Management of the Work Environment

Candidate Safety and Health Research Topics

PART II

PROJECT MINERVA

MANAGEMENT OF THE WORK ENVIRONMENT

Part II: Candidate Safety and Health Research Topics

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DISCLAIMER

FOREWORD

Under the provisions of Section 21.(a) of the Occupational Safety and Health Act of 1970 (Public Law 91-596), the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services, has the mandate to conduct directly, or by grants or contracts, education programs to provide an adequate supply of qualified personnel to carry out the purposes of the Act. Three major approaches have been used by NIOSH to date to fulfill this mandate.

One approach is that of conducting an extensive training project grants program, through which colleges and universities may qualify for funds to provide training to occupational safety and health professionals (e.g., occupational physicians, occupational nurses, industrial hygienists and other occupational health scientists, and safety professionals). In place since 1971, this program has resulted in a strengthened infrastructure of colleges and universities that are prepared and qualified to educate personnel in the occupational safety and health sciences.

A second approach used by NIOSH to ensure an adequate supply of professional manpower to support the nation's occupational safety and health efforts is the Educational Resource Center (ERC) concept. The ERC program was launched in 1977, in response to a national need for occupational safety and health professionals, a need not totally met by the training project grants program described above. The Educational Resource Centers develop and offer degree programs in the disciplines of occupational medicine, nursing, safety and industrial hygiene. At present, 14 ERCs have been approved and funded. Continuing education/outreach is an important ERC function. ERC outreach programs involve providing assistance to other colleges and universities in the areas of industrial hygiene, medicine, nursing, and safety through full-term and part-term teaching, seminars, lectures, and similar types of support.

A third approach used by NIOSH to impact manpower in the occupational safety and health area is that of influencing the curricula of professionals who, while not classified as occupational safety and health professionals, nonetheless play a vital role in ensuring that occupational safety and health initiatives are successful at the company or corporate levels. These professionals include science teachers, industrial arts and vocational education instructors, and engineers. Recently, NIOSH, with the support of various safety and health organizations and representatives of Schools of Business, opted to follow a similar strategy to influence the curricula of the nation's schools of business management.

Project Minerva is based upon the premise that it is of limited value to provide more and better training in the recognition, evaluation and control of safety and health hazards in the workplace to occupational safety and health professionals, *unless managers responsible for the safety and health function and who make the major decisions on resource allocation also receive education and training in the managerial aspects of occupational safety and health.* Since management is the effective utilization of human and material resources to achieve an enterprise's objectives, managers must be aware of the adverse effects of safety and health problems, control strategies and of the resources that they have, or may need, to cope with safety and health issues and problems.

Advances in technology, a changing workforce, and increased legislation in the field of occupational safety and health have also placed new demands upon business managers. The knowledge and skills necessary to address these demands are extensive and generally exceed what is presently offered through courses in the traditional business curriculum.

In response to the need for addressing these demands, the National Institute for Occupational Safety and Health has developed occupational safety and health resource materials consisting of instructional modules and case studies, a book of readings, and candidate research topics. The material addresses some of the more pressing occupational safety and health management issues, and is being made available to schools of business administration in Project Minerva.

It is not the purpose of this occupational safety and health initiative to suggest a new curriculum, but rather to provide a source from which materials can be selected for integration into existing business courses commensurate with faculty interest, and institutional and/or departmental curriculum requirements.

HOW TO USE THIS RESOURCE GUIDE

This compilation of suggested occupational safety and health research problems is designed for use by students pursuing a degree in business administration. The material was developed following extensive review of the literature on occupational safety and health management, inputs from recognized safety and health professionals, and information provided by professionals who work closely with practitioners in academia, business, industry, and government.

Although most problem areas are listed in conjunction with a specific management function, some are multidisciplinary in scope. Accordingly, the placement of a research problem in one management functional area rather than in another is in some cases arbitrary.

Problem areas are presented in a format that allows for flexibility of use depending upon the constraints of time, knowledge and experience of the students and the subject being taught. Some of the problems listed will serve as topics for in-depth research while others may be used to promote class discussions and/or group exercises. Problem areas presented in the form of narrative statements describing a broad problem area are good candidate topics for graduate theses and dissertations. Those presented as questions are more suitable for class exercises and to promote class discussions.

Depending upon the breadth of research desired, instructors may wish to expand the scope of a research problem by combining information from problem areas listed as questions with one or more problem areas listed in narrative form.

Section III entitled: ''Additional Management Related Problems in Occupational Safety and Health,'' is provided to assist faculty and students interested in locating additional occupational safety and health research topics or subjects other than those referenced, and as a source of information for those who may wish to find or define research problem areas consistent with their own interest and/or course instruction.

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SECTION I

WHY MANAGERS SHOULD BE INTERESTED IN OCCUPATIONAL SAFETY AND HEALTH

INTRODUCTION

In his book *Technology, Management and Society,* Peter F. Drucker discusses some of the new realities concerning the assumptions upon which both the theory and practice of management are now based. Drucker states:

> Because our society is rapidly becoming a society of organizations, all institutions, including business, will have to hold themselves accountable for the "quality of life" and will have to make fulfillment of basic social values, beliefs, and purposes a major objective of their continuing normal activities. . .In the business enterprise, this means that the attainment of the "quality of life" increasingly will have to considered a business opportunity and will have to be converted by management into profitable business.[1]*

A safe and healthful workplace is valued more highly by the worker than more pay. The values of the worker are changing, and the workplace is changing. Thus, managers must be attuned to these changes and take them into account during their planning, organizing, staffing, directing and controlling functions. A safe and healthful workplace is one of the key ingredients in any effort to improve the "quality of life" in the workplace.

Occupational safety and health ranks high in terms of what interests both employers and employees. This is not a new phenomenon. Surveys of working conditions, as they are related to job satisfaction, have repeatedly revealed that not becoming ill or injured on the job is regarded as most important, followed by concern for the economic hardships that result from job-related injury or illness.

The Objective of Current Occupational Safety and Health Legislation

Section 2.(a) of the Occupational Safety and Health Act of 1970 (Public Law 91-596 states:
Law 91-596) states:

> The Congress finds that personal injuries and illnesses arising out of work situations impose a substantial burden upon, and are a hindrance to, interstate commerce in terms of lost production, wage loss, medical expenses, and disability compensations payments.[2]

Section 2.(b) of the Act states:

> The Congress declares it to be its purpose and policy, through the exercise of its powers to regulate commerce among the several States, and with foreign nations and to provide for the general welfare, to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources.[3]

The Occupational Injury and Illness Toll

At the time the legislation, which later would become the Occupational Safety and Health Act of 1970 (Public Law 91-596), was being formulated an estimated 14,200 American workers died on the job, another 2.2

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million suffered disabilities, and another 300,000 to 500,000 suffered from occupationally-induced illness annually. Considerable progress has been made in reducing death, injury and illness at the worksite since 1970, but the progress has been painfully slow and the cost has been staggering. National Safety Council data for calendar year 1984 show 11,300 work-related accidental deaths, a total of some 1.9 million disabling work injuries, and a total work accident cost of at least \$32.4 billion.[4]

The injury and illness toll in the American workplace will vary, depending upon the criteria used. However, whatever the precise number of occupationally-induced deaths, injuries and illness, it is staggering. In addition to the often intense personal suffering and financial loss to the injured worker and his family, worker injuries and illnesses add greatly to workers' compensation costs, they disrupt productivity, increase downtime, disrupt production schedules, and add to hiring and training costs. Further,the bad press which frequently follows a major accident (and sometimes even a minor one) can seriously impair the image of the firm in the community. Today, management is open to scrutiny not only from superiors but also from the workforce, from competitors, from governmental and regulatory agencies, and not least, from the public, from special interest groups, and from the communications media. Literally, there is no place to hide.

A 16-member panel convened by the National Academy of Sciences in 1985 reported that injuries caused 143,000 deaths in 1983 as well as 70 million non-fatal injuries severe enough to require medical care or restrict activity for one or more days. The panel also found that injuries account for nearly four-fifths of the deaths of those 15 to 24 years of age and that they remain the leading cause of death up to age 44, when chronic diseases begin to claim more lives. Direct medical expenses, as well as the indirect economic impact of injuries, cost an estimated \$75 billion to \$100 billion each year in the United States. The panel called for a new Center for Injury Control to coordinate and lead research on injuries of all types.[5]

Unhappily, there is no authentic information to indicate the actual scope of the occupational illness problem within American industry. The Congress of the United States recognized the importance of good information systems when it passed the Occupational Safety and Health Act of 1970. Today, fourteen years after its passage, a crisis exists in the statistics on occupational disease. The Manpower and Housing Subcommittee of the Committee on Governmental Operations of the House of Representatives released a report on October 5, 1984 with the dramatic title: *Occupational Illness Data Collection: Fragmented, Unreliable, and Seventy Years Behind Communicable Disease Surveillance.*[6] This report cited the essentiality of accurate and reliable data on occupational disease for informed public policy decisions, employer and employee awareness of health problems, and employers' ability to correct harmful working conditions.

Changing Perceptions of Who is Responsible for Workplace Injuries and Illnesses

Emphasis has shifted dramatically from the "careless worker" to the "careless employer" when it comes to who is responsible for occupationally-induced deaths, injuries and illnesses. There is now plenty of evidence to swing the accident prevention offensive away from the worker to the employer. Management can no longer labor under the mistaken belief that workers are at fault in the majority of the injuries and illnesses incurred in industry. This simply is not true. It never was. Social pressures are causing management to look for more rational explanations for losses within the organization. One need only read the newspaper to find more and more references to "managerial oversights" and "managerial misadventures" following a major industry mishap.

It is not just in industry that the focus of attention following mishaps is moving from the worker to the manager. It is happening in the government, civilian and military sectors as well. For example, recently there have been a number of reports in the press of senior military officers being court-martialed or subjected to other forms of disciplinary action for incidents that occurred in their commands. An example is the action taken by the Chief of Naval Operations (CNO) following a fire on an aircraft carrier. Expressing the belief that fixing blame solely on enlisted personnel is contrary to the Navy's fundamental principles

of command responsibility, the CNO ordered reprimands for the ship's captain, former captain, former executive officer, and former ship's engineer. Penalties of this type seriously jeopardize an officer's career in the military.

Dr. W. Edwards Deming, internationally known consultant in statistical methods whose work in Japan greatly assisted in creating a revolution in quality and economical production and made Japan the industrial giant it is today, has stated repeatedly that poor quality is 85 percent a management problem and 15 percent a work problem.[7] Much the same can be said for occupational and environmental problems in American industry.

Eugene I. Pavalon, a prominent Chicago personal-injury lawyer, made this observation:

> . . . A corporation doesn't act on its own, it's the people who run it, who set the policies and priorities. These were the people who could appreciate the risks and the hazards the workers were being exposed to. They made the decisions that led to the injuries.[8]*

On June 14, 1985, in what many lawyers called a landmark decision, three company officials were found guilty of murder in an employee's death from cyanide poisoning. In a non-jury trial, the judge found that the three executives of a film recovery company, were responsible for workplace conditions so unsafe that they led to the poisoning of a 59-year-old employee. The firm recovered silver by bathing used photographic film in cyanide solutions.[9] On July 1, 1985, each of the three executives were sentenced to 25 years in prison and fined $10,000 for their murder convictions in the job-related death of a worker.[10]

An article in *Fortune* reported that, as a result of the Kepone case, Allied Chemical Corporation " . . . downgrades profitability as a measure of a manager's performance and gives more greater weight to his regard for social and environmental responsibilities."[11]

Irving S. Shapiro, former Chairman of the Board and Chief Executive Officer of DuPont, has said "Perhaps there is no better method of evaluating a company's sense of responsibility than to look at its programs in occupational health and safety . . ."[12] Shapiro added:

> The acid test of a corporation's resolve is the financial bottom line. Talk is cheap, and anyone can makes noises about a commitment to safety; the test comes when safety costs dollars in terms of lost production, potentially profitable products which are never produced, and the risk of criticism in the wake of frank disclosure.[13]†

Immediately after the catastrophe in Bhopal, India, during which methyl isocynanate (MIC) was released into the air, and where the death toll was placed as high as 15,000, India placed five managers from the plant under "house arrest" to make them available for India's own judicial inquiry into the disaster's cause. Later, when the company's chairman from the United States arrived at the scene, he and two other executives were arrested and charged with criminal negligence. They were later released on bail. As of June 1985, some 40 lawsuits for billions of dollars in actual and punitive damages had been filed against the company in U.S. courts on behalf of individual victims of the Bhopal disaster.[14]

Throughout the world, both the central (federal) government and the courts are getting tough on those in positions of responsibility who permit selected types of events to get out of control. For example, *The New York Times*, on July 17, 1985, reported that five Soviet industry officials had received jail sentences of up to five years after being found responsible for an environmental disaster some three years ago (September 15, 1983) that spoiled the water supply for a large part of the Ukraine.

