77)

20. How much do you feel that miners' jobs give them a chance to . . . (Circle ONE "X" for EACH statement)

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>	
a. use their ability?	x	x	x	(78)
b. do challenging work?	x	x	x	(79)
c. do interesting work?	x	x	x	(80)
d. do a variety of things?	x	x	x	(4;9)
e. feel that they are getting things done? . . .	x	x	x	(10)
f. learn new things?	x	x	x	(11)
g. do important work?	x	x	x	(12)
h. make important decisions?	x	x	x	(13)
i. advance or get ahead?	x	x	x	(14)

21. Who do you think has the most influence on a worker's safety behavior?
(Check ONE space)
- | | | |
|--|-------|------|
| a. the foreman | _____ | |
| b. mine management | _____ | |
| c. the work crew (its influence on the worker) | _____ | (15) |
| d. the worker | _____ | |
| e. the safety committee | _____ | |
| f. the company engineers | _____ | |

22. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. too much absenteeism	☒	☒	☒	(16)
b. too high job turnover	☒	☒	☒	(17)
c. too low worker productivity	☒	☒	☒	(18)
d. poor safety training	☒	☒	☒	(19)
e. poor job training	☒	☒	☒	(20)
f. lack of management training	☒	☒	☒	(21)
g. too many labor problems	☒	☒	☒	(22)
h. trouble with safety and health laws	☒	☒	☒	(23)
i. too many accidents	☒	☒	☒	(24)
j. poor equipment maintenance	☒	☒	☒	(25)
k. bad public image	☒	☒	☒	(26)
l. other (specify) _____	☒	☒	☒	(27)

23. How much are accidents in this mine caused by the miners...
(Circle ONE "X" for EACH statement).

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. worrying and being nervous about accidents?	x	x	x	(28)
b. just being careless and not following safety rules?	x	x	x	(29)
c. being afraid of losing their job? . . .	x	x	x	(30)
d. thinking about problems with their children?	x	x	x	(31)
e. worrying about debts?	x	x	x	(32)
f. being upset about marriage problems? . .	x	x	x	(33)
g. bad health and feeling bad?	x	x	x	(34)
h. being very tired or sleepy?	x	x	x	(35)
i. hurrying to begin a vacation?	x	x	x	(36)
j. worrying about future health problems? .	x	x	x	(37)
k. just not giving a damn?	x	x	x	(38)
l. not using good common sense and judgement?	x	x	x	(39)

24. How do you get miners to use safety equipment? (Discuss)

25. How often do you...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. wear safety glasses?	X	X	X	X	X	(40)
b. stop other miners from doing unsafe things?	X	X	X	X	X	(41)
c. talk up safety within the work crew?	X	X	X	X	X	(42)
d. clean up the work area?	X	X	X	X	X	(43)
e. work under unsupported roof?	X	X	X	X	X	(44)
f. take chances or cut corners?	X	X	X	X	X	(45)
g. report safety and health hazards to the safety committee?	X	X	X	X	X	(46)
h. report safety and health hazards?	X	X	X	X	X	(47)
i. refuse to work under unsafe conditions?	X	X	X	X	X	(48)
j. smoke in the mine?	X	X	X	X	X	(49)
k. wear a respirator?	X	X	X	X	X	(50)
l. take part in the government chest x-ray program?	X	X	X	X	X	(51)
m. go to the doctor when sick?	X	X	X	X	X	(52)
n. go to work even when feeling bad?	X	X	X	X	X	(53)
o. bridge the circuit breaker when a circuit overloads?	X	X	X	X	X	(54)
p. report safety and health hazards to the next shift?	X	X	X	X	X	(55)
q. check to see whether re- ported safety hazards have been improved?	X	X	X	X	X	(56)

26. What disciplinary actions are taken against workers who do not use required protective devices?
(Check as many as apply)

- a. verbal reprimand _____
- b. written reprimand _____
- c. fines _____
- d. "demerits" which can be applied toward dismissal _____
- e. "demerits" which will hinder raises _____
- f. "demerits" leading to denial of rewards _____
- g. reassignment to a less desirable job _____
- h. none _____
- i. other (specify) _____

(57-64)

Background Information

1. What is your date of birth? Month _____ Day _____ Year _____ (65-70)

2. In your family, who has been a miner? (Check your answer (s))

- a. brothers _____
- b. father _____
- c. grandfather _____
- d. great grandfather _____
- e. none _____

(71-74)

Please check ONE space for EACH of the following questions:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	<u>Less</u> <u>than</u> <u>1 year</u>	<u>1-2</u> <u>years</u>	<u>3-5</u> <u>years</u>	<u>6-9</u> <u>years</u>	<u>10-19</u> <u>years</u>	<u>20-29</u> <u>years</u>	<u>30 or</u> <u>more</u> <u>years</u>	
3. How long have you been a coal miner?	_____	_____	_____	_____	_____	_____	_____	(75)
4. How long have you worked for this company?	_____	_____	_____	_____	_____	_____	_____	(76)
5. How long have you worked in this mine?	_____	_____	_____	_____	_____	_____	_____	(77)
6. How long have you worked on your present job?	_____	_____	_____	_____	_____	_____	_____	(78)
7. What shift are you on?								
a. 1st shift	_____							
b. 2nd shift	_____							
c. 3rd shift	_____							(79)
d. rotating shift	_____							
8. How long have you been on this shift? (Fill in) _____								(80)

Please check ONE space for EACH of the following questions:

9. IF YOU ARE MARRIED, how does your wife feel about your working as a coal miner?

- a. extremely pleased _____
- b. pleased _____
- c. displeased _____
- d. extremely displeased _____

(5;9)

10. How long does it take you to get to work?

- a. 0-10 minutes _____
- b. 10-20 minutes _____
- c. 20-30 minutes _____
- d. 30-40 minutes _____
- e. 40-50 minutes _____
- f. 50-60 minutes _____
- g. greater than one hour _____

(10)

11. What was your total household yearly income in 1974?

- a. less than \$3,000 _____
- b. \$3,000 to \$5,999 _____
- c. \$6,000 to \$8,999 _____
- d. \$9,000 to \$11,999 _____
- e. \$12,000 to \$14,999 _____
- f. \$15,000 to \$17,999 _____
- g. \$18,000 to \$20,999 _____
- h. \$21,000 to \$23,999 _____
- i. \$24,000 to \$26,999 _____
- j. \$27,000 and up _____

(11)

12. At what level did you finish school?

- a. 6th grade or less _____
- b. 7-9th grade _____
- c. 10-12th grade _____
- d. technical school (such as army training) . . . _____
- e. high school graduate _____
- f. attended college or technical school _____
- g. college or technical school graduate _____

(12)

APPENDIX E
SAFETY DIRECTOR SURVEY

NATIONAL SAFETY AND HEALTH SURVEY

Safety Directors Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much as all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

2. IF YOUR MINE IS UNIONIZED, to what extent does the union...
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u> <u>Extent</u>	(3) <u>Great</u> <u>Extent</u>	
a. set up safety and health training programs?	X	X	X	(24)
b. take care of injured miners and their families?	X	X	X	(25)
c. have the safety committee recheck after the foreman's safety inspection? .	X	X	X	(26)
d. bargain with management for safer and healthier mines?	X	X	X	(27)
e. provide safety and health information to the miners?	X	X	X	(28)
f. check to see if miners and their families receive adequate medical care? . .	X	X	X	(29)
g. discuss safety and health topics in union meetings?	X	X	X	(30)
h. encourage men with health problems to shift to less dusty jobs?	X	X	X	(31)
i. provide legal help in black lung and compensation claims?	X	X	X	(32)
j. put pressure on the company to provide a safe mine?	X	X	X	(33)

3. Do Bureau of Mines inspectors...
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. make careful, thorough inspections? . . .	x	x	x	(34)
b. make enough inspections in your mine?	x	x	x	(35)
c. worry too much about things that do not matter?	x	x	x	(36)
d. ignore dangerous conditions?	x	x	x	(37)
e. have enough experience or training to be good inspectors?	x	x	x	(38)
f. enforce regulations and penalize violations?	x	x	x	(39)
g. forewarn mines of their inspection schedules?	x	x	x	(40)

Now go back through question #3 and circle the letters of the statements that describe state mining inspectors.

(41-47)

4. Who makes the most inspections? (Check ONE)

- a. state government _____
- b. federal government _____
- (48)

5. To what extent is each of the following items a reason why miners might not use safety and health equipment?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some Extent</u>	(3) <u>Great Extent</u>	
a. it is difficult to get	x	x	x	(49)
b. it is poorly maintained	x	x	x	(50)
c. it is uncomfortable to use	x	x	x	(51)
d. lack of training	x	x	x	(52)
e. ailments from use (such as rashes from respirators).	x	x	x	(53)
f. other miners make fun of them	x	x	x	(54)
g. it isn't any good	x	x	x	(55)
h. it gets in the way of working	x	x	x	(56)
i. company or foreman attitudes	x	x	x	(57)
j. it makes the job more dangerous than before	x	x	x	(58)
k. no need for it	x	x	x	(59)

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How important from the company's point of view are each of the following in your mine?