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Russell DeReamer, former corporate safety manager for IBM, has observed:

> There should be no argument that the same management principles and concepts that are applied to quality, cost and production also must be applied to safety. But an examination of many safety programs—even those in cases where it is claimed that supervisors are responsible for safety—will reveal that the same management techniques being used to solve production problems are not being used to solve safety problems.[15]*

Interest in Management Training in Occupational Safety and Health

During the years immediately following the enactment of the Occupational Safety and Health Act of 1970 (Public Law 91-596), employers were primarily interested in how they could comply with the provisions of the Act and with standards and recordkeeping requirements promulgated under the Act. In later years, however, the thrust of employer inquiries shifted dramatically toward what employers could do to establish and maintain an effective safety and health program. For example, they wanted to know more about what occupational safety and health professionals should be doing, and what they, as managers, should be doing to support the occupational safety and health effort within their organization. They wanted to know how to measure their safety and health performance. And, they wanted to know, in the worst way, how those corporations with outstanding safety and health programs actually went about designing, implementing, and evaluating such programs.

The desire on the part of managers to learn more about occupational safety and health is not surprising, nor is it limited to the United States. In an excellent paper which examined the role of management in occupational safety and health, prepared by the Accident Prevention Advisory Unit of Her Majesty's Factory Inspectorate in Great Britain,[16] the observation is made that ". . . Even in industries generally associated with high technology, underlying causes of accidents are often organizational rather than technical."[17] The report is about the manager and his responsibility for occupational health and safety. The report aims to demonstrate that the elimination or control of risks not only calls for expertise and the deployment of specialist skills and services, but is also an essential part of the job of every manager. The word "manager," as used in the report, is intended to include everyone who operates in a management capacity (i.e., the first-line supervisor and upwards). The authors of the report say:

> To prevent accidents to people and damage to plant and the environment, one needs to ask how management should be involved. Management's responsibility is to control work—both its human and physical elements—and accidents are caused by failures of control. They are not, as is so often believed, the result of straightforward failures of technology; social, organizational technical problems interact to produce them.[18]

In his inaugural lecture as the second holder of the University Chair in Safety and Hygiene at the University of Aston in Birmingham, England, Professor Richard L. Booth asked this provocative question: "Safety: too important a matter to be left to the engineers?"[19] In answering his own question, Booth concluded:

> . . . I believe that safety is too important a matter to be left to the engineers working without advice and without from time to time external constraints on their actions. The achievement of acceptable safety standards demands the combined expertise and pooling of many skills. Only by these means can we reduce the unacceptable toll of pain and suffering experienced at work today . . .[20]

The Joint International Labor Organization/World Health Organization (ILO/WHO) Committee on Occupational Health met in Geneva in March 1981 to discuss education and training in occupational health, safety

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and ergonomics. The Committee had this to say about education and training methodology for supervisors and managers:

> Many managers have backgrounds in economics, law, and engineering. In economics and law, there are seldom, if ever, any courses on occupational health and safety. Engineering courses may offer limited teaching on these subjects. Teaching curricula in schools preparing managerial staff should be revised in order to include occupational health, safety and ergonomics.
>
> Every effort should be made to impress upon managers and supervisors the importance of occupational health and safety, and they should understand that good working conditions and a good working environment are necessary for smooth production. The main topics which should be included in educational programs are, among others: the role of management, the functions of safety officers and of the occupational health services, accident investigation, environmental factors, fire hazards, workload ergonomics, productivity and health, and legal requirements.[21]

In Great Britain, the Health and Safety at Work etc. Act 1974 asks managers to see safety and health as an essential part of their job, in the same way as they see design, construction and profit. In this context the Health and Safety Executive sees the most effective safety training for management as that which is integrated into other forms of management training. In a publication on safety and health in the construction industry,[22] the Health and Safety Executive had this to say about the way managers should be trained in health and safety:

> The management skills exercised in making decisions on safety are no different from those used in getting the job done successfully and with profit; yet it is rare, at present, for a site manager to welcome authority for safety and health. This is because he has hitherto lacked any satisfactory measure of the safety problem which he has to solve. Training for management has in the past laid emphasis on a knowledge of what provides compliance with individual regulations. This is important, but more important still is safety training integrated with general management training and showing how high standards of safety can be achieved by planning, by monitoring progress, and by accepting that a manager is accountable for any failure to reach recognized standards.[23]

The National Institute for Occupational Safety and Health (NIOSH) sponsored a series of investigations which examined safety program practices in industry. One study surveyed five plants selected as industry leaders in the number of man-hours without a disabling injury (using ANSI Z16.1 definitions) in order to characterize more definitively the factors distinguishing successful safety program practices. In this study, certain program features emerged as being strongly associated with superior plant safety performance. The following excerpts from the report on this investigation reveal, first, management commitment to safety, and second, management efficiency with respect to safety.

Management Commitment to Safety

Management ordinarily has a written statement of commitment to occupational safety within this plant. All of the five above-mentioned no-lost-workday plants surveyed by NIOSH, likewise, had written corporate and plant safety policies. The difference between success and failure in occupational safety, however, appears to be real commitment, i.e., active management involvement, rather than mere lip service. The evidence to support this conclusion is found by reviewing a range of findings from this survey.

In four plants, the plant safety director had direct contact with the plant manager on a daily basis. All five plants required that safety personnel always approve changes in the design of work facilities before the changes were made. All plants required that new purchases include safety specifications. Four of the

five required approval of any changes in production procedures before the changes were put into operation. Resources for safety, both money and people, were typically abundant. Special emphasis programs were likewise prevalent, e.g., plant-wide safety audits, job hazard analyses, medical examinations and tests, employee counseling, and community action to promote safety off the job. In four of the five plants, the plant and line managers held some of the direct responsibility for safety. In none of the plants was a safety decision made without the involvement of plant or line management.[24]

Management Efficiency with Respect to Safety

Management efficiency is a concept which is given many different meanings in many different contexts. For the purposes of the NIOSH survey, efficiency was defined as the anticipation of potential safety problems, adequate preplanning to overcome these problems, and evaluation of the effectiveness of management and employee efforts in following the plan devised to overcome these problems. In managing occupational safety and health, this means the development of some form of hazard identification program, implementation of hazard prevention through engineering control, preventive maintenance, safety training, a protective equipment program, and utilization of evaluation programs for judging management and employee effectiveness in hazard control.

All five award-winning plants encouraged some form of employee hazard identification; all plants encouraged employees to report hazards to management.

The plants which were superior in safety performance were also typically cleaner, more efficiently designed and had generally better plant environmental qualities (control over noise, heat, dust, fumes, lighting). Work areas and aisles were typically uncluttered. Process layout was efficient and smooth. All five plants required some form of safety approval by the safety director for equipment design, plant layout, and operations. All plants have very good preventive maintenance programs for their production equipment. Use of personal protective equipment was prevalent in areas where there were physical and chemical hazards.

Most of the five plants surveyed had both daily informal inspection of work areas by line supervision, and periodic (typically monthly or quarterly) formal inspections by worker/management teams which utilized checklists, etc., and were considerably more thorough. Some of the larger plants had yearly plant-wide safety audits in which all aspects of the plants' safety programs were critically evaluated. In other words, ''inspection'' in the best plants was a continuous and pervasive set of program activities designed to encourage all employees to be consciously critical observers and safe performers. Four of the five plants had some formal program of safety training for their employees; all five plants used the supervisor for new employee training.

Four plans had formal training sessions for supervisors. Most plants offered organizational development courses to all managers and supervisors in order to promote better employee communication and organizational effectiveness.

All five plants had evaluations of safety performance as an integral part of regular performance ratings at all levels, from the plant manager down to the individual production worker. Indeed, safety was used as a performance criterion of operational efficiency.[25]

Financial Incentives

In addition to the benefits already identified, there are powerful financial incentives to establishing and maintaining an effective safety and health program within any organization. For example, DuPont's safety efforts reap enormous savings. In its U.S. plants in 1980, for example, the company had an annual rate of 0.12 accidents per 100 workers, or one-twenty-third the National Safety Council's average rate for all manufacturers for that year. Had DuPont's record been average, the company would have spent more than $26 million on additional compensation and other costs. That represented, at the time, 3.6 percent of DuPont's profits. To make up the difference, in view of the company's 5.5 percent net return on sales at the time, DuPont

would have had to increase sales by nearly $500 million.[26] This is but one example of the huge savings that can be realized when an establishment, a company or a corporation manages the occupational safety and health function the same way it manages any other function. Preventing accidents, or better still, preventing all types of downgrading incidents, is one of the most profitable activities in any business. All incidents or sources of business interruption eat into business profits.

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SECTION II

CANDIDATE RESEARCH PROBLEMS IN OCCUPATIONAL SAFETY AND HEALTH BY SPECIFIC FUNCTIONS OF MANAGEMENT

INTRODUCTION

Most texts and other publications on the subject of management identify four or more functions as being involved in the process of management. While there is not universal agreement on what these functions should be, many writers on the subject agree on the following: planning, organizing, staffing, directing (and leading), and controlling. Accordingly, these five functions are used in this report as a basis for classifying the numerous problems and problem areas in occupational safety and health which are considered to be in need of initial or further study. A sixth classification has been added, namely: "Problem areas listed by other than function of management," to accommodate those problems and problem areas which do not fit easily into one of the five aforementioned functions of management. The assignment of a problem or problem area to one of the above classifications does not mean that the problem cannot or should not be examined in the light of another classification if the researcher desires to do so. It is not expected that there will be total agreement on where various problems and problem areas have been assigned, but this is not considered a significant problem.

Some of the problems and problem areas listed are not purely "management-type" problems, since many of those who prepare for careers in business management have undergraduate backgrounds in economics, law, engineering, operations research, mathematics, and in many other disciplines. Thus, these individuals might welcome a problem related to their undergraduate field of study which would still give them exposure to occupational safety and health as it relates to the management process.

PLANNING

Introduction

> Planning is the beginning of the process of management. Before managers can organize, lead, or control, they must make plans that give purpose and direction to those activities. Because planning sets the other functions into action, it can be seen as the most fundamental of the responsibilities and tasks of the manager.[1]*

According to Stoner, the basic process of planning involves four major steps, namely:

1. Establishing a goal or set of goals to be achieved; that is, deciding what the organization or subunit wants or needs.
2. Determining where the organization or subunit is relative to the goal. This means deciding how far the unit is from the goal, what resources it has for reaching the goal, and what its limitations are.
3. Determining which factors in the environment will help the organization or subunit reach its goal and which factors will act as barriers. This step includes predicting, or forecasting, which factors will appear in the future and how present factors will change.

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4. Developing a plan, that is, a set of actions for reaching the goal. This is done by generating a set of alternative courses of action, evaluating them, and then choosing among them.[2]*

The planning function is essential both in thinking through and documenting what needs to be done to enable the organization to achieve its objectives without incurring unnecessary losses of any type, and in developing those procedures to be used in the event of an incident which may result in significant loss to the organization. In an occupational safety and health context, planning should cover post-event, as well as pre-event, factors.

Problems and problem areas associated with organizational objectives, planning premises, decision-making, strategies and policies, types of plans, and methods for making planning more effective appear under this heading. Some problems are preceded by brief background information.

Policy

- A policy is a statement, either expressed or implied, of principles and their consequent rules of action, set up by executive leadership as guides and constraints for the organization's thought and action. The primary purpose of a policy is to enable the manager to relate the organization's work to its objectives. Analyze the occupational safety and health policy statements for a sample of establishments within a specific Standard Industrial Classification (SIC) industry. What patterns emerge? What benefits and disbenefits would accrue if each industry used a model occupational safety and health policy? To what extent do organizations seem to be guided by their occupational safety and health policies in designing and implementing occupational safety and health countermeasures?

- Conduct an analysis of how a sample of employers develop a corporate philosophy regarding safety and health matters as these philosophies relate to public affairs, media interactions, regulatory activities, and litigation.

- Irving S. Shapiro, former chairman of the board and chief executive officer of DuPont deNemours and Company, has stated that " . . . Direction from top management is essential to our policy that all accidents and illnesses from exposure to known hazards can be prevented."[3]† Survey a sample of organizations to identify the extent to which the managements of these organizations believe that all occupationally-related injuries and illnesses can be prevented, and which have policies that reflect this belief. Of those organizations included in the survey, what is the relationship between occupational safety and health policy and actual safety and health performance on the job (i.e., do their records reflect their policies)?

- How much consistency is there in the occupational safety and health policy statements, safety and health organization, staffing, and methods used to assess the effectiveness of occupational safety and health within their organizations, of a sample of establishments within a single SIC industry, all of which have an injury and illness experience below the national average for their industry?

- How do a sample of employers in a single SIC industry incorporate occupational safety and health programs into their day-to-day activities so that the programs are considered routine and not "special" activities?

- How much time do managers spend on the occupational safety and health function? Conduct a survey of selected organizations to determine the types of direct and indirect involvement managers have in the various facets of the organization's occupational safety and health program (e.g., input to the organization's safety and health policy; goal setting; reviews of injury,illness, and property damage data; developing specifications for, interviewing, and determining performance criteria for safety and health professionals; etc.). What patterns emerge? Is there a relationship between the amount and type of personal

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involvement of top management and the organization's safety and health performance? If so, what is this relationship?

- In a report on management safety policies, the National Safety Council states: '' . . . If the top executive is not genuinely interested in preventing accidents and injuries, no one else is likely to be. Since this basic fact applies to every level of management and supervision, an accident control program must result from top management's announced and demonstrated interest if employee cooperation and participation are to be obtained.''[4]* To what extent is this philosophy prevalent among a sample of managers in selected establishments, companies and corporations? Can an organization have an effective occupational safety and health program without a highly visible management profile with regard to occupational safety and health interest? Why? Why not?