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Not</u>	<u>Slight-</u>	<u>Moder-</u>	<u>Very</u>	
	<u>Impor-</u>	<u>ly</u>	<u>ately</u>	<u>Impor-</u>	
	<u>tant</u>	<u>Impor-</u>	<u>Impor-</u>	<u>tant</u>	
	<u>tant</u>	<u>tant</u>	<u>tant</u>	<u>tant</u>	
a. keeping good safety records . .	x	x	x	x	(1;9)
b. correcting safety hazards in the mine	x	x	x	x	(10)
c. having miners not take chances	x	x	x	x	(11)
d. having miners participate in decisions involving safety	x	x	x	x	(12)
e. having miners wear pro- tective equipment	x	x	x	x	(13)
f. having miners get physical examinations	x	x	x	x	(14)
g. checking for gas in the mine . .	x	x	x	x	(15)
h. making sure mine walls are rock dusted	x	x	x	x	(16)
i. keeping miners' satisfied in their jobs	x	x	x	x	(17)
j. assuring miners' security . . .	x	x	x	x	(18)
k. having competition among work crews	x	x	x	x	(19)
l. having miners report safety hazards	x	x	x	x	(20)
m. getting coal out regardless of safety	x	x	x	x	(21)
n. having miners get black lung examinations	x	x	x	x	(22)
o. upholding the company safety record	x	x	x	x	(23)

6. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Not</u> <u>Much</u>	<u>Some</u>	<u>A Lot</u>	
a. dust	X	X	X	(60)
b. gas	X	X	X	(61)
c. noise	X	X	X	(62)
d. lighting	X	X	X	(63)
e. company policy	X	X	X	(64)
f. cramped working conditions	X	X	X	(65)
g. seam height	X	X	X	(66)
h. "Acts of God"	X	X	X	(67)
i. rib rolls	X	X	X	(68)
j. layout of the mine	X	X	X	(69)
k. worker attitude	X	X	X	(70)
l. foremen	X	X	X	(71)
m. bad top	X	X	X	(72)
n. faulty equipment	X	X	X	(73)
o. human error	X	X	X	(74)
p. water	X	X	X	(75)
q. driving in	X	X	X	(76)
r. retreating	X	X	X	(77)

7. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost None</u>	(2) <u>Some</u>	(3) <u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(78)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(79)
c. feel accidents are not caused they just happen?	x	x	x	(80)
d. talk a lot about accidents they have had?	x	x	x	(2;9)
e. are superstitious?	x	x	x	(10)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(11)
g. have dreams and nightmares about getting hurt?	x	x	x	(12)
h. worry a lot about accidents?	x	x	x	(13)
i. are nervous while they are working? . .	x	x	x	(14)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(15)
k. never talk to their families about dangers and accidents?	x	x	x	(16)
l. really enjoy working in the mines? . .	x	x	x	(17)
m. are afraid of losing their jobs? . . .	x	x	x	(18)
n. need a few drinks to relax after work?	x	x	x	(19)
o. feel they cannot trust management? . .	x	x	x	(20)
p. feel they cannot trust mine inspectors?	x	x	x	(21)
q. wish they had never gone into the mines?	x	x	x	(22)
r. do not want their sons to go into the mines?	x	x	x	(23)
s. take a lot of time off?	x	x	x	(24)

3. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. too much absenteeism	x	x	x	(25)
b. too high job turnover	x	x	x	(26)
c. too low worker productivity	x	x	x	(27)
d. poor safety training	x	x	x	(28)
e. poor job training	x	x	x	(29)
f. lack of management training	x	x	x	(30)
g. too many labor problems	x	x	x	(31)
h. trouble with safety and health laws . . .	x	x	x	(32)
i. too many accidents	x	x	x	(33)
j. poor equipment maintenance	x	x	x	(34)
k. bad public image	x	x	x	(35)
l. other (specify) _____	x	x	x	(36)

Now go back through question #8 and circle the letters in front of the 2 statements which you feel describe the most serious problems in your mine.

(37-40)

9. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this alternative), who do you think is next most responsible (place a 2 by that alternative)?

a. the foreman	_____
b. mine management	_____
c. the work crew (its influence on the worker)	_____
d. the worker	_____
e. the safety committee	_____
f. the company engineers	_____
g. the safety director	_____

(41-42)

10. Which of the following would you say describes your company best?
(Check ONE space)

- a. the company puts production over safety (43)
- b. the company puts safety over production
- c. the company gives both safety and production equal
importance
- d. the company pays almost no attention to safety
- e. the company pays almost no attention to production

11. Who do you think has the most influence on a worker's safety behavior?
(Check ONE space)

- a. the foreman (44)
- b. mine management
- c. the work crew (its influence on the worker)
- d. the worker
- e. the safety committee
- f. the company engineers

12. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest	
9	_____		
8	_____		
7	_____		(45-55)
6	_____		
5	_____		
4	_____		
3	_____		
2	_____		
1	_____	Most Unsafe	

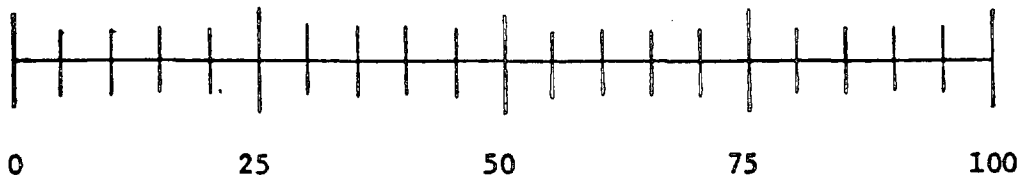
13. In this company what is the general attitude of management toward miners?
(Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(56)

14. In this company what is the general attitude of foremen toward miners?
(Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(57)

15. What percentage of your time is spent in the mines?
(Mark the scale with an X)



(58-60)

16. Do you feel that the miner's family and/or the outside community can have a beneficial effect on worker safety performance? (Check ONE)

- a. Yes _____
b. No _____

(61)

17. How often do safety personnel have to approve new or modified work processes before they are put in operation?
(Check ONE space)

- a. always _____
b. often _____
c. occasionally _____
d. never _____

(62)

18. How often are safety features included in the specifications for new equipment purchases?
(Check ONE space)

- a. always _____
b. often _____
c. occasionally _____
d. never _____

(63)

19. How often do safety personnel have to approve newly installed equipment before it is used?
(Check ONE space)

- a. always _____
b. often _____
c. occasionally _____
d. never _____

(64)

20. What is the approximate percentage of the total operational budget in your mine that is ear-marked for safety?
(Check only ONE)

- a. no money specifically ear-marked for safety _____ (65)
- b. less than one percent _____
- c. between one and three percent _____
- d. more than three percent but less than five percent _____
- e. between five percent and ten percent _____
- f. more than ten percent _____

21. What disciplinary actions are taken against workers who do not use required protective devices?
(Check as many as apply).

- a. verbal reprimand _____
- b. written reprimand _____ (66-74)
- c. fines _____
- d. "demerits" which can be applied toward dismissal _____
- e. "demerits" which will hinder raises _____
- f. "demerits" leading to denial of rewards _____
- g. reassignment to a less desirable job _____
- h. none _____
- i. other (specify) _____

22. Which of those disciplinary actions checked in question 21 have you found most effective? Place a "1" after the most effective, a "2" after the second most effective, and a "3" after the third most effective.

(75-77)

23. To what extent do the following contribute to new ideas about safety and health?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>To Some Extent</u>	(3) <u>To A Great Extent</u>	
a. miners' suggestions	x	x	x	(78)
b. management's suggestions	x	x	x	(79)
c. publications and safety literature	x	x	x	(80)
d. union	x	x	x	(3;9)
e. Bureau of Mines Inspectors	x	x	x	(10)
f. other safety directors	x	x	x	(11)
g. The Coal Mine Health and Safety Act	x	x	x	(12)
h. State mining bureaus	x	x	x	(13)
i. Insurance company reports	x	x	x	(14)
j. Bureau of Mines safety education program	x	x	x	(15)
k. other companies' safety programs .	x	x	x	(16)
l. manufacturer's safety ideas	x	x	x	(17)
m. accident investigations in this mine	x	x	x	(18)
n. accident reports from other mines	x	x	x	(19)
o. foremen suggestions	x	x	x	(20)

24. To what extent do the following factors hinder your safety program?
(Circle ONE "X" for EACH statement).

	(1) Not Much	(2) To Some Extent	(3) To A Great Extent	
a. shortage of money	x	x	x	(21)
b. production goals	x	x	x	(22)
c. miners' resistance to change . . .	x	x	x	(23)
d. union	x	x	x	(24)
e. design of work equipment	x	x	x	(25)
f. management	x	x	x	(26)
g. foremen's resistance to change . .	x	x	x	(27)
h. The Coal Mine Health and Safety Act	x	x	x	(28)
i. your not having enough authority	x	x	x	(29)
j. shortage of supplies	x	x	x	(30)
k. miner turnover	x	x	x	(31)
l. too many different rules to follow	x	x	x	(32)
m. other (specify) _____	x	x	x	(33)

25. What training is required for persons who have responsibility for designing or directing safety programs in your company?
(Check as many as apply)

- a. no special training _____ (34-40)
- b. experience gained by coming up through the ranks _____
- c. specific college or training courses related to safety _____
- d. satisfactory completion of training program offering
certificate in industrial safety _____
- e. bachelor's degree in a field related to safety, e.g.
industrial or safety engineering, industrial hygiene, etc. _____
- f. master's degree in a field related to safety _____
- g. other (specify) _____

26. While working in this mine how much do miners learn about safety and health practices from...

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	Not Much	Some	A Lot	
a. on the job experience?	X	X	X	(41)
b. practice emergency drills?	X	X	X	(42)
c. company training programs?	X	X	X	(43)
d. other miners?	X	X	X	(44)
e. foremen?	X	X	X	(45)
f. operating manuals or books?	X	X	X	(46)
g. union sponsored programs?	X	X	X	(47)
h. Bureau of Mines training?	X	X	X	(48)
i. government inspectors?	X	X	X	(49)
j. state mining training?	X	X	X	(50)
k. doctors or public health medics?	X	X	X	(51)
l. Black Lung Association workers?	X	X	X	(52)
m. relatives or friends?	X	X	X	(53)
n. other (specify)? _____	X	X	X	(54)

27. Which of the following incentives do you use in promoting worker safety?
(Check as many as apply)

a. safety attitude and behavior included in worker performance evaluation	_____	(55-60)
b. running tally of accident free man-hours	_____	
c. recognition awards, e.g., certificates, medals, etc.	_____	
d. cash awards or prizes	_____	
e. publicity of outstanding safety performance	_____	
f. other (specify) _____	_____	

28. Which of those incentives checked in question 27 do you consider most effective? Place a "1" after the most effective, a "2" after the second most effective, and a "3" after the third most effective.

(61-63)

29. Has your company initiated or aided family or community efforts to instill miner safety consciousness? (Check ONE)

- a. yes _____ If yes, how? _____
b. no _____

(64)

30. Which of the following techniques of safety training do you employ? (Check as many as apply)

- a. lecture _____
b. demonstration _____
c. posters _____
d. circulars _____
e. group discussions _____
f. literature/pamphlets _____
g. movies/slides _____
h. instruction by supervisors _____
i. instruction by fellow workers _____
j. instruction by safety personnel _____
k. other (specify) _____

(65-67)

31. Which of those techniques checked in question 30 do you consider most effective? Place a "1" after the most effective, a "2" after the second most effective, and a "3" after the third most effective.

(78-80)

32. To whom is initial safety training made available? (Check as many as apply)

- a. to all new employees _____
b. to all new production employees _____
c. to new employees in particularly dangerous jobs _____
d. to production employees reassigned to new jobs _____
e. to production employees whose work procedures have changed _____
f. other (specify) _____

(4; 9-14)

33. Who receives continuing safety training in your mine?
(Check as many as apply)
- a. all employees _____ (15-20)
 - b. employees in jobs where accidents can occur _____
 - c. employees in high accident risk jobs _____
 - d. employees in jobs where accidents have occurred recently _____
 - e. employees who have had accidents or near accidents recently _____
 - f. no continuing training is offered _____
34. Are company training procedures tailored for specific jobs? (Check ONE)
- a. yes _____ (21)
 - b. no _____
35. How often are personal protective devices inspected in your mine? (Check ONE)
- a. never _____ (22)
 - b. occasionally _____
 - c. at specified intervals _____
 - d. at worker's request _____
 - e. other (specify) _____

36. What disciplinary actions are imposed against miners who habitually fail to follow safe work practices or who are known risk-takers?
(Check as many as apply)
- a. verbal reprimand _____ (23-31)
 - b. written reprimand _____
 - c. transfer to less hazardous job _____
 - d. fines _____
 - e. required to participate in special safety training. _____
 - f. suspension _____
 - g. dismissal _____
 - h. other (specify) _____

 - i. none _____

37. Which of the disciplinary actions checked in question 36 have you found most effective? Place a "1" after the most effective, a "2" after the second most effective, and a "3" after the third most effective. (32-34)

38. Is there a system established for workers in your mine to report suspected accident hazards? (Check ONE)

- a. yes _____ (35)
b. no (if no, omit question 39) _____

39. In general, how does the worker report accident hazards? (Check as many as apply)

- a. in writing _____
b. by informing one's supervisor _____ (36-39)
c. by telling maintenance or safety personnel _____
d. other (explain) _____

40. Who investigates accidents or near accidents? (Check as many as apply)

- a. medical personnel _____ (40-47)
b. safety personnel _____
c. management personnel _____
d. union officials. _____
e. worker representative(s) _____
f. involved employee(s) _____
g. first line supervisor _____
h. other (specify) _____

41. What are the major causes of accidents in this mine? (Discuss)

42. As a safety director, what changes would you suggest to make your position more effective? (Discuss)

43. Are there any special precautions or programs that your mine has that help increase miner safety and health? (Discuss)

Background Information

1. What is your birthdate? _____

(48-53)

Please check ONE space for EACH of the following questions:

	(1) Less than <u>1 year</u>	(2) <u>1-2</u> <u>years</u>	(3) <u>3-5</u> <u>years</u>	(4) <u>6-9</u> <u>years</u>	(5) <u>10-19</u> <u>years</u>	(6) <u>20-29</u> <u>years</u>	(7) <u>30 or</u> <u>more</u> <u>years</u>	
2. How long have you been in coal mining?	_____	_____	_____	_____	_____	_____	_____	(54)
3. How long have you worked for this company?	_____	_____	_____	_____	_____	_____	_____	(55)
4. How long have you worked in this mine?	_____	_____	_____	_____	_____	_____	_____	(56)
5. A. Are you a certified miner?			_____ Yes		_____ No			(57)
B. IF NO, were you previously a certified miner?			_____ Yes		_____ No			(58)
6. A. Have you had special instruction or training specifically in safety?			_____ Yes		_____ No			
B. IF YES, please specify.	_____ _____ _____ _____							

APPENDIX F
MANAGEMENT SURVEY

OMB No. 68-S 72047
Expires 6-30-75

NATIONAL SAFETY AND HEALTH SURVEY

Management Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

SAFETY AND HEALTH QUESTIONNAIRE

Instructions

The Westinghouse Behavioral Safety Center is doing work with the National Institute for Occupational Safety and Health in finding out what miners think about a number of topics having to do with safety and health in the mine. Your name will not be used in this survey so you don't need to be afraid to say exactly what you think. Only averages of answers will be shown in our report. The questionnaire should take you just a little more than a half hour to complete, and the time you spend will be a tremendous help to us in trying to make mines a safer place to work.

The following questionnaire includes a number of different kinds of questions. One kind of item has a main question which you read first and a number of different alternatives underneath the main question. To record your answers circle the "X" to the right of each alternative under the column heading which best shows your opinion.

Example

How much do the following things keep you from seeing well while working in the mine?

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>
a. safety glasses	x	x	x
b. dust	x	x	x

If safety glasses were a big problem in keeping you from seeing well, you would circle the "X" under the heading, "A Lot". If safety glasses hindered your vision some, but not a lot, you would circle the "X" under the heading, "Some". If safety glasses did not hinder your vision much as all, you would circle the "X" under the heading, "Not Much". After answering the question for the first alternative, you would go on and answer it for all of the rest of the alternatives. For

example, you would next answer about how much dust kept you from seeing well.

Following some of these questions are boxes with special directions in them. Please read the directions and do as they direct.

The other kinds of questions are short answer types accompanied by separate directions for each. Please read the directions and follow them in answering these questions.

Please ignore the numbers in parentheses "()"; these numbers are for later use in computer analysis.

1. How good has miner training been in...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	
	<u>Poor</u>	<u>Fair</u>	<u>Good</u>	<u>Excel- lent</u>	
a. how the mining machinery works? . . .	x	x	x	x	(1;9)
b. how the electrical power system works?	x	x	x	x	(10)
c. using safety and health equip- ment?	x	x	x	x	(11)
d. handling physical features of the mine (such as type of top, general layout, etc.)?	x	x	x	x	(12)
e. dealing with hazards such as gases, coal dust, noise, etc.? . .	x	x	x	x	(13)
f. how to use the tools and equipment?	x	x	x	x	(14)
g. requirements of the coal mine safety act?	x	x	x	x	(15)
h. first aid procedures and techniques?	x	x	x	x	(16)
i. locating escape routes?	x	x	x	x	(17)
j. mine rescue procedures and techniques?	x	x	x	x	(18)
k. how to report potential dangers and hazards?	x	x	x	x	(19)

Now go back through question 1 and circle the letters of the three statements that you think describe the most important things a miner should know.

Value

(20-21)

(22-23)

(24-25)

2. How important from the company's point of view are each of the following in your mine?

(Circle ONE "X" for EACH statement)

	(1) Not Import- tant	(2) Slight- ly Import- tant	(3) Moder- ately Import- tant	(4) Very Import- tant	
a. keeping good safety records . . .	x	x	x	x	(26)
b. correcting safety hazards in the mine	x	x	x	x	(27)
c. having miners not take chances	x	x	x	x	(28)
d. having miners participate in decisions involving safety	x	x	x	x	(29)
e. having miners wear pro- tective equipment	x	x	x	x	(30)
f. having miners get physical examinations	x	x	x	x	(31)
g. checking for gas in the mine . .	x	x	x	x	(32)
h. making sure mine walls are rock dusted	x	x	x	x	(33)
i. keeping miners' satisfied in their jobs	x	x	x	x	(34)
j. assuring miners' security . . .	x	x	x	x	(35)
k. having competition among work crews	x	x	x	x	(36)
l. having miners report safety hazards	x	x	x	x	(37)
m. getting coal out regardless of safety	x	x	x	x	(38)
n. having miners get black lung examinations	x	x	x	x	(39)
o. upholding the company safety record	x	x	x	x	(40)

3. In this mine...

(Circle ONE "X" for EACH Statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do miners get along with each other?	x	x	x	x	x	(41)
b. do miners discuss work- related issues?	x	x	x	x	x	(42)
c. are miners able to de- pend on each other?	x	x	x	x	x	(43)
d. do miners horse around? .	x	x	x	x	x	(44)
e. do miners leave the work- place ready ("shaped up") for the next crew?	x	x	x	x	x	(45)
f. do work crews try to outdo other crews?	x	x	x	x	x	(46)
g. do miners get mad if a miner takes risks?	x	x	x	x	x	(47)
h. do miners spend time with each other after work?	x	x	x	x	x	(48)
i. do miners get mad if a miner works too slow? .	x	x	x	x	x	(49)
j. do miners get mad if a miner works too fast? . .	x	x	x	x	x	(50)
k. do miners complain about safety?	x	x	x	x	x	(51)
l. do miners report small accidents?	x	x	x	x	x	(52)

4. Are any of the following items major problems within this mine?
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. too much absenteeism	☒	☒	☒	(53)
b. too high job turnover	☒	☒	☒	(54)
c. too low worker productivity	☒	☒	☒	(55)
d. poor safety training	☒	☒	☒	(56)
e. poor job training	☒	☒	☒	(57)
f. lack of management training	☒	☒	☒	(58)
g. too many labor problems	☒	☒	☒	(59)
h. trouble with safety and health laws . . .	☒	☒	☒	(60)
i. too many accidents	☒	☒	☒	(61)
j. poor equipment maintenance	☒	☒	☒	(62)
k. bad public image	☒	☒	☒	(63)
l. other (specify) _____	☒	☒	☒	(64)

Now go back through question #4 and circle the letters in front of the 2 statements which you feel describe the most serious problems facing your mine.