- In what ways can management ensure that subcontractors engaged by an organization perform their program of work in accordance with applicable laws and regulations governing occupational safety and health? Identify the principal laws and regulations which apply to subcontractors. Develop a model policy which management can use when employing subcontractors to ensure that occupational safety and health regulations and other requirements will be complied with. Have this proposed model policy reviewed and critiqued by: a) management, b) a sample of subcontractors, and c) federal OSHA (or by an occupational safety and health agency in a state with an OSHA-approved plan).[5] [6]

- In efforts to curb death, injury and illness on the job, safety and health practitioners speaks of the "Three E's—Engineering, Enforcement and Education. These form an *interdependent* relationship; no one of these alone can do the job. Wrenn made these observations about various control measures:

    Engineering controls are unquestionably the best method for effective and reliable control of hazardous materials because they act on the source of emission to eliminate and reduce employee exposure without relying on the employee to take protective action. Once implemented, engineering controls protect the employee permanently, provided they are adequately maintained.

    Work practice controls are often an integral part of a program of worker protection, but they rely upon employee behavior, which in turn, relies upon supervision, motivation and training and education to make them effective.[7]

To what extent do a sample of employers in establishments concur with this view? Does the concurrence or non-concurrence with the above observations relate significantly to the type of industry and its levels of hazards. Is it possible to develop a formula for the application of engineering controls, enforcement efforts, and training and education methods, irrespective of the type of industry and its levels of hazards?

- In selected organizations whose operations generate sizeable quantities of toxic wastes, identify: a) the major kinds of wastes, and b) the laws and regulations that govern disposition of these wastes. Describe the procedure(s) these organizations use to ensure compliance with legal requirements. Identify and describe the role of corporate safety and health personnel in the organization's system for managing the toxic waste activity. How well documented are the organization's policies for properly disposing of toxic wastes? How frequently have these organizations been inspected or monitored by regulatory authorities, and what have been the results of such inspections or monitoring visits? What improvements in toxic wastes disposal policy are indicated for these organizations?

- In selected companies whose operations involve hazardous materials, what plans do their managements have in place to deal with toxic spills on company premises? On public premises? In describing these plans, address the nature of potential spills, size of the "spill brigades" set up to deal with spill events, the training and periodic practice sessions (or drills) held by the brigades, protective clothing worn by brigade members, disposal of the toxic materials, and costs of the total activity. Also, determine the extent (and cost) of plant-wide interruption of production following major spills requiring employee (or community) evacuation until cleanup operations are completed and the area(s) are determined to be free of further hazards.

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- In a sample of organizations within the same industry, examine the policies that management has in effect with regard to the safety and security of visitors to the organization's premises. To what extent are head, eye, foot and other forms of personal protection issued for visitor wear in critical plant areas? Do these organizations have written Standing Operating Procedures (SOPs) for use when visitors are allowed on the organization's premises? What is the nature and extent of visitor injuries or illnesses at these organizations? What improvements are indicated for the organization's policies with regard to visitors and suppliers? For their SOPs?

- To what extent is occupational safety and health policy planning integrated into the activities of the organization's joint labor-management committees (e.g., quality circles, etc.) where these exist? How is this done, and how well do management and labor representatives believe the process is working? What views do a sample of management and labor representatives from organizations where such policy planning is integrated into the activities of the organization's joint labor-management committees have with regard to the effectiveness of such policy planning integration? What evidence is there that such policy planning integration is effective in achieving a safe and more healthful workplace?

OSHA Impact on Planning

- Conduct a survey of a sample of corporations, companies or establishments in a high-hazard industry to identify what significant changes in occupational safety and health programming came about as a result of the enactment of the Occupational Safety and Health Act of 1970 (Public Law 91-596). What were the results of these changes in terms of the ways in which managers perceive their responsibilities for occupational safety and health, and in terms of the types of occupational safety and health programs their occupational safety and health staffs proposed for complying with the Act?

- Study occupational safety and health clauses in labor agreements before and following the enactment of the Occupational Safety and Health Act of 1970. What changes have taken place and what is the significance of these changes? What implications do these findings have for employers? For employees? For organized labor? What trends are in evidence with regard to occupational safety and health clauses in labor contracts within selected industries in the United States? Do these clauses tend to be "fill in the blanks" types, or do they reflect the hazards associated with the tools, machines, processes and materials used in the industries within which the contracts were negotiated?

- To what extent do organizations take into account the projected policy changes and projected activities of such federal agencies as OSHA, EPA, CPSC, and others when they formulate their plans? What methods do they use to gather data on such projected policy changes and activities? How successful have they been in anticipating such changes?

- Survey a sample of establishments within a high-hazard industry to identify how managements within these organizations go about complying with occupational and environmental safety and health standards and other requirements. What actions do they take to ensure that they have relatively few adjustments to make when these standards and other requirements become effective?

- Identify what role(s) business and industry are currently playing in consensual development of occupational safety and health standards development and what role(s) they should play (e.g., active participation in activities of groups such as the American National Standards Institute, the National Fire Protection Association, etc.). What patterns emerge with regard to business and industry involvement in the promulgation of occupational safety and health standards by the federal government? By state governments?

- In the private as well as the public sector, employers must generally comply with standards promulgated by the Occupational Safety and Health Administration, or with standards promulgated by the state in which their facilities are located. In those organizations covered by collective bargaining agreements, to what extent do the parties negotiate "tougher" standards than those required by either the federal government (i.e., OSHA) or the state, and in what specific areas do these stricter standards, if any, apply? Is there any evidence that these perceived stricter standards result in a safer and more healthful

workplace? What criterion(ia) were used to determine whether the workplace is safer and more healthful as a result of the promulgation and enforcement of these "tougher" occupational safety and health standards?

Objectives, Goal-Setting

- Conduct a survey of the literature of operations research to determine which techniques have found applications in safety and health policy analysis and program design. Publish the results to stimulate interest in occupational safety and health problems by operations research practitioners.

- How do a sample of employers in high-hazard industries with highly effective occupational safety and health programs establish occupational safety and health goals for their organizations, and to what extent and how is the occupational safety and health staff involved in such goal-setting?

- Examine the methods used by selected organizations to establish occupational safety and health goals for their organizations, e.g., some organizations establish what they term "expectancy rates" which are intended to reflect what the organization believes it might reasonably expect in terms of fatal injuries, disabling and non-disabling injuries, and illnesses, lost workday case rates, etc. Should an organization, in its planning, start off with the premise that there probably will be selected types of losses? Is it any more realistic for an organization to expect "zero accidents" than it is to expect "zero defects?" If so, why? If not, why not?

- How do selected organizations within a specified industry develop and implement plans for reaching their occupational safety and health goals? How effective have these decision-making processes been?

- Analyze the occupational safety and health goals of a sample of organizations to determine to what extent these are *measurable goals*. What are the implications of the findings for: a) planning staffs, b) managers, and c) occupational safety and health professionals?

- The term "management by objectives" (MBO) was first applied by Peter F. Drucker in 1954 to an approach to planning that he detailed in his book *The Practice of Management*.[8] To what extent does occupational safety and health influence the selection of the objectives of higher management and of the company as a whole? To what extent are occupational safety and health staffs involved in the formulation of these objectives?

- Some occupational safety and health professional personnel are perceived by management as being reluctant to set goals insofar as these relate to work-related injuries and illnesses. Based on interviews with a sample of occupational safety and health professionals and their supervisors, how accurate a perception is this? It if is inaccurate, how can the faculty perception be corrected? If the the perception is accurate, how can occupational safety and health professionals personnel overcome this reluctance to set goals insofar as these relate to work-related injuries and illnesses?

- Stoner has observed that " . . . Forecasts are necessary, because without them we are at the mercy of future events. By anticipating the future, we make it more likely that our decisions and actions will be sound."[9]* To what extent do a sample of organizations prepare forecasts of what their experience is likely to be with regard to work-related death, injuries, illnesses, property damage, and other downgrading incidents? For those organizations which prepare such forecasts, who is involved in the process? What forecasting techniques are used? How accurate have these forecasts been? What has been the utility of such forecasts in the opinion of: a) management, and b) occupational safety and health professionals of those organizations where they are used?

- How do a sample of organizations go about including occupational safety and health in their considerations when attempting to forecast (i.e., predict what opportunities and problems will exist) what is likely to occur that will affect their organization's operations and activities in the future?

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- Develop a model for carrying out the occupational safety and health function within a specified type of industry and then, using forecasting techniques, identify the modifications to this model that will be necessary as the United States moves increasingly toward a service-oriented society and an information technology.

- How can the occupational safety and health function best be integrated into the businesses' perspective of cost reduction and asset protection?

- How do a sample of employers with highly effective occupational safety and health programs develop short-, intermediate-, and long-range plans as these relate to occupational safety and health? Typically, what types of programs and program activities are spelled out in each type of plan?

- Examine how a sample of employers in organizations with highly successful occupational safety and health programs *establish* occupational safety and health goals for their organizations.

- Examine how a sample of employers in organizations with highly successful occupational safety and health programs *implement* plans for achieving their occupational safety and health goals.

- On what bases do a sample of employers with highly effective occupational safety and health programs revise their occupational safety and health plans (e.g., actual safety and health experience within the organization, actual safety and health experience within the industry of which they are a part, other data gleaned from the organization's management information system, from consultants, etc.)? How well do each of these data sources seem to serve the organization in this regard?

- How do a sample of organizations build flexibility into their occupational safety and health plans (e.g., how do they plan for as many contingencies as possible during the planning process)?

- Examine ways by which selected employers assess and quantify the safety and health risks within their organizations for the purpose of executive decision-making. Such an analysis would include a determination of how safety and health risk acceptance/rejection should be handled in trade-off decisions made by management. How are decisions made regarding the probability of a catastrophe or other large unplanned event, and who is involved in the decision-making process?

- Why does management, on occasion, trade-off the benefits of safety and health in its planning? Is it because of a lack of knowledge of the benefits of effective occupational safety and health planning and programming, or is it because management does not understand how to implement safety and health plans and programs to achieve both business and employee morale-type benefits? Are there other reasons? What are they? What rationale does management use for making such trade-offs?

- Conduct an examination of the extent to which selected techniques used in occupational safety and health programming (e.g., fault-tree analysis, failure mode and effect analysis, system safety analysis, preliminary hazard analysis, management oversight and risk tree analysis, etc.) are understood and practiced by: a) a sample of employers, and b) a sample of occupational safety and health practitioners.

Factors Affecting Occupational Safety and Health Planning

- What are the social, legal, and political issues facing corporate management with regard to environmental safety and health administration? How can management best accommodate these issues?

- What are the major factors that influence management when it is involved in decision-making regarding occupational safety and health (e.g., the "bottomline," reputation of the company among its clients and customers, image of the company in the community, etc.)? Do these factors tend to vary, depending upon the size of the organization and its product(s), for example? How? Why?

- Prevention is always preferable to actions taken after the fact for both ethical and economic reasons. This is especially true in the case of occupational safety and health at the workplace and in cases involving product safety. Analyze selected incidents (e.g., the S.C. Johnson and Sons ban on fluorocarbons in aerosol-spray cans, Ford Motor Company's experience with its Pinto, and Firestone Tire and Rubber Company's experience with its "500" tire). What lessons are there in these and other incidents which can help the employer to avoid the negative public relations and adverse economic impact which frequently accompanies the introduction of selected products into the marketplace?

- Document the impact of selected incidents such as those involving Allied Chemical Company (kepone), Union Carbide (MIS), Manville (asbestos), and others on the subsequent philosophies of these organizations insofar as occupational safety and health is concerned. What are some of the major lessons from these incidents from which other employers can learn? For example, Zim has observed that " . . . as a result of kepone case, Allied Chemical Company downgrades profitability as a measure of a manager's performance and gives much greater weight to his regard for social and environmental responsibilities."[10]

- For multi-plant corporations, what are the advantages and the disadvantages of allocating resources to the plants within the corporation on the basis of their occupational safety and health record, with the greater resources going to those elements of the organization with the poorest record? Should resource allocation for occupational safety and health purposes be made irrespective of the actual records of the individual establishments and be focused, instead on the *potential* for death, injury, illness and other type of loss at each plant? Why? Why not?

- What constitutes a "reasonable" budget for occupational safety and health activities within an organization of specified size, mission, hazard category, geographic spread of its operations, etc.?

- What types of problems do organizations most frequently encounter when attempting to "start up" an occupational safety and health program? Why do these problems exist and how do a sample of managers who have had such problems solve them?

- How should occupational safety and health programs in industry be re-oriented and re-directed to provide more selective medical surveillance of employees so as to protect workers and at the same time have the cost of such programs kept to a minimum?

- To what extent is a sample of U.S. manufacturing plants using system safety analysis to assure a reliable quantitative safety factor at the time of design of equipment or facilities, to overcome critical hazards that have not been controlled effectively by either administrative actions or by work-practice rules?

- Identify the potential occupational safety and health hazards of new technologies, procedures, equipment, etc., and discuss the corrective actions that may be taken before these new technologies, etc., are introduced into the workplace.

- To what extent are separate safety sub-tests conducted on products within U.S. industry? In a sample of U.S. manufacturing facilities, to what extent are all plans and specifications for construction, modification, production-line changes, product design, product testing, etc. reviewed for safety? To what extent is safety in production and product compromised by other concerns relating to design, production, or sales, thereby allowing higher levels of risk at the worksite and a dangerous product to enter the marketplace?

- How can the management of purchasing departments prevent the creation of actual and potential hazards which result from unsafe or unhealthful supplies and equipment procured for use by employees?

- Document methods by which employers manage change in operations, organizational structure and climate, staffing, etc., so that actual or potential hazards are identified early during the process so that such hazards

- can be removed or effectively guarded against before the changes are implemented. Present findings in the form of a guide for use by employers involved in virtually any type of manufacturing activity.

- Some chief executive officers and senior managers have expressed the belief that there is a significant gap between the typical functions of an occupational safety and health practitioner and certain actual needs within an establishment, company or corporation, such needs having to do with providing consultation at the early stages of design and engineering and for new facilities and equipment, when major alterations are contemplated. Some occupational safety and health practitioners have expressed the belief that, perhaps with only few exceptions, in areas such as chemicals and petroleum, their counsel is not sought by designers, architects, or engineers at the planning stages with regard to new facilities or modifications to facilities or equipment. Occupational safety and health professionals tend to accept the workplace designed and engineered by others as a ''given,'' rather than as something into which they should have significant input. It is commonly believed that just about all of the design decisions for new facilities which are related to occupational safety and health are made by staff who do not necessarily have the knowledge appropriate to the task, and very often, installations need to be re-done or modified extensively as operations evidence requires. Examine the typical decision-making model relating to safety and health in the design and engineering functions to see how the occupational safety and health practitioner might bring his knowledge and skills fully to bear, serving the best interests of both employers and employees.

- Conduct a definitive study of occupational safety and health program planning and organization in the facilities of foreign manufactures which have located in the United States. What types of problems were encountered and how were these problems solved?

- Conduct a definitive study of occupational safety and health program planning and organization in the facilities of United States companies which have located abroad. What types of problems were encountered and how were these problems resolved?

- How do a sample of establishments, companies and corporations in high-risk industries pre-plan for incidents involving their operations? Such pre-plans would take into account factors such as notification procedures, employees, management, the community, enforcement authorities, federal and state authorities (when required), evacuation plans, emergency medical treatment, the news media, securing the area to prevent further impact of the event on employees and the public, etc.

- Who should be charged with developing plans for emergency actions when catastrophic mishaps take place which involve safety and health issues? Why? How should such emergency plans be handled throughout the different levels of the organization?[11]

- How do a sample of organizations with highly effective safety and health programs integrate safety and health into all organization methods, processes and activities?

- How can the benefits derived from occupational safety and health program planning and implementation best be related to overall management planning and support for the occupational safety and health function?

- In 1972, the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services, published procedures whereby workers, trade unions, and employers could request a Health Hazard Evaluation (HHE).[12] An HHE is a study of a particular workplace, such as a department of a particular factory, or industrial plant. An HHE is conducted to find out whether there is a health hazard to workers caused by exposure to toxic chemicals or materials. Copies of HHE reports published to date are available from the Hazard Evaluations and Technical Assistance Branch (HETAB), NIOSH, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Identify management-type problems gleaned from a

sample of HHE reports for a specific high-hazard type of industry, and develop a set of recommendations which managers in the same industry may use for removing or alleviating these problems.

- In organizations with extensive motor vehicle fleet operations, what measures (e.g., driver selection, training, supervision, periodic vehicle inspection; vehicle preventive maintenance programs; etc.) does management regularly utilize to assure viable day-to-day operations? Describe how management communicates with drivers (and drivers with management) while they are away from their operating base. Find out in what ways management uses tachographs and other devices to monitor driver speeds, times, and lengths of stops, and other aspects of vehicle operation. Also determine the nature of: a) driver pre-trip and post-trip inspections, and b) written reports and other communications between drivers and vehicle maintenance personnel regarding the safe operating condition of vehicles. Which measures appear to be successful in helping the organization accomplish its assigned mission at the lowest cost?

Small Business

- It is estimated that there are some 15 million small businesses in the United States. This total includes part-time businesses as well as farms and franchises. Of these 15 million businesses, more than 99 percent are small—even if we define a business as small if it employs fewer than 100 persons. Clearly, small business is a vital force in our economy. Further evidence of its vitality is the fact that small businesses employ some 58 percent of the nation's workforce. Based on a survey of a sample of small business enterprises which have outstanding safety and health records, develop a set of guidelines for use by other small business employers to aid them in establishing and maintaining an effective occupational safety and health organization. The focus should be on a relatively simple occupational safety and health program model which they can develop, implement and monitor with little, if any, outside help. Any outside help required should not exceed that which is available at no cost from OSHA-sponsored consultation programs delivered either by the states or by consultants under contract to OSHA.

- How do a representative sample of small and medium-size employers determine which occupational safety and health standards and other federal and state standards, directives and instructions apply to operations within their establishments? Do they, for example, tend to rely on in-house staff, on consultants, on free consultation services offered through the various states, or their trade associations, or local safety councils, or professional societies in occupational safety and health, etc.? What are the implications of these findings for regulatory agencies such as the Occupational Safety and Health Administration, the Environmental Protection Agency, the Consumer Product Safety Commission, and other federal regulatory agencies, in terms of ensuring that small-size employers know what is expected of them and are able to comply with these requirements without an undue financial or manpower burden?

- Should occupational safety and health programs for small business employers be simply scaled-down programs which were designed for medium-size and larger employers, or should such programs be designed to accommodate the often unique infrastructure and mission of the small employer? Why? Why not?

- A related problem would be a survey of a sample of small business employers in a specific high-hazard industry to determine how they plan to comply with mandated occupational safety and health standards and with other recommended safe and healthful practices in their establishments.

- Conduct one or more clinical studies of small business enterprises in a high-hazard industry which have highly effective occupational safety and health programs, to identify how these programs were designed, funded, implemented, and evaluated. The report on these business enterprises should be in a form that would permit the experience of those employers studies to be duplicated, in whole or in part, by other small business employers in the same SIC industry classification.

- Survey methods by which small business employers receive information and instruction on federal and state and other jurisdiction requirements relating to occupational safety and health. What implications do these findings have for federal, state and local occupational safety and health agencies?

- Design an effective program plan for providing occupational safety and health information and instruction and other services to small business employers, and investigate ways to motivate small business employers to use these programs and services.

- Determine the major safety and health problems and needs of workers in small businesses and of the self-employed.

Federal Occupational Safety and Health Programs

- Successful occupational safety and health programs are rarely developed and implemented fully in a single year. However, in the federal government with political appointments in subordinate policy positions lasting about two years on the average, together with budgeting on an annual basis, how can department and agency management properly plan, and then implement, an appropriate safety and health program (e.g., planning, organizing, staffing, capital expenditures, abatement expenditures, and support facilities)?

ORGANIZING

Introduction

> In order to make it possible for people to work effectively toward accomplishing goals, a structure of roles must be designed and maintained. This is the purpose of the managerial function of organizing.[13]*

According to Stoner, the organizing process can be described in terms of a three-step procedure as follows:

1. Detailing all the work that must be done to attain the organization's goals.
2. Dividing the total workload into activities that can logically and comfortably be performed by one person.
3. Setting up a mechanism to coordinate the work of organization members into a unified, harmonious whole.[14]†

A complaint voiced frequently by occupational safety and health professionals is that the safety and health function frequently is not placed properly within the organization. There is little but opinion to support this contention. When pressed for an explanation as to where the occupational safety and health professionals feel the function should be located, many respond with comments such as ''We need higher visibility,'' or ''We should report directly to the president or directly to the general superintendent,'' etc. In these instances, rarely does anyone discuss why the current placement of the function is perceived not to work. Since many safety and health professionals see their role in a broad context, they tend to shun being placed under ''engineering,'' for example, citing the differences between what they do and what those in ''quality control'' or ''environmental control,'' functions which frequently are placed under ''Engineering,'' do. The fact is that in most organizations, safety and health is perceived, correctly or incorrectly, as a service function. Accordingly, it will be found in a variety of locations, depending upon the nature of the enterprise and the way the function is perceived by the president or the chief executive officer. For example, in a department store, safety may be found under a ''General Superintendent,'' along with functions such as personnel, shipping and receiving, and customer service. Or, in a wholesale enterprise, safety may be found under a ''Service Manager'' along with functions such as warehousing, receiving, will-call, supplies and purchasing, personnel, and shipping. In a manufacturing enterprise, where the bulk of safety and health

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professionals are found, it is likely that the safety and health function will be found under "Industrial Relations" along with functions such as wage and salary administration, grievances, employee services, recruitment and training, and union negotiation. The fact is that there is no single agreed upon location for the safety and health function. This is true not only of business and industry, but for organizations such as the defense department. Within the Department of Defense, safety policy is currently located in the office of an Acting Deputy Assistant Secretary of Defense for Equal Employment Opportunity and Safety Policy. Within the Department of the Navy, safety will be found in the area of industrial relations; in the Department of the Army and the Department of the Air Force, the function will be found as a sub-function of the Office of the Inspector General.

Over the years, there has been little resolution of the question as to where the safety and health function should best be located. The problem has been pretty well written off with the belief that it really doesn't matter where the function is located, as long as the organization has a sound safety and health policy and the mechanism and the resources in place for carrying out that policy.

Problems associated with organizational structure; coordination and span of management; authority, delegation, and decentralization; groups and committees; managing organizational change; and managing organizational conflict, will appear under this heading.

Organizational Placement of the Safety and Health Function

- Is there an optimal location for the safety and health function within an organization? If so, what is this location and on what bases has this determination been made? It it is determined that there is not an optimal location for the safety and health function within an organization, why isn't there, and on what bases has this determination been made?

- Where is the most efficient place to locate the safety and health function within an organization? For example, should it be located under "Operations" where most of the work is, or should it come under "Personnel," "Employee Relations," or some other non-operational department? Why?

- Where do a sample of occupational safety and health professionals from a variety of corporations, companies and establishments believe that occupational safety and health function should be located and why? Where do the Chief Executive Officers (or their equivalents) of these same organizations believe the function should be located and why? Where do other members of top management in these organizations feel the function should be located? What is the significance of the levels of agreement or difference that are identified?

- How strongly do managers feel that they have selected the optimal location for the occupational safety and health function and on what basis would they be willing to reassign the function? How much agreement is there between a sample of managers and a sample of occupational safety and health professionals (in the same organizations) as to where the occupational safety and health function should be located? What are the implications of the levels of agreement and disagreement that are identified?

- Some occupational safety and health practitioners believe that the principal occupational safety and health professional within an organization should report directly to the Chief Executive Officer (CEO) of the organization. How prevalent is this belief and on what bases is such a belief held? What benefits/disbenefits would such placement have from the viewpoint of a sample of CEO's and occupational safety and health professionals?

- What patterns appear in corporations where new management has taken over with regard to the placement of the occupational safety and health function, e.g., to what extent is the function reassigned, realigned or otherwise changed from what it was under the previous management? What are the implications of these changes on the part of new management?

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- What are the relationships, if any, between the organizational placement of the occupational safety and health function and the organization's occupational injury and illness experience, lost workday case rate, and other indicators of perceived occupational safety and health program effectiveness?

- Stoner sees a major disadvantage of organizational charts as follows:

    . . . there are too many things that they obscure or do not show. They do not, for example, indicate who has the greater degree of responsibility and authority at each managerial level. Nor do they indicate the organization's informal relationships and channels of communication, without which the organization could not function efficiently. In addition, people often read into charts things they are not intended to show. For example, employees may infer status and power according to one's distance on the chart from the executive's box. These disadvantages can be minimized if we do not expect charts to do more than they were designed to do—reveal the basic framework of the organization.[15]*

On the same topic, Mild has observed that:

    The structure of a business is described only partly by functional organization charts. Each rectangle is a neatly packaged set of duties unique to that department or division. The job descriptions for each rectangle use such nebulous words as *coordinate, perform liaison,* and the like . . . [16]†

What is the relationship between the "formal" organization and the "informal" organization within an organization, and the occupational safety and health experience of that organization? How much of the plan for implementing organizational safety and health policy is dependent upon the full use of the "informal" organization?

- What are the specific functions of various levels of management in a properly organized occupational safety and health program? Do these functions change significantly depending upon the classification of the industry, its size, hazard-level, geographic spread, or other factors? Why? Why not?

- It is an axiom of management that responsibility and authority can be delegated, but not accountability. How and to whom does management in those organizations with highly successful occupational safety and health programs delegate responsibility and authority for occupational safety and health? What patterns evolve in such delegations?

- Who should be assigned the responsibility for safety and health program administration at the *corporate level* within an organization? Why? At the *establishment level?* Why?