Value

(65-66)

(67-68)

5. IF YOUR MINE IS UNIONIZED, to what extent does the union...
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u> <u>Extent</u>	(3) <u>Great</u> <u>Extent</u>	
a. set up safety and health training programs?	x	x	x	(69)
b. take care of injured miners and their families?	x	x	x	(70)
c. have the safety committee recheck after the foreman's safety inspection? .	x	x	x	(71)
d. bargain with management for safer and healthier mines?	x	x	x	(72)
e. provide safety and health information to the miners?	x	x	x	(73)
f. check to see if miners and their families receive adequate medical care? . .	x	x	x	(74)
g. discuss safety and health topics in union meetings?	x	x	x	(75)
h. encourage men with health problems to shift to less dusty jobs?	x	x	x	(76)
i. provide legal help in black lung and compensation claims?	x	x	x	(77)
j. put pressure on the company to provide a safe mine?	x	x	x	(78)

6. Do Bureau of Mines inspectors...
(Circle ONE "X" for EACH statement)

	(1) <u>No</u>	(2) <u>Unsure</u>	(3) <u>Yes</u>	
a. make careful, thorough inspections? . .	x	x	x	(79)
b. make enough inspections in your mine?	x	x	x	(80)
c. worry too much about things that do not matter?	x	x	x	(2; 9)
d. ignore dangerous conditions?	x	x	x	(10)
e. have enough experience or training to be good inspectors?	x	x	x	(11)
f. enforce regulations and penalize violations?	x	x	x	(12)
g. forewarn mines of their inspection schedules?	x	x	x	(13)

Now go back through question #6 and circle the letters of the statements that describe state mining inspectors.

7. Who makes the most inspections? (Check ONE)

a. state government _____

(21)

b. federal government _____

8. How often do miners in this mine . . .
(Circle ONE "X" for EACH statement)

	<u>Almost Never</u>	<u>Sel- dom</u>	<u>Some- times</u>	<u>Often</u>	<u>Almost Always</u>	
a. wear safety glasses?	x	x	x	x	x	(22)
b. stop other miners from doing unsafe things?	x	x	x	x	x	(23)
c. talk up safety within the work crew?	x	x	x	x	x	(24)
d. clean up the work area? . . .	x	x	x	x	x	(25)
e. work under unsupported roof?	x	x	x	x	x	(26)
f. take chances or cut corners?	x	x	x	x	x	(27)
g. report safety and health hazards to the safety committee?	x	x	x	x	x	(28)
h. report safety and health hazards to the foreman? . . .	x	x	x	x	x	(29)
i. refuse to work under unsafe conditions?	x	x	x	x	x	(30)
j. smoke in the mine?	x	x	x	x	x	(31)
k. wear a respirator?	x	x	x	x	x	(32)
l. take part in the government chest x-ray program?	x	x	x	x	x	(33)
m. go to the doctor when sick?	x	x	x	x	x	(34)
n. go to work even when feeling bad?	x	x	x	x	x	(35)
o. bridge the circuit breaker when a circuit overloads? . .	x	x	x	x	x	(36)
p. report safety and health hazards to the next shift? . .	x	x	x	x	x	(37)
q. check to see whether re- ported safety hazards have been improved?	x	x	x	x	x	(38)

9. How often do miners in this mine have to . . .

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. do the same things many times a day?	x	x	x	x	x	(39)
b. work very fast?	x	x	x	x	x	(40)
c. work very hard?	x	x	x	x	x	(41)
d. think a lot?	x	x	x	x	x	(42)
e. do a lot of things at the same time?	x	x	x	x	x	(43)
f. work alone?	x	x	x	x	x	(44)
g. work with new inexper- ienced men?	x	x	x	x	x	(45)
h. look out for the safety of other miners?	x	x	x	x	x	(46)
i. answer to more than one person?	x	x	x	x	x	(47)
j. do a lot of different kinds of work?	x	x	x	x	x	(48)
k. work without clear-cut duties?	x	x	x	x	x	(49)
l. take care of absentees' jobs?	x	x	x	x	x	(50)
m. work at jobs they do not like?	x	x	x	x	x	(51)

10. How often do foremen in this company...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
a. get angry when miners have job problems or questions?	x	x	x	x	x	(52)
b. allow miners to work at their own speed?	x	x	x	x	x	(53)
c. ask miners to do things which are against miners' better judgements?	x	x	x	x	x	(54)
d. make mistakes?	x	x	x	x	x	(55)
e. have disagreements with miners about safety procedures?	x	x	x	x	x	(56)
f. make miners afraid to point out hazards to the safety committee?	x	x	x	x	x	(57)
g. give miners a pat on the back when they follow safety procedures?	x	x	x	x	x	(58)
h. allow men to work in unsafe conditions?	x	x	x	x	x	(59)
i. turn in an inaccurate safety report (such as dust levels)?	x	x	x	x	x	(60)
j. play favorites?	x	x	x	x	x	(61)
k. review each accident with individual miners?	x	x	x	x	x	(62)
l. wear their respirators in dusty conditions?	x	x	x	x	x	(63)
m. remind miners of safety and health practices?	x	x	x	x	x	(64)
n. get mad when workers miss too many days?	x	x	x	x	x	(65)
o. check closely to make sure that the men are working?	x	x	x	x	x	(66)
p. allow miners to work on their own?	x	x	x	x	x	(67)

10. (Continued)

How often do foremen in this company...

(Circle ONE "X" for EACH statement)

	(1) <u>Almost Never</u>	(2) <u>Sel- dom</u>	(3) <u>Some- times</u>	(4) <u>Often</u>	(5) <u>Almost Always</u>	
q. cut corners on safety? . .	x	x	x	x	x	(68)
r. let miners know what's expected of them?	x	x	x	x	x	(69)
s. plan work poorly?	x	x	x	x	x	(70)
t. give a pat on the back to the man who cuts corners?	x	x	x	x	x	(71)
u. push hard for production?.	x	x	x	x	x	(72)
v. show real concern for worker's welfare? : . . .	x	x	x	x	x	(73)
w. lie to crews?	x	x	x	x	x	(74)
x. not use safety procedures because production is slowed up (such as water slowing down continuous mining process)?	x	x	x	x	x	(75)

11. To what extent is each of the following items a reason why miners might not use safety and health equipment?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u>	(2) <u>Some Extent</u>	(3) <u>Great Extent</u>	
a. it is difficult to get	x	x	x	(76)
b. it is poorly maintained	x	x	x	(77)
c. it is uncomfortable to use	x	x	x	(78)
d. lack of training	x	x	x	(79)
e. ailments from use (such as rashes from respirators).	x	x	x	(80)
f. other miners make fun of them	x	x	x	(3; 9)
g. it isn't any good	x	x	x	(10)
h. it gets in the way of working	x	x	x	(11)
i. company or foreman attitudes	x	x	x	(12)
j. it makes the job more dangerous than before	x	x	x	(13)
k. no need for it	x	x	x	(14)

12. When safety procedures and policies are not followed, who do you think is most responsible (place a 1 by this item), who do you think is next most responsible (place a 2 by that item)?

a. the foreman	_____	(15-16)
b. mine management	_____	
c. the work crew (its influence on the worker)	_____	
d. the worker	_____	
e. the safety committee	_____	
f. the company engineers	_____	
g. the safety director	_____	

13. How much are any of the following related to accidents in this mine?
(Circle ONE "X" for EACH statement)

	<u>Not Much</u>	<u>Some</u>	<u>A Lot</u>	
a. dust	x	x	x	(17)
b. gas	x	x	x	(18)
c. noise	x	x	x	(19)
d. lighting	x	x	x	(20)
e. company policy	x	x	x	(21)
f. cramped working conditions	x	x	x	(22)
g. seam height	x	x	x	(23)
h. "Acts of God"	x	x	x	(24)
i. rib rolls	x	x	x	(25)
j. layout of the mine	x	x	x	(26)
k. worker attitude	x	x	x	(27)
l. foremen	x	x	x	(28)
m. bad top	x	x	x	(29)
n. faulty equipment	x	x	x	(30)
o. human error	x	x	x	(31)
p. water	x	x	x	(32)
q. driving in	x	x	x	(33)
r. retreating	x	x	x	(34)