- Many organizations have safety functions split among several departments. The traditional function of personnel accident prevention may be located in a safety office in a personnel, industrial relations, or risk management department. The industrial hygiene function may be part of the medical department. Fire protection engineering may be located in the facilities department, and safety engineering in an industrial or manufacturing engineering group. In addition to the splitting of responsibility among various departments, some organizations may also have an office of regulatory compliance which duplicates some of the functions as they relate to governmental regulation such as OSHA standards, hazard communication standards, hazardous waste regulations, etc. While splitting or duplicating functions throughout the organization, many organizations may also "saddle" the personnel safety office with several non-safety functions such as workers' compensation claims, security, and first-aid. Would the combining of all safety functions in one organization and removing the non-safety functions from the responsibility of the safety office result in a more effective and efficient safety and health program? A comparison of perform ance measures, and cost measures for organizations with split or overlapping safety functions versus

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organizations with unified safety functions might be useful in providing data to determine the relative effectiveness of these two approaches to organizing the safety function.

- Determine whether differences in various aspects of workplace organizational structure are associated with differences in accident experience. (Examples of organizational structure include: management structure, organizational policies, management and worker roles in terms of occupational safety and health responsibilities and policy formulation, communications channels used to distribute information relevant to health and safety, etc.).

- Two of the major ways by which an organization's department can be formally structured are by function or by division. Stoner describes the differences thusly:

> Organization by *function* brings together in one department all those engaged in one activity or several related activities. For example, the organization divided by function might have separate manufacturing, marketing, and sales departments. A sales manager in such an organization would be responsible for the sale of *all* products manufactured by the firm. . . . A major advantage of the functionalized structure is that it makes supervision easier, since managers have to be expert in only a narrow range of skills . . .

> Organization by *division* brings together in one department all those involved in the production and marketing of a product or related group of products, all those in a certain geographic area, or all those dealing with a certain type of customer.[17*]

Does the way an organization's department is structured (i.e., by function or division) have any significant effect on the way the occupational safety and health function is perceived and the effectiveness with which it (i.e., the safety and health function) is carried out?

- Based on a sample of both centralized and decentralized safety and health programs in selected organizations, what are perceived as the advantages and disadvantages of centralizing or decentralizing the function? How were the factors of "advantage" and "disadvantage" selected (i.e., what criteria were used)? Under what sets of conditions are centralization or decentralization of the safety and health function recommended?

- What is the relationship between the level of decentralization within an organization and that organization's occupational safety and health record?

- What are the advantages and disadvantages of decentralization within an organization insofar as occupational safety and health is concerned? How can those factors which are perceived as disadvantages be turned into advantages?

- In organizations which have the functions of occupational medicine, industrial hygiene and health physics, how are the missions and responsibilities of each spelled out so as to eliminate wasteful duplication of effort and possible tensions among the staffs? To whom do such individuals report and why? To whom should they report and why?

- Because so many industries have workers with musculoskeletal and cardiovascular impairments, what is the present worth of having in-plant fitness centers with highly trained staffs?

- Conduct an examination of the scope and functions of design safety, particularly in the realm of heavy production or materials-handling equipment. (Unsafe design of many pieces of equipment is the direct cause of a significant number of industrial work injuries, as many designs are inherently dangerous and error-provocative, endangering not only the user's life, but often the lives of co-workers and the public).

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- Simon has described the informal organization as " . . . the interpersonal relationships in the organization that affect decisions within it, but either are omitted from the formal scheme or are not consistent with it."[18] Conduct a study of a sample of occupational safety and health professionals in organizations with effective occupational safety and health programs and describe the extent to which each uses and believes in the informal organization and the perceived benefits and disbenefits associated with its use.

- What problems in achieving optimal safety and health conditions, if any, have arisen in matrix-type organizations? (In a matrix structure, two types of organization design exist simultaneously—functional departments and project teams. On an organization chart, the resulting lines of authority resemble a grid—hence the term "matrix").

- How do factors such as size, "economic health," type of product produced or service rendered, centralized management versus decentralized management, etc., affect the roles of safety and health staff and company management relative to safety and health within the organization?

- Some labor organizations provide extensive information and instruction on occupational safety and health to their members. As a result of this activity on the part of some unions, some managements have opted not to provide such information and instruction to their employees, leaving this task to the union. How prevalent is this practice on the part of management, and what implications does it have for employers and employees, and for labor organizations?

Functions of the Occupational Safety and Health Staff

- What are the appropriate functions of the occupational safety and health staff? What auxiliary functions, if any, should be assigned by management to the occupational safety and health staff (e.g., tracking first-aid cases, workers' compensation, plant security, etc.)?

- Based on an analysis of several small-, medium-, and large-size establishments, what significant differences exist in terms of the safety and health policy, the functions of occupational safety and health professionals, the functions of other staff, etc.? What is the significance of these differences and what types of guidance is indicated for these organizations in terms of safety and health policy; size, qualifications and tasks of safety and health professional staff, etc.?

- How do a sample of organizations with highly effective occupational safety and health programs ensure that their occupational safety and health staffs are routinely involved in providing input to decisions of design and engineering groups? How valuable is this input perceived to be by: a) managers, b) design and engineering staffs, and c) occupational safety and health staffs?

- What are the specific functions of the safety and health staff in a properly organized safety and health program (i.e., in some organizations, the safety staff conducts orientation and training sessions for employees, designs and operates the safety and health incentive awards program, and performs other tasks)? To what extent are safety and health staffs being used to perform tasks that actually should be performed by other staff members? To what extent are other staff members performing tasks that correctly belong in the safety and health function? Why has this situation occurred? What have been the benefits/disbenefits of such allocations of these functions?

- What is the occupational safety and health experience in a sample of establishments, companies and corporations where: a) the headquarters safety and health executive controls hiring, promotion and salary throughout the organization, and b) local management has complete control over all occupational safety and health-related functions and activities at the local operation? Under which conditions are: a) or b) recommended? Why?

- The occupational safety and health professional frequently is found on the specialized staff of the organization. One identifying characteristic of specialized staff members is that they usually have no formal authority over other parts of the organization. How is this lack of formal authority perceived by occupational safety and health professional personnel? Do they perceive it as impairing their ability to accomplish the tasks to which they have been assigned? How accurate are their perceptions in this regard?

- Conduct an examination of the process of decision-making in corporate decentralized organizations. To what extent do line and staff functions determine the final outcomes of decision-making with regard to occupational safety and health matters? The traditional role of the staff professional is to advise and present alternative courses of action to line managers. However, with the advent of regulations in the field of occupational safety and health, there are other requirements on staff professionals, namely: reporting substantial risks, the general duty clause, and resolving professional ethics on a day-to-day basis. To what extent are health and safety professionals adhering to the traditional staff role and permitting line managers to make decisions that may jeopardize the safety and health of the workers? What are the options for the safety and health professional when such decisions are made in conflict with major safety and health recommendations?

Employee Involvement in Occupational Safety and Health Programs

- Generally, committees have a bad name. Those opposed to the use of committees frequently cite the late humorist Fred Allen's observation that "A committee is a group of people who, individually, can do nothing, but who, collectively, can agree that nothing can be done!" While the comment is frequently good for a laugh, it needn't be true. Stoner observes that " . . . because of their collective information and authority, committees and task forces are frequently more likely than individuals to come up with workable solutions to problems."[19]* To what extent are occupational safety and health committees used in industry and with what success?

- To what extent and with what success have various creative thought processes (e.g., "brainstorming," "morphological analysis," etc.) been used to solve occupational safety and health related problems? What processes are being used? How are they being used? When are they being used? What types of organizations tend to use these and similar processes? How effective have these processes been and what criteria have been established for determining "effectiveness?"

- To what extent do joint labor-management safety and health committees influence management decisions on occupational safety and health matters? Can such committees be structured for greater effectiveness? How?

- Does collective bargaining, which often takes place under adversarial conditions, help or hinder management's ability to implement an effective occupational safety and health program, or do the most effective dealings result from joint consultations which take place outside of the frequently adversarial collective bargaining context?

- Conduct a survey of the extent to which selected employers in high-hazard industries utilize occupational safety and health committees. What types of policies govern the operation of these committees? What are some specific examples of committee achievements? What do a sample of managers, supervisors and employees think of the effectiveness of such committees in terms of effecting change within the organization? How effective do the committee members, themselves, believe the committees to be? What type(s) of training have committee members received to cause them to be more alert to occupational and environmental hazards within their organizations? What are the costs of establishing and operating these committees versus the benefits received as a result of their activities? From this information, develop a proposed standing operating procedure (SOP) for establishing, operating, and evaluating occupational safety and health committees.

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- In organizations with "accident review boards," or "accident review committees," how are such bodies organized? Under whose aegis do they function? What is their mission and function? How are they staffed (both in terms of size and types of individuals who serve on them)? How does management assess their value? On what bases does management assess their cost and benefits. On what bases do employees assess their value? Do such boards and committees seem to be limited to selected industries? If so, which ones? Why?

- Quality circles are relative newcomers to the American business scene. Brought to the United States in 1974 by Lockheed, it is now estimated that there are more then 2,000 establishments, companies and corporations which have quality circles. What is the relationship between quality circles and injury and illness experience at those establishments, companies and corporations which have established such circles? Conduct a clinical study of the quality circle concept in selected organizations to determine how the concept is being used to improve the quality of occupational safety and health within such organizations.

- How do "quality circles" serve management's and employees' interest in helping to achieve the occupational safety and health goals of the organization? What kinds and sizes of quality circles are being used in selected organizations? How are they set up? How do they operate? What data are available to indicate how effective they have been? Out of the information and other data collected during the study to answer these and related questions, develop a set of guidelines for use by employers when planning, implementing and evaluating quality circles from the standpoint of their contribution to improved occupational safety and health within the organization.

- How do a sample of organizations optimize the knowledges and skills of their entire staff to support occupational and environmental safety and health objectives of the organization? For example, how do these organizations ensure that occupational and environmental problems are brought to their attention in a prompt, concise manner, and how do they solicit input from these other staff members? How is feedback provided to both those providing input and to the occupational safety and health staff?

- Study a sample of joint labor-management health and safety committees to identify their structure, functions and their perceived and documented effectiveness. Prepare a report based on findings which could serve as a set of guidelines for employers considering establishing such committees.

- Conduct a definitive study of the structure, function and operation of each of three different types of occupational safety and health committees (i.e., the plant central committee, the departmental safety committee, and the workers' committee) in manufacturing-type facilities. What impact have these committees had on occupational safety and health within those establishments where they have been used? How was this impact determined?

- Identify and describe the contributions that each function within an organization can make to achieving the organization's occupational safety and health goals.

- Survey a sample of employers in a high-hazard industry to identify the types of rewards systems, if any, that are used to help those employers to achieve their occupational safety and health goals. How are these reward systems designed? Who had input into the design of such systems? On what bases did the employers decide to establish such systems? How are the results of such systems measured? Based on findings, develop a set of guidelines for establishing, operating and evaluating a reward system designed to motivate further employee performance in support of occupational safety and health goals within an organization.

Other Problems Relating to the Function of Organizing

- Stoner defines a manager's span of management as " . . . the number of subordinates who report directly to him or her."[20]* What is the relationship, if any, between the span of management within an organization and the injury and illness experience within that organization? Can any differences observed be related to the span of management? Why? Why not?

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- In the literature and in the press, one often reads about "successful" organizations. Examine the criteria which are used to determine "success" in this context to determine what role the organization's occupational safety and health policies, organization, and programs have on the determination of a "successful" identification for selected establishments, companies and corporations.

- Develop and test a simulation exercise for use with both management and occupational safety and health professionals, which takes into consideration the planning, organizing, staffing, directing and controlling of the safety and health function in a manufacturing facility of specified size. What significant differences are there between the model developed for testing via simulation and the actual safety and health organization within this same manufacturing facility? What are the implications of these findings?

  Problems related to the one described above would be to repeat the activity for: a) a construction industry, b) a maritime operation, or c) a service industry.

- Identify and analyze a sample of occupational safety and health delivery systems for the small business sector. How effective are these delivery systems? Upon what bases were they developed? Who took the lead in their development (e.g., OSHA, the Small Business Administration, trade associations, local safety councils, others)?

- Many organizations have developed programs for *job enlargement* and *job enrichment* to increase employee satisfaction. Stoner defines these two terms as follows:

  > *Job enlargement* tackles the problem of dissatisfaction by increasing job scope. Various work functions from a horizontal slice of an organizational unit are combined, thereby giving workers more operations to perform . . .
  > *Job enrichment* tries to deal with dissatisfaction by increasing job depth. Work activities from a vertical slice of the organizational unit are combined in job so that employees have greater job autonomy . . . [21]*

  What problems, if any, have these personnel practices created for the occupational safety and health professional, e.g., the additional tools, machines, materials, process and reporting relationships to which the worker is exposed in such circumstances?

- How does management successfully incorporate into their personnel management systems an active health promotion plan that emphasizes the benefits of such a program for a reduction in both job-related and non-job-related diseases and injuries?

STAFFING

Introduction

> . . . The function of staffing has to do with manning the organization structure to assure that an enterprise can be competently operated. Staffing must be regarded as a system, a subsystem of the total management system. In other words, manager selection, appraisal, inventorying, and development are closely interrelated.

> In particular, staffing involves the proper and effective selection, appraisal, and development of personnel to fill the roles designed into an organizational structure . . . [22]†

Little has been written about the staffing of occupational safety and health programs, and the research which has been conducted in this field is virtually nil. Unlike the military, civilian organizations, even those within the federal government, normally do not develop and publicize staffing patterns for their safety and health functions. In the U.S. Army, for example, there is an Aviation Safety Officer for each Aviation Company. In addition to other criteria, this individual must be: a) an active Army military personnel, b) a rated pilot, and c) a graduate of specified aviation safety courses at both the U.S. Army Aviation School

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at Fort Rucker, Alabama, and at the University of Southern California's Institute of Safety and Systems Management.