14. How many miners in this mine do you think...
(Circle ONE "X" for EACH statement)

	(1) <u>Almost None</u>	(2) <u>Some</u>	(3) <u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(35)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(36)
c. feel accidents are not caused they just happen?	x	x	x	(37)
d. talk a lot about accidents they have had?	x	x	x	(38)
e. are superstitious?	x	x	x	(39)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(40)
g. have dreams and nightmares about getting hurt?	x	x	x	(41)
h. worry a lot about accidents?	x	x	x	(42)
i. are nervous while they are working? . .	x	x	x	(43)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(44)
k. never talk to their families about dangers and accidents?	x	x	x	(45)
l. really enjoy working in the mines? . .	x	x	x	(46)
m. are afraid of losing their jobs? . . .	x	x	x	(47)
n. need a few drinks to relax after work?	x	x	x	(48)
o. feel they cannot trust management? . .	x	x	x	(49)
p. feel they cannot trust mine inspectors?	x	x	x	(50)
q. wish they had never gone into the mines?	x	x	x	(51)
r. do not want their sons to go into the mines?	x	x	x	(52)
s. take a lot of time off?	x	x	x	(53)

15. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine you work in at present? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(54-55)

16. In this company what is the general attitude of management toward miners? (Circle the word which best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(56)

17. Why do you think miners might not use available health programs (such as the Federal X-ray program)? (Circle any letters that apply)

- a. doctors are too hard to get to
 - b. you have to wait too long to see doctors
 - c. X-rays may be used to get rid of miners with black lung
 - d. doctors talk so you cannot understand them
 - e. health care is too expensive
 - f. doctors might put you in the hospital
 - g. government X-ray programs aren't any good
 - h. hospital facilities aren't adequate
 - i. doctors don't know what they're doing anyway
 - j. other (please describe) _____
- _____

(57-67)

18. Which of the following would you say describes your company best?
(Check ONE space)

- a. the company puts production over safety (68)
- b. the company puts safety over production
- c. the company gives both safety and production equal importance
- d. the company pays almost no attention to safety
- e. the company pays almost no attention to production

19. Who do you think has the most influence on a worker's safety behavior?
(Check ONE space)

- a. the foreman (69)
- b. mine management
- c. the work crew (its influence on the worker)
- d. the worker
- e. the safety committee
- f. the company engineers

20. How necessary is each of the following for a miner's personal well-being on the job?
(Circle ONE "X" for EACH statement)

	(1) Not Neces- sary	(2) Some- what Neces- sary	(3) Very Neces- sary	
a. hard hat	x	x	x	(70)
b. gloves	x	x	x	(71)
c. hard toe shoes	x	x	x	(72)
d. safety glasses	x	x	x	(73)
e. respirator	x	x	x	(74)
f. ear protectors	x	x	x	(75)
g. methane detector	x	x	x	(76)
h. dust sampler	x	x	x	(77)
i. fire extinguishers	x	x	x	(78)
j. self rescuer	x	x	x	(79)
k. more lighting equipment	x	x	x	(80)
l. garters for pants legs	x	x	x	(4; 9)
m. sounding device to test roof . . .	x	x	x	(10)
n. other (specify) _____	x	x	x	(11)

21. How much do you feel that miners' jobs give them a chance to . . .
(Circle ONE "X" for EACH statement)

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. use their ability?	X	X	X	(12)
b. do challenging work?	X	X	X	(13)
c. do interesting work?	X	X	X	(14)
d. do a variety of things?	X	X	X	(15)
e. feel that they are getting things done? . . .	X	X	X	(16)
f. learn new things?	X	X	X	(17)
g. do important work?	X	X	X	(18)
h. make important decisions?	X	X	X	(19)
i. advance or get ahead?	X	X	X	(20)

22. Who has the most important decision-making responsibility for the following things in your mine?

a. setting production goals	_____	(21-22)
b. making safety inspections	_____	(23-24)
c. approving or disapproving equipment purchases	_____	(25-26)
d. shifting workers to less hazardous or healthier jobs	_____	(27-28)
e. planning and organizing work	_____	(29-30)
f. work crew safety	_____	(31-32)

23. How important is each of the following to miners?

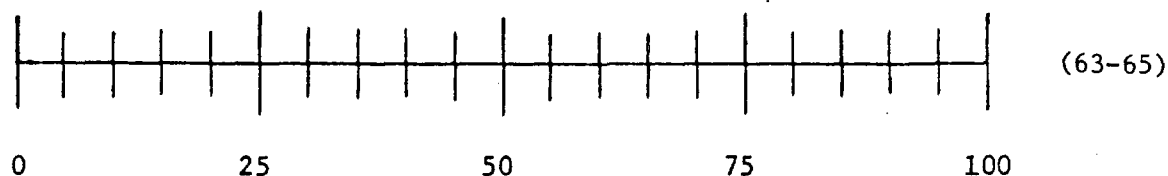
(Circle ONE "X" for EACH statement)

	(1) <u>Not Impor- tant</u>	(2) <u>Slight- ly Impor- tant</u>	(3) <u>Moder- ately Impor- tant</u>	(4) <u>Very Impor- tant</u>	
a. a good safety record for the crew	x	x	x	x	(33)
b. learning escape routes	x	x	x	x	(34)
c. the company safety record . .	x	x	x	x	(35)
d. reporting safety hazards . . .	x	x	x	x	(36)
e. not taking chances	x	x	x	x	(37)
f. correcting safety and health hazards	x	x	x	x	(38)
g. participating in decision making	x	x	x	x	(39)
h. getting coal out regardless of safety	x	x	x	x	(40)
i. moving to a less dusty job . .	x	x	x	x	(41)
j. wearing protective equip- ment	x	x	x	x	(42)
k. having black lung exami- nations	x	x	x	x	(43)
l. checking for gas in the mine .	x	x	x	x	(44)
m. making sure sections are rockdusted	x	x	x	x	(45)
n. family life	x	x	x	x	(46)
o. job security	x	x	x	x	(47)
p. satisfaction with their job	x	x	x	x	(48)
q. producing as much as other crews	x	x	x	x	(49)
r. having physical exami- nations	x	x	x	x	(50)

24. How much are accidents in this mine caused by the miners...
(Circle ONE "X" for EACH statement).

	(1) <u>Not</u> <u>Much</u>	(2) <u>Some</u>	(3) <u>A Lot</u>	
a. worrying and being nervous about accidents?	x	x	x	(51)
b. just being careless and not following safety rules?	x	x	x	(52)
c. being afraid of losing their job? . . .	x	x	x	(53)
d. thinking about problems with their children?	x	x	x	(54)
e. worrying about debts?	x	x	x	(55)
f. being upset about marriage problems? . .	x	x	x	(56)
g. bad health and feeling bad?	x	x	x	(57)
h. being very tired or sleepy?	x	x	x	(58)
i. hurrying to begin a vacation?	x	x	x	(59)
j. worrying about future health problems? .	x	x	x	(60)
k. just not giving a damn?	x	x	x	(61)
l. not using good common sense and judgement?	x	x	x	(62)

25. What percentage of the safety director's time is spent in the mine?
(Mark the scale with an X)



26. How much government pressure (State and/or Federal) does this company receive concerning compliance with the Coal Mine Safety Act in the following areas?

(Circle ONE "X" for EACH statement)

	(1) <u>Not Much</u> <u>Pressure</u>	(2) <u>Some</u> <u>Pressure</u>	(3) <u>Great Deal</u> <u>of Pressure</u>	
a. training	x	x	x	(66)
b. protective equipment (personal) . .	x	x	x	(67)
c. safety procedures and precautions . .	x	x	x	(68)
d. equipment design and safeguards . . .	x	x	x	(69)
e. inspections	x	x	x	(70)
f. updating certifications	x	x	x	(71)

27. Which do you think exerts the greatest pressure? (Check ONE)

- a. State Government _____ (72)
- b. Federal Government _____

28. What is the general attitude of miners toward this company?
(Circle the appropriate word)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(73)

29. Do you feel that the miners' family and/or the outside community can have a beneficial effect on worker safety performance? (Check ONE)

- a. Yes _____ (74)
- b. No _____

30. What is the approximate percentage of the total operational budget in your mine that is ear-marked for safety?
(Check only ONE)

- a. no money specifically ear-marked for safety _____ (75)
- b. less than one percent _____
- c. between one and three percent _____
- d. more than three percent but less than five percent _____
- e. between five percent and ten percent _____
- f. more than ten percent _____

31. What disciplinary actions are taken against workers who do not use required protective devices?
(Check as many as apply)

- a. verbal reprimand _____ (76-80, 5, 9-11)
- b. written reprimand _____
- c. fines _____
- d. "demerits" which can be applied toward dismissal _____
- e. "demerits" which will hinder raises _____
- f. "demerits" leading to denial of rewards _____
- g. reassignment to a less desirable job _____
- h. none _____
- i. other (specify) _____

32. Some "experts" say miners are fatalistic when it comes to coal mine safety, that is they show little safety consciousness because they believe that accidents are out of their hands, that when their "number" is up it is simply up, etc. Do you agree? Please Explain:

33. Do you believe miners are resistant to new safety procedures and ideas? If yes, why and what can be done about it? (Fill in)

34. Do you believe miners are really interested in safety or do they use safety as a bargaining tool? Explain. (Fill in)

Background Information

1. What is your date of birth? Month _____ Day _____ Year _____ (12-17)

Please check ONE space for EACH of the following questions:

	(1) <u>Less</u> <u>than</u> <u>1 year</u>	(2) <u>1-2</u> <u>years</u>	(3) <u>3-5</u> <u>years</u>	(4) <u>6-9</u> <u>years</u>	(5) <u>10-19</u> <u>years</u>	(6) <u>20-29</u> <u>years</u>	(7) <u>30 or</u> <u>more</u> <u>years</u>	
2. How long have you been in coal mining?	_____	_____	_____	_____	_____	_____	_____	(18)
3. How long have you been with this company?	_____	_____	_____	_____	_____	_____	_____	(19)
4. How long have you been in this position?	_____	_____	_____	_____	_____	_____	_____	(20)
5. All told how many years have you been in a bosses position?	_____	_____	_____	_____	_____	_____	_____	(21)
6. What was your total household yearly income in 1974?								
a. less than \$3,000	_____							(22)
b. \$3,000 to \$5,999	_____							
c. \$6,000 to \$8,999	_____							
d. \$9,000 to \$11,999	_____							
e. \$12,000 to \$14,999	_____							
f. \$15,000 to \$17,999	_____							
g. \$18,000 to \$20,999	_____							
h. \$21,000 to \$23,999	_____							
i. \$24,000 to \$26,999	_____							
j. \$27,000 and up	_____							

Please check ONE space for EACH of the following questions:

7. At what level did you finish school?

- a. 6th grade or less _____
- b. 7-9th grade _____
- c. 10-12th grade _____
- d. technical school (such as army training) _____
- e. high school graduate _____
- f. attended college or technical school _____
- g. college or technical school graduate _____

(23)

APPENDIX G
MINERS' WIVES SURVEY

NATIONAL SAFETY AND HEALTH SURVEY

Miners' Wives Survey



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
U.S. POST OFFICE AND COURTHOUSE
CINCINNATI, OHIO 45202

Dear Respondent:

The National Institute for Occupational Safety and Health is interested in American workers. We are concerned with the type of work they do, the problems they face, their feelings about their job and the effect of work on their health and well-being. The aim of this study is to obtain an idea of how to improve the conditions of work.

Answers to all questions on the attached questionnaire are voluntary and anonymous. We are not asking for your name because we are interested in the answers to these questions from many workers, not just one person, so please answer honestly. Feel free to add comments in the margins or at the end of the questionnaire.

We are grateful for your assistance.

Sincerely yours,

William H. Kroes

William H. Kroes, Ph.D.
Chief, Stress Research
Section

WIVES QUESTIONNAIRE

PLEASE CHECK THE APPROPRIATE ANSWER(S) TO THE FOLLOWING QUESTIONS

1. How long have you been married?

- a. less than 1 year _____
- b. 1-2 years _____
- c. 3-5 years _____
- d. 6-10 years _____
- e. 11-15 years _____
- f. 16-20 years _____
- g. more than 20 years _____

(1;9)

2. How long has your husband been a miner?

- a. less than 1 year _____
- b. 1-2 years _____
- c. 3-5 years _____
- d. 6-10 years _____
- e. 11-15 years _____
- f. 16-20 years _____
- g. more than 20 years _____

(10)

3. Was your husband already working in a mine when you were married?

- a. yes _____
- b. no _____

(11)

4. In your parent's family, who has been a miner?

- a. brothers _____
- b. father _____
- c. grandfather _____
- d. great grandfather _____
- e. uncle _____
- f. none _____

(12-16)

PLEASE CHECK THE APPROPRIATE ANSWER(S) TO THE FOLLOWING QUESTIONS

5. How many hours a day does your husband spend at the mine (including the time it takes him to get to and from work)?

- a. less than 8 hours _____
- b. 8-9 hours _____
- c. 10-11 hours _____
- d. 12-13 hours _____
- e. 14-15 hours _____
- f. 16-17 hours _____

(17)

6. How many children do you have? (Please place the ages of boys and girls, from oldest to youngest, in the spaces provided below)

No children _____

	<u>Age</u>		<u>Age</u>
1. girl	_____	1. boy	_____
2. girl	_____	2. boy	_____
3. girl	_____	3. boy	_____
4. girl	_____	4. boy	_____
5. girl	_____	5. boy	_____

(18-49)

7. Would you like for your son(s) to...

- a. work in the mining industry _____
- b. not work in the mining industry _____

(50)

8. Which area do you think your son(s) will go into?

- a. working in the mining industry _____
- b. working outside of mining _____

(51)

9. Would you like for your child (children) to marry miner(s)?

- a. yes _____
- b. no _____

(52)

10. Overall, how do you think your husband feels about his job?

- a. extremely dissatisfied _____
- b. dissatisfied _____
- c. neither satisfied nor dissatisfied _____
- d. satisfied _____
- e. extremely satisfied _____

(53)

PLEASE CHECK THE APPROPRIATE ANSWER(S) TO THE FOLLOWING QUESTIONS

11. How safe is the mine your husband works in?

- a. very safe _____
 b. somewhat safe _____
 c. not very safe _____

(54)

12. What is your husband's particular job in the mine? (Fill in)

(55-56)

13. How often is your husband bothered by...
 (Circle ONE "X" for EACH statement)

	<u>Almost Never</u>	<u>Sel- dom</u>	<u>Some- times</u>	<u>Often</u>	<u>Almost Always</u>	
a. skin rashes	x	x	x	x	x	(57)
b. shaking of any kind	x	x	x	x	x	(58)
c. backaches	x	x	x	x	x	(59)
d. colds or flu	x	x	x	x	x	(60)
e. trouble seeing	x	x	x	x	x	(61)
f. trouble hearing	x	x	x	x	x	(62)
g. trouble with his teeth	x	x	x	x	x	(63)
h. breathing trouble	x	x	x	x	x	(64)
i. coughing problems	x	x	x	x	x	(65)
j. bad scrapes and burns	x	x	x	x	x	(66)
k. trouble sleeping	x	x	x	x	x	(67)
l. headaches	x	x	x	x	x	(68)
m. being tired and rundown	x	x	x	x	x	(69)
n. worries	x	x	x	x	x	(70)
o. being unhappy alot	x	x	x	x	x	(71)
p. other (specify) _____	x	x	x	x	x	(72)

13. Please circle the "X" beside any of these illnesses if your husband has had them in the past year.

For the alternatives you circled, please go back and answer the following questions: Please circle the "X" in the column if the answer to the question is yes.

		Was this diagnosed by a doctor?	Was this caused or made more severe by his job?	Has he taken any medication for this in the past year?	
Hay Fever	x	x	x	x	(73-80)
Swelling in the throat or sudden weight gain (thy- roid trouble or goiter)	x	x	x	x	(2;9-56)
Rheumatism (trouble with joints)	x	x	x	x	
High blood pressure	x	x	x	x	
Diabetes (sugar)	x	x	x	x	
Stomach trouble (ulcers)	x	x	x	x	
A stroke	x	x	x	x	
Cancer (tumors)	x	x	x	x	
Hernia or rupture	x	x	x	x	
Heart trouble	x	x	x	x	
Gallbladder trouble	x	x	x	x	
Kidney trouble	x	x	x	x	
Fits (epilepsy)	x	x	x	x	
Nerves	x	x	x	x	

14. Is your husband missing any...

Yes No

a. fingers

(57-59)

b. arm

c. leg

15. How often does your husband use...
(Circle ONE "X" for EACH statement)

	(4) Every- day	(3) More Than Once A Week	(2) Once A Week	(1) Less Than Once A Week	
a. aspirin or headache medi- cine	x	x	x	x	(60)
b. antacids	x	x	x	x	(61)
c. laxatives	x	x	x	x	(62)
d. cough and cold medicine . .	x	x	x	x	(63)

15. (Continued)

How often does your husband use...

(Circle ONE "X" for EACH statement)

	(4)	(3)	(2)	(1)	
	<u>Every-</u> <u>day</u>	<u>More Than</u> <u>Once A Week</u>	<u>Once</u> <u>A Week</u>	<u>Less Than</u> <u>Once A Week</u>	
e. medication to give him pep	x	x	x	x	(64)
f. throat lozenges and cough drops	x	x	x	x	(65)
g. sleeping pills	x	x	x	x	(66)
h. tranquilizers	x	x	x	x	(67)
i. cigarettes	x	x	x	x	(68)
j. other tobacco	x	x	x	x	(69)
k. alcohol (e.g. beer, wine liquor)	x	x	x	x	(70)
l. other medicines (specify). .	x	x	x	x	(71)

How often are you bothered by...

(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	(4)	(5)	
	<u>Almost</u> <u>Never</u>	<u>Sel-</u> <u>dom</u>	<u>Some-</u> <u>times</u>	<u>Often</u>	<u>Almost</u> <u>Always</u>	
a. nervous stomach	x	x	x	x	x	(72)
b. sleeping trouble	x	x	x	x	x	(73)
c. worries	x	x	x	x	x	(74)
d. being tired and rundown . .	x	x	x	x	x	(75)
e. being unhappy a lot	x	x	x	x	x	(76)
f. headaches	x	x	x	x	x	(77)
g. backaches	x	x	x	x	x	(78)
h. trouble breathing	x	x	x	x	x	(79)
i. female troubles	x	x	x	x	x	(80)
j. other (specify) _____	x	x	x	x	x	(3;9)

17. Why do you think miners might not use available health programs (such as the Federal X-ray program)?
(Circle any letters that apply)

- a. doctors are too hard to get to
- b. you have to wait too long to see doctors
- c. X-rays may be used to get rid of miners with black lung (10-19)
- d. doctors talk so you cannot understand them
- e. health care is too expensive
- f. doctors might put you in the hospital
- g. government X-ray programs aren't any good
- h. hospital facilities aren't adequate
- i. doctors don't know what they're doing anyway
- j. other (please describe) _____

18. How satisfied are you with your husband's job as far as...
(Circle ONE "X" for EACH statement) (3) (2) (1)

	(3)	(2)	(1)	
	<u>Satisfied</u>	Neither Satisfied Nor Dis- <u>satisfied</u>	<u>Dissatisfied</u>	
a. pay?	x	x	x	(20)
b. his safety in the mine? .	x	x	x	(21)
c. its effects on his health?	x	x	x	(22)
d. vacation?	x	x	x	(23)
e. other benefits?	x	x	x	(24)
f. future family security?	x	x	x	(25)
g. the social life it provides?	x	x	x	(26)

19. Here is a list of things which people may like about their jobs. Which of these does your husband like about his work?
(Check all those that apply)

- a. type of work _____
- b. chance to work with friends _____
- c. wages _____
- d. steady work _____
- e. hours of work _____
- f. physical conditions of work _____
- g. independence _____
- h. chance to get ahead _____
- i. security _____

(27-35)

Which of the things checked in question #19 does your husband like the most? Place a "1" after the most liked, a "2" after the second most liked, and a "3" after the third most liked.

(36-38)

20. Here are some other things people may like about work. Are any of these liked by your husband?
(Check all those that apply)

- a. what people think of persons doing this
type of work _____
- b. not too much pressure to get things done _____
- c. good benefits like vacation and medical
care _____
- d. trust shown by boss _____
- e. good boss to work for _____
- f. holding a responsible position _____
- g. chance to do things a person really knows
well _____
- h. friendly people to work with _____
- i. other (specify) _____

(39)

(40)

(41)

(42)

(43)

(44)

(45)

(46)

(47)

Which of the things checked in question #20 does your husband like the most? Place a "1" after the most liked, a "2" after the second most liked, and a "3" after the third most liked.

(48-50)

CONCERNING YOUR HUSBAND:

21. How often is there a lot of pressure or tension involved in his job?
(Check ONE space)

- a. all the time _____
- b. often _____
- c. sometimes _____
- d. seldom _____
- e. never _____

(51)

22. How would you say that his job affects his physical health? Would you
say this makes it better, worse, or has no effect?
(Check ONE space)

- a. better _____
- b. has no effect _____
- c. worse _____

(52)

23. How would you say that his job affects his nerves or outlook? Would you
say this makes it better, worse, or has no effect? (Check ONE space)

- a. better _____
- b. has no effect _____
- c. worse _____

(53)

24. If he had his choice of jobs, or could do the kind of work he really wanted
to do, what would it be?

(54-55)

(specific occupation)

25. Have any of the following kept him from getting the job mentioned in question #24? (Check as many that apply)

- a. lack of education _____
- b. family responsibilities (past as well as present) _____
- c. health _____
- d. racial prejudice _____
- e. need training/skills _____
- f. not enough jobs _____
- g. present job security _____
- h. friendship with the people he works with _____
- i. financial reasons _____
- j. other (specify) _____

(56-66)

26. What one or two things does your husband dislike most about the job he has now? (Fill in)

- a. _____
- b. _____

27. Do you normally think of your husband's work as being dangerous or hazardous?
(Check ONE space)

- a. yes _____
- b. no _____

(67)

28. IF NO, are any of the following reasons why you consider his job safe?
(Check all those that apply)

- a. because of the safety rules and laws _____
- b. safety programs _____
- c. facilities and equipment are safe _____
- d. physical environment is safe _____
- e. husband's carefulness _____
- f. the job is basically safe _____
- g. other (specify) _____

(68-74)

29. IF YES, are any of the following reasons why you consider it dangerous?
(Check all those that apply)

- a. company workers are careless _____
- b. management's neglect _____
- c. equipment and facilities are unmaintained _____
- d. lack of training for miners _____
- e. laws are no good _____
- f. other (specify) _____

(75-80)

30. In your opinion, what should be done to make the work safer?
(training; laws; inspections; other) (Please write in)

31. To what extent do you think that most accidents in the mines...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	Not Much	To Some Extent	To A Great Extent	
a. could be prevented?	x	x	x	(4;9)
b. happen by chance?	x	x	x	(10)
c. happen because of company policies? .	x	x	x	(11)
d. happen because of bad equipment? . .	x	x	x	(12)
e. happen because of men worrying about personal problems?	x	x	x	(13)
f. happen because of people's mistakes?	x	x	x	(14)

32. How big a problem for miners' wives are the following?
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Not Much of A Problem At All</u>	<u>Somewhat of a Problem</u>	<u>Big Problem</u>	
a. worry about husband's safety . .	x	x	x	(15)
b. worry about husband losing his job	x	x	x	(16)
c. husband having health problems	x	x	x	(17)
d. dirt and grime on the job . . .	x	x	x	(18)
e. wife having to take lots of responsibility for house and children	x	x	x	(19)
f. living conditions in a mining area	x	x	x	(20)
g. the ideas other people have about miners	x	x	x	(21)

33. How many miners in your husband's mine do you think...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Almost None</u>	<u>Some</u>	<u>A Great Many</u>	
a. are afraid of working underground . . .	x	x	x	(22)
b. have warnings or premonitions (signs) of accidents and fatalities?	x	x	x	(23)
c. feel accidents are not caused they just happen?	x	x	x	(24)
d. talk a lot about accidents they have had?	x	x	x	(25)
e. are superstitious?	x	x	x	(26)
f. tend to be very religious and pray for safe keeping in the mine?	x	x	x	(27)
g. have dreams and nightmares about getting hurt?	x	x	x	(28)
h. worry a lot about accidents?	x	x	x	(29)
i. are nervous while they are working? . .	x	x	x	(30)
j. think more about the good things of mining rather than the bad things? . .	x	x	x	(31)

33. (Continued)

How many miners in your husband's mine do you think...
(Circle ONE "X" for EACH statement)

	(1)	(2)	(3)	
	<u>Almost None</u>	<u>Some</u>	<u>Many</u>	
k. never talk to their families about dangers and accidents?	x	x	x	(32)
l. really enjoy working in the mines? . .	x	x	x	(33)
m. are afraid of losing their jobs? . . .	x	x	x	(34)
n. need a few drinks to relax after work?	x	x	x	(35)
o. feel they cannot trust management? . .	x	x	x	(36)
p. feel they cannot trust mine inspectors?	x	x	x	(37)
q. wish they had never gone into the mines?	x	x	x	(38)
r. do not want their sons to go into the mines?	x	x	x	(39)
s. take a lot of time off?	x	x	x	(40)

34. Here is a ladder. Suppose the very safest mine is at the top and the most unsafe at the bottom. Where on the ladder is the mine where your husband works? Place an "X" in the space next to the correct number.

10	_____	Safest
9	_____	
8	_____	
7	_____	
6	_____	
5	_____	
4	_____	
3	_____	
2	_____	
1	_____	Most Unsafe

(41-42)

35. In your husband's company what is the general attitude of management toward miners?

(Circle the WORD that best describes their attitude)

(5)	(4)	(3)	(2)	(1)	
Very Good	Good	Indifferent	Bad	Very Bad	(43)

36. What is your birthdate? Month _____ Day ____ Year _____

(44-49)

APPENDIX H
INSTRUCTIONS FOR INTERVIEWERS

INSTRUCTIONS FOR INTERVIEWERS

Introduction

The Westinghouse Behavioral/Safety Center is a part of Westinghouse Electric Corporation. As you know, we are doing a national survey of coal miners' safety attitudes. We would like to thank you for your interest and welcome you as part of the project team.

This Interviewers' Guide gives you all the information you need to do the miner survey and the miners' wives survey. Separate sections of the guide will describe the project in general, your duties as an interview team, and the pay you will receive.

Description of the Project

This project is made up of two separate surveys. The first one will require the most effort on your part. We will call it the Westinghouse Survey. The second one we will call the NIOSH Survey.

The formal name for the Westinghouse survey is "Attitudinal and Motivational Factors Affecting Coal Miner Utilization of Safety and Health Practices". Westinghouse is doing the survey for the National Institute for Occupational Safety and Health (NIOSH). The purpose of this survey is to find out how miners feel about safety, and why they feel that way. Surveys will be given out at 30 mines in nine different states. At each mine, workers in many jobs will be surveyed. These are: mine superintendent; safety director; foremen; union officials; underground miners; and above

ground miners. In addition, miners' wives will be interviewed. This procedure will provide a good look at attitudes from many viewpoints.

Total results of the survey will be published in a final report. However, the names of the mines from which the information was collected will not be printed. Also, the names of miners filling out the surveys will not be revealed.

Management from a specific mine may request a summary of results of the survey from that mine. However, no information will be given to management concerning other mines by name. Management will not be told what any one miner said.

The NIOSH survey is a general job survey. It is about things that could be found in any job which affect a worker. This survey form has been used to survey workers in chemical factories, policemen, and other people.

Westinghouse Responsibilities

At Westinghouse, we have already done a number of things. First, surveys for each management and miner job were written. Second, 30 mines in nine states were selected. Third, permission to do the surveys at the mines was gotten. Fourth, interviews were held with the mine superintendent and safety director at each mine. Fifth, arrangements were made for you to do the miner survey. Sixth, miners at each mine have been chosen on a chance basis. They will get a letter before you begin your work.

In getting ready for your visit to the mine, we did the following things: 1) we explained your job as an interviewer to officials at the mine; 2) we looked at the room where you will

give the survey; 3) we talked to local union officials to let them know about the survey; 4) we asked for the names and addresses of mine workers in order to write letters to miners selected for the Westinghouse surveys.

Your Duties

It is your job to give Westinghouse surveys to five groups of people: 1) foremen, 2) underground miners, 3) above ground miners, 4) union officials, and 5) miners' wives. Separate survey forms have been written for each group. In addition, you have to give out the NIOSH survey to other miners who are not asked to fill out the Westinghouse survey. The steps you should follow are different for the Westinghouse survey and the NIOSH survey. Let's look at how you should give surveys to each group.