Currently, the information on the staffing of occupational safety and health programs is based, for the most part, on tradition and on the opinions of those responsible for the safety and health function. Thus, there is little guidance for the employer who may want to staff in accordance with selected criteria, e.g., size of workforce; levels of risk of the operations performed within the establishment, company or corporation; geographic spread of the organization's operations; the "track" of the organization in terms of its occupational injuries and illnesses; or the management philosophy espoused by top officials of the organization.

Problems relating to the staffing process, human resource planning, recruitment, selection, induction and orientation, training and education, placement and performance appraisal will be found in this section of the report.

Employment Factors

- Does the establishment of competencies and other personnel criteria enhance occupational safety and health program quality? If so, in what ways?

- What employee selection criteria are related to an increased risk of involvement in incidents at the workplace, and what selection criteria are related to a decrease in incidents at the workplace? On what bases were these determinations made?

- Is there such a phenomenon as a "safe" and "healthful" worker? If so, define such individual and develop the rationale for determining that there is such an individual. If not, explain the process by which this determination was made.

- Is "safety proneness" any more logical as an explanation for an absence of incidents resulting in death, injury, or illness than "accident proneness" is for a presence of incidents which result in death, injury or illness? Why? Why not?

- To what extent are occupational safety and health staffs involved in developing specifications for various classifications of personnel so as to ensure that individuals selected for employment in specific tasks are likely to be able to perform those tasks without undue risk?

- Develop measures for determining how safety conscious (aware) a worker is, and in which job types he is most likely to operate safely. What are the implications of such findings for the staffing function within an organization where significant safety and health risks are present?

- How can data best be collected with regard to reproductive toxicology for both men and women in consideration of the development of suitable guidelines for the employment (and placement) of women and men of reproductive capacity? Document examples of how selected employers in establishments where there are health hazards which affect the reproductive systems of men and women accommodate this problem satisfactorily.

Training and Development of Employees Other Than Occupational Safety and Health Personnel

- Cohen, Smith and Anger have examined techniques for influencing individual worker behavior, actions and attitudes in ways that could offer greater self-protection against workplace hazards and have concluded that " . . . training remains the fundamental method for effecting self-protection against workplace hazards."[23]* Is there a single model for providing the information and instruction on occupational safety and health to employees which may be used, irrespective of industry classification or level of hazard? If not, what guidelines should be used by employers to develop programs designed to provide such information and instruction to the worker? What are the limitations of information and instruction as occupational safety and health injury and illness countermeasures?

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- Are there "generic" types of information and instruction on occupational safety and health hazards and what to do about them that *all* employees should know, regardless of the level at which they work or where they work in an organization? If so, what are these increments of information and instruction?

- There is evidence to indicate that accident frequency rates are susceptible to business cycle influences. In periods of prosperity, rates tend to increase whereas in a recession they tend to decline. In periods of prosperity, the increased press of work brings additional stress but, just as important, it brings younger, more inexperienced workers into the workforce. Accident rates tend to fluctuate not only with the age of workers, but with time and experience on the job.[24] A problem which continues to plague industry is that of the high injury and illness rates for young workers, new workers and employees who have been on the job for less than one year. Data from the Bureau of Labor Statistics, U.S. Department of Labor, show that such individuals account for a startling 48 percent of all work-related injuries. Why do youth continue to be involved in injury- and illness-producing incidents at a much higher level than their numbers in the workforce would suggest? Why hasn't there been a significant improvement in the occupational injury and illness experience of young workers? What programs and program elements initiated and carried out by employers seem to be effective in reducing the frequency and severity of young worker's involvement in injury- and illness-producing events at the workplace?

- Conduct an analysis of the occupational safety and health information and instruction provided to youth during apprenticeship training to determine its nature, scope and applicability to the types of safety and health hazards to which these apprentices will be exposed when joining the workforce as journeymen.

- How can employers best reach young workers, new hires and employees otherwise inexperienced in their job assignments more effectively to prevent their being involved in injury- and illness-producing incidents at the workplace at the levels at which they are now involved?

- How can computer-aided instruction, video-disk technology, simulation, and the like be used to better train employees to perform their work safely and recognize hazards more effectively? Data and experience suggest that the frequency of accidents is much higher during the early part of a person's employment. Workers are often shown how to operate equipment, such as turning it on and off. Seldom are they run through "the things that can go wrong." Over time, workers see things go wrong (such as in operating a machine) and learn what to do to act safely in these rather rare events. With computers, video-disk and simulation training, for example, workers can move through the unusual operations (misfeeds, maintenance, etc.) which often lead to injuries. The problem here is to define and demonstrate how dangerous events can be simulated and people trained in responding to these events correctly (safely).

- Develop a systematic, consistent, impartial and quantitative planning tool whereby available training resources can be effectively aligned with occupational safety and health training needs for an establishment, company or corporation. To perform this task, it would be necessary for the investigator to: 1) identify quantitatively and in priority order occupational safety and health training needs for the present, short-term and long-term; 2) identify and characterize quantitatively available options in training philosophy, methodology, technique, and aids in terms of effectiveness, efficiency, general acceptability, cost, and other factors; 3) quantitatively model the training delivery process and represent thereby all tangible and intangible factors reasonably affecting the process and the relationships between and among these factors; 4) exercise the model in "known input" configurations and validate all assumptions made and relationships employed; 5) perform necessary model refinements and updating and revalidate; and 6) utilize the model on an experimental basis as an occupational safety and health training resource allocation aid.

- What types of occupational safety and health-related training should managers receive to enable them to work more effectively with occupational safety and health professionals?

- How can more operations people be moved through occupational safety and health positions, either in the early years of their development, or as managers on their way up? (This would give the people who

manage the plants and the organization a better grounding in occupational safety and health, thus enabling them to support better the organization's occupational safety and health initiatives.)

- MacCollum has identified seven basic reasons why people accommodate (put up with, work with, or around) hazards. These are:

    1. They are unaware of the hazard.
    2. They are unable to evaluate the possibility of accident risk.
    3. They work under competitive peer or production circumstances.
    4. They work with machines that have incompatible controls, conflicting instructions, no guards or warnings.
    5. They work with machines that exceed human capabilities.
    6. They work with machines that create distractions (such as noise).
    7. They work under stressful environmental conditions. (This cause is often overlooked in accident investigation.)[25]

To what extent are a sample of managers at U.S. manufacturing facilities aware of these reasons and, of those who are familiar with them, what actions are being taken to correct the conditions which lead workers to accommodate hazards?

- How knowledgeable are a sample of manufacturers' designers, who are assigned the responsibility for design safety, in the techniques of system safety hazard identification and in other hazard identification techniques (e.g., management oversight and risk tree analysis, failure mode and effect analysis, fault tree analysis, etc.)?

- Are there significant differences in the bodies of occupational safety and health knowledge and skill that the following groups see managers as needing: other managers at higher, the same and lower levels within the same organization; representatives of the workforce; members of organized labor groups within the organization; occupational safety and health practitioners within the organization; academic personnel; government safety and health personnel; etc.?

- What is the impact of an inability to read and write, and poor usage of English on numerous facets of safety and health within an organization? With estimates of 26 million U.S. adults being classified as "illiterate" and another 46 million as "barely literate," what impact does this have on workplace programs, safety/caution messages, instructions/warnings on products, etc.? To what extent are organizations dismissing employees who cannot read and understand warning signs, etc., so as to protect both them and fellow workers? What types of programs has industry instituted to combat this problem? How is this nation's educational system reacting to the size and seriousness of this problem?

- To what extent has a sample of employers with highly effective occupational safety and health programs prepared job safety and health analyses (sometimes referred to as "job hazard analyses") for *all* positions within the organization? What types of problems were encountered in preparing such analyses? Who was involved in the preparation of these analyses? How are such analyses used? How effective has the use of these analyses been in improving the safety and heath posture of the workplace and in reducing selected types of injury- and illness-producing incidents? A job safety and health analysis (or job hazard analysis) is a procedure for studying and recording each step of a job, identifying existing and potential hazards, and determining the best way to perform the job in order to reduce or eliminate the risk. Information obtained from such analyses can be used as the content for the training activity and as checklists for use by the supervisor to ensure that the employee is following a standing operating procedure.

- Survey a sample of organizations within the same industry classification to identify the types of employees whom management sends off the premises to attend occupational safety and health conferences, seminars and other meetings with expenses paid. What classifications of personnel receive such training? How often? At what cost? What are those employees who receive such training required to do upon their return to their place of employment (e.g., provide written reports to management, provide training to supervisors and to workers on what they have learned, or other tasks)? How well do these requirements on

the part of those who have received off-the-premises training seem to be working in terms of achieving a multiplier effect for their training, and in terms of effecting change in the occupational safety and health program of the organization? Do these organizations have a formula for such training investments (e.g., not more than one week away from the facility for such training each calendar year, etc.)?

- Survey a sample of organizations to identify and describe their personnel development systems (i.e., training and education of all types, on or off company time and on or off the company premises) insofar as these systems relate to the provision of information and instruction on occupational safety and health to all levels of employees. What is the relationship between the quality of an organization's personnel development system and its occupational safety and health record?

- Review the literature with regard to the impact of alcohol abuse on worker injury, illness and property damage at work. Review also the literature on the extent, nature and effectiveness of employer countermeasure programs. Based on these literature reviews, prepare a document which will aid employers in establishing programs to combat the problem effectively.

  A related problem would be to conduct the same type of review, but for the impact of drug abuse on worker injury, illness and property damage at the workplace, to review employer programs designed to combat this problem, and to prepare a document which would aid employers to establish programs to combat this problem effectively.

- Analyze the data available on the effects of working overtime on workers' health and safety, particularly for those in transportation industries, forest fire fighting, and selected health care occupations. Based on this analysis, develop a set of guidelines for use by managers and supervisors in these occupations.

- Is employee absenteeism related to an organization's injury and illness record and, if so, in what ways and to what extent? Identify and describe the actions that a representative sample of employers are taking to curb excessive absenteeism in those instances where employers have found a relationship between such absenteeism and injury and illness experience.

- Examine current work procedures used in selected hazardous work situations to determine the adequacy of these procedures in terms of worker safety and health.

- Develop the most appropriate techniques of data collection, analysis and reporting in order to facilitate identification of high-risk job tasks, operations and materials.

- Many organizations (both public and private) offer short-term training programs (institutes, seminars, symposia, conferences, etc.) for managers to keep them abreast of the latest developments in occupational safety and health. To what extent do a sample of managers participate in such training programs? How do these managers estimate the effectiveness of this training in enabling them to achieve improved safety and health performance upon return to their organizations? On what bases are these estimates of effectiveness made?

- Develop profiles of the health and safety hazards associated with particular occupations and for particular substances, including information on ways to avoid or eliminate these hazards.

- Since engineers design, or specify, most of the work conditions, at what level of occupational safety and health competency should a manager expect the engineering staff to function?

- The National Safety Council, as well as other individuals and organizations, have frequently expressed the belief that the supervisor is the "'key'' man in the safety program because he is in constant contact with employees.[26] Some occupational safety and health practitioners take issue with this observation. However, virtually everyone who has written on the subject, agrees that the supervisor does play an important role in both the design, implementation and evaluation of an organization's occupational safety and health program. In view of this, how do a sample of employers with highly effective occupational safety and health programs provide information and instruction on occupational safety and health to their supervisors? What types of information and instruction are included in such training programs?

What are the perceptions of a sample of supervisors in these organizations with regard to the relevance and utility of the information and instruction that they have received? How are supervisors perceived by employees as a source of information and instruction on actual and potential hazards at the worksite and what should be done about them?

- A study sponsored by OSHA found that there was a 90–10 safety-health mix in current training and education programs in occupational safety and health (i.e., 90 percent of the subject matter covered was safety-oriented and only 10 percent of it was health-oriented). In view of the large amount of attention being given to actual and potential health risks at the worksite, why is it that so few training programs focus on health issues? What is the rationale behind programs of instruction for workers that seem to ignore the health risks of the workplace? What can be done to stimulate interest in both the development of health hazard-focused training programs, and to get these programs used by employers who have significant health risks at their worksites?

- A factor in some occupational injuries and illnesses is that of human performance deficiencies. Rummler has stated the belief that:

> For the most part, human performance deficiencies can be classified as *deficiencies of knowledge,* which result from an employee's not knowing what to do, how to do it, or when to do it; or as *deficiencies of execution,* which result from an employee's failing to perform because of factors in the work environment; or as some combination of the two. Thus, unless the problem is one of a deficiency of knowledge, training is probably not the solution. And, any training program conducted to solve a deficiency in execution probably will fail.[27]

To what extent do employers in selected industries attempt to differentiate between deficiencies of knowledge and deficiencies of execution before designing informational and instructional programs and scheduling personnel to participate in them?

- Training may be defined as transforming a given input into a desired output, with training being the throughout process. This being the case, the employer should know what the employees already know before designing an informational or instructional program for them. What do a sample of employees in a specific high-hazard industry know about the occupational safety and health hazards of their jobs and what to do about these hazards? What don't these employees know that they should know?