On the first day, you should go to see the safety director or other person listed on your mine information sheet. He will know you are coming and will show you the room you should use for giving the Westinghouse survey.

How to do the NIOSH Survey

On the first day you visit the mine, you will spend the time at shift breaks talking to the miners in the bathhouse telling them who you are, as well as when and where you will be giving the Westinghouse surveys. At this time you will meet men who are not going to be filling out the Westinghouse survey. Ask these men if they will take the NIOSH survey home, fill it out, put it in the envelope, and return it to you the next day.

Each time you go back to the mine, remind those men you have already given NIOSH surveys to return them to you. Get as many

men as you can to fill out the NIOSH survey. Remember, the NIOSH survey should be filled out at home. They should then bring the survey back to you.

How to do the Westinghouse Survey with Foremen

From the list of workers gotten from the mine, five foremen's names were picked on a chance basis. These five foremen were sent letters about the survey. They were told that you will be giving the survey, and the days you are supposed to be at the mine. You will be given their names. You should see these men the first day you are at the mine. At each shift break get as many as possible to sit in a group and fill out the Foremen Survey. You should meet them in the bathhouse and lead them to the room where you will be giving the survey. Once you're in the room, have the men take a seat. You will probably have a room with tables. If not, you'll have clipboards for the men to use. Once you have given out the surveys, read the instructions out loud to the men. Give them a chance to ask questions, if they have any. After you're sure they understand the instructions, let them write their own answers in the survey booklet. You must be there while they fill out the surveys in order to answer any questions they have about the items. Be sure each fills his survey out without talking about the answers with the other foremen. Tell the men to answer all the questions. When they're finished they should return the survey forms to you.

As the men start to fill out the surveys, some may have trouble reading the questions and filling in their answers.

Find out who is having trouble reading it and take them aside. You might have to read through the survey with them, question by question.

How to do the Westinghouse Survey with Miners

The miner group is the largest and most important survey group. The category of "miner" is broken down into three parts: 1) underground miners, 2) above ground miners, and 3) union officials. Separate survey forms have been made up for each of these.

You must try to get at least 6-10 above ground miners, 40 underground miners, and at least 2 union officials to fill out the survey form written for them.

As was said before, worker lists were gotten by Westinghouse from each mine. From these lists, underground and above ground miners were selected on a chance basis and written a letter about the project. They were told that you would be coming to the mine to give the surveys. They were told the days you are supposed to be at the mine. If your mine is a UMWA mine, a letter was enclosed from Mike Trbovich stating the union's backing of the project. These men were picked from all shifts. You will be given a list of the men who were sent the letter.

When you give the Westinghouse survey, you must get the men together in a group. This should be done starting the second day at the mine, since you will be busy giving out the NIOSH survey and giving the foreman survey on the first day. You must go to the mine before the break in shifts to be in the bathhouse when the men come out of the mine. While they're changing, find out

who has gotten a letter in the mail for the Westinghouse survey. Ask those men to come with you to fill out the survey.

Once you have talked with the men at the bathhouse and the men are finished changing, take the group of men you have gathered to the room where you will give the survey.

Once you're in the room, have the men take a seat. You will probably have a room with tables. If not, you will have clipboards for the men to use.

Ask the men to tell you if they are a union official, or an above ground worker, or an underground miner. Give each man the right survey form. Remember, each different job has a different survey. Once you have given out the surveys, read through the instructions out loud to the men. Give them a chance to ask questions, if they have any. After you're sure they understand the instructions, let them write their own answers in the survey booklet.

It is very important that each man fill out his own survey. You must not let the men talk about their answers with each other. If someone has a question about an item in the survey, he should ask you about it. Tell the men to answer all the questions. When they're finished, they should return the forms to you.

As the men start to fill out the surveys, some may have trouble reading the questions and filling in their answers. Find out who is having trouble reading it, and take them aside. You might have to read through the survey with them, question by question.

You will need to go back after each shift for several days until you have gotten as many men on the list as possible to fill out the Westinghouse survey.

How to do the Westinghouse Survey with Miners's Wives

When you are giving the survey at the mine, ask if any of the underground miners would let your wife (or the other woman who is helping you) interview their wife at home. It is necessary to get three interviews with miners' wives.

Once you've gotten an ok from the husband, ask him for his home phone number and address. Then call the wife to get her ok and set up a time which would be convenient for her.

To do the interview, your wife (or the other woman who is helping you) should go to the home of the miner's wife. Let your wife give the survey in the same way that you gave the survey to underground miners. She should read the instructions to the miner's wife, and then stay there with the miner's wife while she's filling out the survey. She should bring the completed survey home to you so that you can mail it to us.

It is important for the miner's wife to answer without talking about the questions with her husband. So it would be best if your wife and the miner's wife could be in a room by themselves. The survey should take about 45 minutes to finish.

Once you have given surveys to as many people on the list as you can, mail all of the surveys back to us. Each NIOSH survey has its own envelope. You can mail NIOSH surveys in these envelopes. The NIOSH survey envelopes do not need any stamps.

Wait until you have completed all of the Westinghouse surveys that you are going to do before mailing them back to us. You might have to go back to the mine as many as four or five days to finish, and your wife will have to visit three miners' wives. When you are finished, put all of the surveys in the envelopes provided. You should mail back surveys that have been filled out and any extras you might have left over. You will have to take these envelopes to the post office to have them weighed and to buy stamps before you mail them.

Review

Here is a day-by-day review of the steps you should follow.

Monday

1. See the safety director or the other person listed on your mine information sheet. He will know you are coming and will show you the room to use for giving the survey.
2. Go to the mine 1/2 hour before the break of every shift.
3. Talk with men coming off each shift, telling them who you are and why you are there. Give out the NIOSH survey to miners who will not be filling out the Westinghouse survey.
4. Contact any foremen who have been picked for the Westinghouse survey and get them to fill out the survey with you.

Tuesday

1. Go to the mine 1/2 hour before the break of every shift.
2. Pick up any NIOSH surveys that were filled in by other miners.
3. See the men coming off the shift who have gotten a letter about the Westinghouse survey and ask them to go with you to fill out the survey.
4. Ask if any of the miners would let your wife give the survey to their wife. Get his home phone number and call his wife to set up a time to give the survey.

If you need to go back to the mine on Wednesday, Thursday, or Friday, repeat the same steps as for Tuesday until you have gotten as many miners as possible to fill out the surveys.

Additional Comments

At some mines, the men who work the second shift arrive early at the mine. It may be possible to have men from the second shift fill out the Westinghouse surveys before they go into the mine. However, you must be sure the men have at least an hour to fill out the survey.

If you go back to the mine on a couple of days and it looks like you will not get the needed number of men to fill out the survey form from the men that were mailed letters, ask the other miners if they would fill it out. Remember, you should get at least the following number of people to fill out surveys:

- 3 foremen
- 6 above ground workers
- 40 underground miners
- 2 union officials (if yours is a union mine)
- 3 miners' wives

When you go to the bathhouse to meet the men, it may be helpful to take a sign that you could hang in the bathhouse. It will remind miners that the project is underway and that you are there to give the survey. A sign has been enclosed for you to use.

If the people who fill out the surveys have any questions, you will have to answer them. You will have to understand all of the instructions and all of the questions on the survey. To help you get ready for giving the survey, you should read all of the sample surveys. Read the instructions and answer the questions on the survey yourself. When you answer the questions on the survey think about the last mine you worked in. Make a mark on the side of the page if you do not understand any of the instructions or any of the questions on the survey. When we call to go over these instructions we will be able to explain anything you do not understand.

Pay

You will get a total of \$250.00 for giving the surveys. In order to give the surveys you have to get yourself ready by reading the instruction booklet and by learning about the surveys so that you can answer questions. In addition, you will have to visit the mines to actually give the surveys. You can begin getting ready to give the surveys right away, but chances are it will be early in May before your visit to the mine can be scheduled. The \$250.00 is the total amount you will be paid. It includes your pay for getting ready and your pay for giving the surveys. In addition, if you use your car to travel to and from the mine or to the miners' homes for the wives' surveys, you will get 12¢ per mile.

Be sure to keep track of the number of miles you drive.

We are asking you to do your best and give an honest effort to try to get as many men on the list as possible to fill out the surveys. You are being paid for your time, not the number of surveys which are filled out. If you have trouble getting miners to fill out surveys, call us collect at (Area Code 301) 730-8429.

Again, we would like to welcome you as a part of the project team. We are confident that this research project will be a big step toward making the mines a safer place to work, and we appreciate your help.

APPENDIX I

CODING CATEGORIES UTILIZED IN CLASSIFYING MINE PERSONNEL

Coding Categories Utilized in Classifying Mine Personnel

01 Upper Management	Operator/Owner Top Management Upper Management Company General Manager Manager of Mines Mine Managers
02 Mine Management (Middle)	Mine Superintendent Superintendent Management Mine Management General Foreman General Mine Foreman Mine Foreman Assistant Mine Foreman
03 1st Line Supervision	Foreman Section Foreman Face Foreman Face Boss Immediate Foreman Immediate Supervisor
04 Safety Department	Safety Department Safety Director Safety Inspector Safety Engineer
05 Engineering Department	Engineering Department
06 Industrial Relations	Industrial Relations
07 Union	Union Safety Committee Job Bidding "You Can't"
08 Supplymen	
09 Master Mechanic	
10 Federal Bureau of Mines	Federal Bureau of Mines Federal Bureau MESA

- 11 Combination Management
and Union
- 12 Combination Upper Manage-
ment & Middle Management
- 13 Combination Middle Manage-
ment & 1st Line Supervisors
- 14 Other (Miscellaneous)