- Based on surveys of a sample of selected organizations with highly effective occupational safety and health programs, develop outlines of the information and instructions in occupational safety and health which should be provided to each of the following categories of employee:

    Directors and senior executives
    Works and functional managers
    Supervisors and foremen
    Professional engineers
    Scientists and technologists
    Laboratory staffs
    Engineering craftsmen
    Engineering trainees
    Process operatives
    Administrative, office and clerical staff
    Safety and health personnel
    Other personnel (depending upon the types of organizations studied).

- Based on surveys of a sample of selected organizations with highly effective occupational safety and health programs, develop a course (course objectives, lesson objectives, lesson plans, and an evaluation plan) to be provided to all new employees as a part of their orientation to the job.

- Conduct an analysis of the content of professional development training received by a sample of managers and staff (other than occupational safety and health professional personnel) to determine how much information and instruction on occupational safety and health they receive. A related problem would be to conduct an analysis of the content of professional development training received by a sample of occupational safety and health professional personnel to determine how much information and instruction they received on functions other than occupational safety and health. What are the implications of these findings for professional development programs designed and funded by selected organizations?

- Investigate and evaluate methods for providing occupational safety and health professionals, medical professionals, etc., with education regarding work-related illnesses and injuries, and their prevention.

- Investigate ways to apply current research knowledge regarding the factors associated with effective attitudes and behavior changes, to specific hazardous work situations.

- Investigate individual and societal acceptance of risk and of the controls which reduce risks; determine the factors which contribute to individual and societal decisions regarding "acceptable risks" levels.

Numbers and Types of Occupational Safety and Health Personnel

- Develop and test a staffing guide to assist employers to determine when full-time or part-time occupational safety and health professionals are needed by an organization, or whether a consulting service or a safety and health auditing service can suffice. Such a guide would identify not only when an employer should have specific numbers of full- or part-time help (or the help of a consultant or auditing service), but would also indicate the type(s) of individuals required (e.g., safety engineers, industrial hygienists, toxicologists, occupational physicians, occupational nurses, etc.).

  NOTE: Some excellent background information for anyone desiring to study this or a related problem may be found in: Fine, William T., "Proper staffing of an occupational safety and health office," *Professional Safety*, March 1982.pp. 20–24.

- On what bases should occupational safety and health program activities be staffed within an organization? For example, should the numbers and types of occupational safety and health professionals, paraprofessionals and technicians employed be based on the size of the workforce, the levels of risk within the organization, geographic spread of the organization's operations, management philosophy within the organization, on all of these factors, or on other factors (specify)?

- Is there such a thing as a "correct mix" of occupational physicians, occupational nurses, industrial hygienists and other occupational health professionals, and other staff in a plant medical department of an organization of specified size, location, hazard category and mission? If so, on what is this "correct mix" based? If there is no such mix, what criteria should be used when staffing the plant medical department?

- How do the factors of risk and company size interact as determinants of the type and size of the safety and health staff of an organization?

- To what extent are individuals without adequate professional preparation in occupational safety and health placed in occupational safety and health assignments? What impact does this have on: a) the injury and illness experience of those organizations which use such personnel, and b) the ability of management to motivate employees to work toward improved safety and health within the organization?

- When organizations select individuals to fill full-time occupational safety and health positions from within the organization, despite the fact that they have no significant training in occupational safety and health, what types of individuals do these organizations normally select (i.e., what requirements do they require and to what parts of the organization do they normally look)? Why do some employers choose non-occupational safety and health professionals when such professionals are available?

- Conduct a survey of "situations wanted" announcements filed by occupational safety and health professionals in search of initial or other positions in the field, to identify what the focus of their announcements is. For example, do they focus on their education and experience, or on their accomplishments (in the case of those who have been active in the field for some time)? A companion study would be to analyze "positions available" announcements filed by employers in search of occupational safety and health professionals to identify what the thrust of their announcements is (e.g., do they focus on education, experience, actual on-the-job performance, or a combination of these).

- Analyze "positions available" announcements in the press, and employment firms, to identify precisely what employers are looking for in terms of occupational safety and health professionals. To what extent are employers searching for individuals with CSPs (i.e., Certified Safety Professional status conferred by the Board of Certified Safety Professionals of the Americas, Inc., or Certified Industrial Hygienist status conferred by the American Board of Industrial Hygiene)? What other specific types of qualifications are employers looking for when they hire occupational safety and health professionals on an initial basis or as replacements for those personnel who have left the organization on their own or at their employer's request?

- At what point should a business have "in-house" occupational safety and health capabilities (e.g., business size, profit margin, nature of hazards, single plant versus multi-plant operation, etc.)? On what bases were these criteria identified? How valid are such criteria?

- What is the relationship, if any, between the numbers and types of occupational safety and health professional and support personnel and the various indices of occupational safety and health program effectiveness by which organizations are normally measured (e.g., injury and illness frequency and severity rates, lost workday case rates, etc.)? Is an organization's occupational safety and health experience related to the numbers and types of safety and health professionals in its employ? If not, what is the experience related to?

- Section 21.(a). of the Occupational Safety and Health Act of 1970 (Public Law 91-596) directs the Secretary of Health, Education, and Welfare (now the Secretary of Health and Human Services) to " . . . conduct, directly or by grants or contracts (1) education programs to provide an adequate supply of qualified personnel to carry out the purposes of this Act, . . ." This mandate is generally accepted to mean the training of occupational physicians, occupational nurses, industrial hygienists and other occupational health scientists, and safety engineers. NIOSH has interpreted the mandate to include influencing the curricula for those who work in support roles to occupational safety and health professionals, including managers. In view of the specific mandate of the Act, NIOSH, in 1974, commissioned a study[28] to determine whether a nationwide survey could accurately describe the existing occupational safety and health workforce and to develop a manpower forecasting model capable of estimating future occupational safety and health work force requirements. The goal of the study was to provide NIOSH, other federal agencies, educational institutions, private industry, and individuals interested in entering the occupational safety and health field with an assessment of the demand for additional trained employees. The study revealed that occupational safety and health professional personnel were known by more than 100 different titles. Some of the titles by which these individuals were known were: safety aide, safety assistant, safety officer, safety inspector, safety engineer, safety manager, safety supervisor, safety superintendent, loss prevention specialist, industrial hygienist, occupational safety specialist, occupational health specialist, fire prevention specialist, fire protection specialist, etc. Those interviewed or polled by the investigators preparing this NIOSH-funded study identified the following "Job Cluster Titles" for those individuals participating in the study:

Administers, advises and interprets	Performs tests and analyzes
Inspects, interprets, investigates, and plans	Maintains and repairs equipment
Analyzes plans and develops procedures	Physician
Provides training	Nurse

What is the significance, if any, of the large number of job titles for individuals who perform professional or support functions in the area of occupational safety and health? Is there a single job title or identifier by which occupational safety and health professional personnel could be known which would accurately describe their tasks, irrespective of the type, size or risk category of the organization for which they work? Would there be any merit to a single job description for those individuals? What would it be?

- Survey organizational practices in the selection of occupational safety and health professional personnel, e.g., what roles do the following criteria play: formal education, work experience, motivation, physical agility, mental ability, personal characteristics, physical ability, willingness to travel, willingness to relocate, and others?

- Develop and test a model which an employer can use to help him to determine when one or more part-time (or collateral duty) personnel are required to perform occupational safety and health related functions. What types of backgrounds (educational and experienced) appear to be most important when choosing such individuals? To which element of the organization do employers normally turn when choosing individuals to serve in part-time occupational safety and health functions? Why?

- Examine the effectiveness of selected organizations which use periodic occupational safety and health audits as a substitute for full-time occupational safety and health professionals. What conclusions may be drawn from this analysis?

- Determine where occupational safety and health professional personnel come from. An examination of the recruitment patterns for occupational safety and health professional personnel in selected organizations (e.g., are most hired from other organizations, upon graduation from colleges and universities, or are they developed from within the organization). What are the benefits and disbenefits to the employer for each route of entry into the occupational safety and health field?

- Develop and test a model for assessing occupational safety and health professional personnel requirements in business and industry, organized labor, government, academia, and research-oriented organizations. There is not now any definitive information with regard to how to determine the actual demand for occupational safety and health professional personnel either in the short-, intermediate-, or the long-term.

- Study the impact of NIOSH-sponsored programs under Section 21.(a) of the Occupational Safety and Health Act of 1970 (Public Law 91-596) on both the quantity and quality of occupational safety and health professional personnel (especially occupational physicians, occupational nurses, industrial hygienists and other occupational health scientists, and safety engineers). Specifically, what impact have the training grants program and the Educational Resource Center (ERC) program of the National Institute for Occupational Safety and Health (NIOSH) had on the availability and quality of occupational safety and health professional personnel?

- During 1981, the Tennessee Valley Authority, an organization of some 40,000 employees and the nation's largest producer of electricity, had one of the poorest safety records in the Federal government. In just three years, TVA has achieved a dramatic turnaround. TVA's Chairman of the Board, Charles Dean, in explaining how this marked improvement came about, cited a number of corrective measures. One of these was the substantial reduction of the number of professional safety personnel, particularly at the corporate level, in order to minimize the line manager's reliance on a central staff to carry out day-to-day safety functions to achieve *improved safety performance.*[29] This raises the question of just how many safety and health professionals are ''enough'' in an organization. TVA's action cited above is not unique. Some executives have expressed concern that a large safety and health staff may be perceived by other staff members and line managers as being responsible for safety and health functions and thereby may lessen their own interest and activity in this regard. How prevalent is the thinking expressed by the Chairman of the Board of the TVA among Chief Executive Officers and managers, and what implications does the decision by TVA have for the occupational safety and health staffing of other organizations, especially those within the federal government? What implications does the decision have for managers in general?

Training and Development of Occupational Safety and Health Personnel

- In the United States, it is estimated that less than ten percent of the some 225,000 people working in safety- and health-related positions belong to professional safety and health organizations, and that far less than that are active members. In view of this estimate, what actions do employers of occupational safety and health personnel who do not belong to professional societies take to ensure that they keep abreast of the latest developments in the field?

- Some of the respondents to the survey on which this report is based questioned the relevance of much of what is being taught to today's occupational safety professionals. They say much of the training relates to hazards which were found and which continued to be found in heavy industry, while little or no attention is being given to the hazards associated with the service industries and to the "hi-tech" industries. How accurate is this portrayal of the education of occupational safety professionals?

- What are the developmental costs of occupational safety and health professional personnel as compared to the developmental costs of other professional staff with comparable levels of responsibility in selected organizations? If there is a significant difference in these costs, what is the significance of these differences?

- Many organizations permit professional staff to attend one professional meeting, seminar, conference or symposium, or other professional development activity each year. What type(s) of activities do occupational safety and health professional staff select to invest in under these conditions? Do choices of developmental activities differ significantly between occupational safety and health professional personnel and other professionals within the organization? If so, what is the significance of these differences?

- Study the extent to which Individual Development Plans (IDP's) are used for occupational safety and health professional personnel in career development programs of selected organizations. (IDP's are formal, written documents, developed jointly by the employee and his supervisor, which spell out the information, instruction and assignments which the individual and his supervisor believe he needs to develop himself to the level desired by his supervisor). Typically, McLean sees an IDP as containing the following:

  1. Work assignments. (Specify special assignments to be given; identify their developmental purpose; state time schedule.
  2. Coaching and counseling. (Specify areas for improvement, where coaching and counseling skills of immediate supervisor will be utilized).
  3. Educational experiences. (Specify courses, seminars, independent study, personal visits, industry events, etc.; identify their developmental purpose; state time schedule).[30]*

- How do a sample of employers go about ensuring adequate career development for both their corporate and plant safety and health professional personnel? Based on these and other findings, develop a model program for such career development.

- Should occupational safety and health personnel be rotated into and out of various other functions within an organization (e.g., planning, purchasing, operations, etc.) in a definite career plan for these personnel?

  A comparable question would be "Should non-occupational safety and health personnel be rotated into and out of the occupational safety and health function as a part of a definite career plan for these personnel?"

- Study the professional advancement patterns for occupational safety and health professionals within a sample of corporations to determine the rates at which and the levels to which such personnel are advanced. How do the rates of advancement and levels to which such personnel are advanced compare with those of other professionals with comparable levels of education and responsibility within these same organizations? What differences are there and why?

- What educational and experiential background is necessary for an individual to function successfully as a collateral duty (part-time) safety and health official? Since these individuals rarely have the safety

and health function as their primary job task, how does an organization's management ensure that such individuals are properly motivated to complete their assigned tasks effectively? Under what conditions are collateral duty personnel useful? Under what conditions are they ineffective? On what bases should collateral duty safety and health personnel be evaluated, since only a part of their time is devoted to the organization's safety and health function? To whom in the organization should an individual with safety and health functions on a collateral duty basis report? Why?

- Study the attrition among occupational safety and health professional personnel. Is the turnover among this group lower, about the same as, or higher than that for staff with comparable qualifications and responsibilities? Why? What can be done to retain the more effective occupational safety and health professional personnel for longer periods?

- Develop and test a model for an occupational safety and health professional personnel management program to include:

    Personnel requirements in the near-, medium-, and long-term
    Specifications for specific classifications of occupational safety and health professional and support personnel
    Staffing patterns
    Recruiting plans and procedures
    Selection plans and procedures
    Placement plan and program
    Supervision of occupational safety and health professional and support personnel
    Human resource development plan and program
    Performance appraisal, promotion, demotion, reassignment and separation
    Remuneration.

- Develop and test a model for personnel development for occupational safety and health professional and support personnel within an organization. Such model should take into account the nature, amount and frequency of information and instruction to be provided through: a) self-study, b) on-the-job training, c) formal training, d) rotational assignments and e) other types of developmental activities.

- Develop a profile of occupational safety and health professional personnel in terms of age, sex, educational level, work experience, job history, job turnover, job satisfaction, salary, and other factors. What are the implications of this profile for: a) employers of occupational safety and health professional personnel, b) colleges and universities that train occupational safety and health professional personnel and c) the occupational safety and health profession itself?

- What types of management-oriented training should occupational safety and health professionals receive to enable them to work more effectively with management? With peers? With subordinates?

- A federal-private program which operates under the auspices of the President's Commission on Executive Exchange, allows managers in private industry and government to swap places for a year. It has been described as a program to "give the industry person and the federal person a chance to walk a mile in each other's moccasins." Originally geared toward young managers, the 16-year-old program is now open to executives, young and old, provided they are "exceptional managers" with unique qualifications and extremely high potential for policy-making positions. Examine this program to determine the extent to which occupational safety and health professionals from within industry and government have participated, the views of those who have participated and the changes in their careers performance has benefitted. Essentially, such a study would attempt tp answer the question: "To what extent is the program known to occupational safety and health professionals, how many have participated in it, and what effects has the program had both in terms of changes in occupational safety and health programming and on the careers of those individuals who have participated in it?"

Performance Appraisal for Occupational Safety and Health Professional Personnel

- Survey selected occupational safety and health professional personnel to identify what they perceive as significant strengths and limitations of managers in their interaction with these safety and health personnel.

- Survey selected managers to identify what they perceive as significant strengths and limitations of occupational safety and health professional personnel in their interaction with peers and supervisors.

- Develop a profile of those occupational safety and health professional personnel who are perceived by their managers as *effective* and the bases upon which these determinations were made, and a profile of those occupational safety and health professional personnel who are perceived by their managers as *ineffective* and the bases upon which these determinations were made.

- Is there a significant difference in the on-the-job performance of those occupational safety and health professionals who hold certification in organizations such as the Board of Certified Safety Professionals of the Americas and the American Board of Industrial Hygiene, for example, and those occupational safety and health professional personnel who do not hold such certification? If there is a significant difference, on what bases was this determined, and what is the significance of this difference?

- To what extent do employers with highly effective occupational safety and health programs include effective occupational safety and health program management as a rating factor in managerial performance evaluations? Document the rating factors and the weight(s) assigned to them. Document also how such rating factors were introduced, the reception they received initially from managers, and what managers currently think of the rating factors? What significant changes in occupational safety and health programming, if any, have occurred since the initiation of such a rating system?

  NOTE: An individual considering investigating this problem may be interested in the following article: Garner, Charlotte A., "Let's Put Safety on the Appraisal Form," *Occupational Hazards*, March 1980. pp. 75–78.

- In his book *There is a Better Way to Manage*, McLean discusses what he terms "stewardship review," which he describes as a process, conducted at least quarterly " . . . that provides not only an exchange of information on a specific responsibility or objective but also perspective on the job as a whole . . ."[31]* How does management of selected organizations with good occupational safety and health records go about structuring, scheduling and carrying out performance reviews for their occupational safety and health professional personnel? How are these performance reviews perceived by: a) managers and b) occupational safety and health professional personnel?

- In many organizations, subordinates (including occupational safety and health professional personnel) have the responsibility for reporting their most important achievements for the year in an annual report to their supervisor. What types of achievement do occupational safety and health professional personnel who are perceived by their managers as highly effective include in such reports? Do they tend to focus on: a) the fact that objectives were met, b) how the injury and illness frequency and severity rates and the lost workday case rates compare with those of the previous year(s), c) the value of their accomplishments to the mission of the organization, d) other factors (specify)? What implications may be drawn from the content of such reports by occupational safety and health professional personnel? What do other staff specialists (other than occupational safety and health professional personnel) tend to highlight in their annual reports on their most important achievements during the year? What is the significance of the differences in what, and the way in which, the two different groups report their achievements?

- Examine how selected organizations assess the job performance of occupational safety and health professional personnel and support staffs. Is the process significantly different from that used to assess other individuals with comparable staff responsibility? If the process is significantly different, what is the rationale for this(these) difference(s)? Is this rationale sound?

- Develop and test a model for determining the remuneration of occupational safety and health professional and support personnel. Among the questions which would have to be considered during the development and testing of such a model is whether occupational safety and health professional and support personnel should be paid on the same bases as other staff with comparable educational and/or experiential experience and job responsibility, or should they be paid on other bases? If the latter, what are these other factors and why should they be considered in determining the salary levels for occupational safety and health professional and support personnel? Are occupational safety and health professional personnel paid bonuses when the organization has a good safety and health record for the year? Should they be paid on this basis? Why? Why not?

- There is legal precedent for occupational safety and health professional personnel to be held legally liable for actions they recommended or fail to recommend which lead to incidents resulting in death, injury or illness to employees or to the public. What lessons are there in these court decisions for: a) managers, b) occupational safety and health professional personnel, and c) those who prepare occupational safety and health professional personnel at the higher education level?

- Conduct a study of downgrading, reassignment, reclassification, and dismissal actions among occupational safety and health professional personnel, and the reasons for these actions. What implications do these actions have for the initial preparation, subsequent development, and supervision of these personnel?

Utilization of Occupational Safety and Health Professional Personnel

- Some occupational safety and health professionals feel that they have more to offer management than advice and counsel on the recognition, evaluation and control of physical (safety) and health hazards at the worksite. How can the talents of occupational safety and health professional personnel best be utilized by management in the development and achievement of organizational goals?

- Conduct a survey of the aspirations of a sample of occupational safety and health professional personnel. Do occupational safety and health professional personnel tend to choose occupational safety and health-related activities as their life's work, or do they see a safety and health position as a "steppingstone" to positions of actual or perceived greater value, both financially and psychically?

- To what extent is what Maslow terms the need for "self-actualization" being realized by a sample of occupational safety and health professionals in: a) a sample of organizations with good-to-excellent occupational safety and health programs and accompanying records, and b) a sample of organizations with occupational safety and health experience which is less than the national average for their industry? In each instance, the organizations represented by the personnel studied should be from the same SIC industry.

- Many occupational safety and health professionals view themselves as managers. Are they really? Generically, do they not fit into the organizational structure in much the same way as the medical director, legal adviser, etc.? How prevalent is the belief held by a sample of occupational safety and health professionals that they are managers? How do the top managers of these same organizations view the occupational safety and health professional? What are the implications of these findings for: a) managers, and b) occupational safety and health professionals?

- What percentage of occupational safety and health professionals in a sample of corporations aspire to positions of top management? How does this percentage of individuals with such aspirations compare with that of other professionals with comparable levels of education and responsibility within these same organizations? What differences are there and why?

- To what extent are occupational safety and health professional personnel involved in the design, development, implementation and evaluation of training programs which have as their focus the increase in the level of skill and knowledge of occupational safety and health hazards and their recognition, evaluation and control? Who should provide such information and instruction to the employee? Why?

- Conduct an analysis of job satisfaction/dissatisfaction among a sample of occupational safety and health professional personnel. What factors tend to ensure retention of high-performance occupational safety and health professionals, and what factors tend to cause these individuals to change jobs or to leave the field entirely?

- Examine the job content documents (considered by some as being the same as position descriptions) for occupational safety and health professional personnel within selected organizations. Job content has been described by McLean as having to do with the work itself, as involving " . . . the responsibilities to be managed, the results to be achieved, and the power to achieve them." McLean provides the following sequence of steps in defining job content:

  > Step 1: Understand how your boss's job contributes to the success of the business
  > Step 2: Identify the major areas of responsibility of your job
  > Step 3: Select the controls to manage each responsibility
  > Step 4: Set objectives that are important to the success of the business
  > Step 5: Test each objective, and the sum of all objectives, for achievement, motivation, priorities, and standards
  > Step 6: Achieve "correlation" with others in the organization (Correlation means to achieve a reciprocal, supportive relationship).[32]*

How do the job content documents for occupational safety and health professional personnel in organizations studied compare with McLean's model, outlined above?

- In his book, *There is a Better Way to Manage*, McLean makes the following observation: "The responsibility title suggests accountability for results, not for activities. In effect, for each responsibility title, the individual is saying: "I have responsibility for results having to do with ''[33]* Different levels of management within an organization have different responsibilities for occupational safety and health (e.g., the president, a vice-president for engineering, a manager of operations, and a plant manager). How do those organizations with the better occupational safety and health records ensure that occupational safety and health responsibilities are neither duplicated not overlooked when delegating the authority and responsibility for selected aspects of occupational safety and health?

Operating Styles of Occupational Safety and Health Professional Personnel

- Study the perceptions of other professional staff members toward occupational safety and heath professional personnel. Are occupational safety and health professional personnel perceived in the same way as other staff members with comparable staff responsibilities? If not, how are they perceived and why, and what are the implications of these perceptions in terms of achieving a reciprocal supporting relationship with others within an organization?

- Develop a profile of how a sample of occupational physicians go about their tasks at selected industrial establishments. What patterns emerge? Does there appear to be an optimal method of operation which would be suitable for all or most industries? Why? Why not? Variants of this type of study could be to develop similar profiles for occupational nurses, industrial hygienists and other occupational health scientists, and for safety engineers.

- Study the perceptions of what managers believe the occupational safety and health professional personnel should know about how the business system operates in general, and about management of the system in particular, in order to be more effective staff members. How do these perceptions compare with what occupational safety and health professional personnel feel they already know about how the business system operates and how the system is, or should be, managed?

- To what extent are occupational safety and health practitioners viewed by corporate executives and by their peers as "super technicians?" How prevalent is this view and what can be done to change these perceptions? On what bases were these perceptions developed? How valid are they? Are occupational

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safety and health professionals in these same organizations aware of the perceptions of corporate executives and peers toward their contributions?

- The term "post-ventionists" has entered the lexicom of some occupational safety and health professionals and some managers. Essentially, the term relates to those individuals who focus on after-the-fact actions in their occupational safety and health programming, rather than on "prevention." How is a sample of occupational safety and health professionals in specific high-hazard industries perceived with regard to whether they "preventionists" or "post-ventionists?"

- To what extent do a sample of occupational safety and health professionals at the higher echelons of an organization feel that they are under pressure to serve the perceived needs of the organization first and the needs of the workers second? Are these valid perceptions? How was the validity of these perceptions determined? If these perceptions are found to be valid, how extensive is this conditions and what can and should be done about it?

- In his book *Goal Setting,* Hughes discusses goal-oriented individuals and task-oriented individuals, with the former being those who get much satisfaction from solving difficult problems, whereas the latter get satisfaction not so much from problem-solving as from finishing a task.[34] Based on a survey of managers within a single SIC industry, using Hughes' definitions, how are occupational safety and health practitioners perceived? What relationships, if any, are evident between the ways by which occupational safety and health practitioners are perceived by their managers and the safety and health records of these organizations?

- McLean, in his book *There is a Better Way to Manage,* differentiates between "job content" and "job context" as follows:

  > *Job content* has to do with the work itself. It involves the responsibilities to be managed, the results to be achieved, and the power to achieve them. *Job content* has to do with the motivators, the satisfiers, responsibility, achievement, recognition for achievement, psychological growth. *Job context* has to do with the environmental factors used to control job dissatisfaction: company policy and administration, supervision, compensation, interpersonal relations, and working conditions.[35]*

What are the motivators for occupational safety and health professional personnel as revealed by a survey of selected organizations with "good" occupational safety and health records? "Good" would be defined by the investigator and could take into account such factors as whether the organization had a record the same as, or better than, the average for the industry of which it was a part.

- Conduct a survey of a sample of occupational safety and health professional personnel and their managers to determine the compatibility of their perceptions of why accidents happen and the most effective countermeasures for correcting the causes of these accidents. What are the implications of the levels of agreement? Of the levels of disagreement?

DIRECTING AND LEADING

Introduction

> The functions of directing and leading are concerned with the interpersonal relations of managers and non-managers. Planning, organizing, and staffing, as effectively done as they might be, must be supplemented by giving people guidance, by good communications, and by an ability to lead. Managing, as leadership, must be based on an understanding of what motivates people and on an ability to build into roles an interpersonal relationships system of inducements so that people will obtain satisfaction from contributing to the achievement of enterprise and department goals.[36]†

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Problems identified in this section of this report relate to the management functions of directing and leading. Such problems include those associated with communications and various forms of leadership within organizations. Cohen defines communication as " . . . the transference of information from one person to another, with a shared understanding of what is meant . . . "[37]

Problem Areas

- Section 8.(f)(1) of the Occupational Safety and Health Act of 1970 (Public Law 91-596) gives each employee the right to request an Occupational Safety and Health Administration (OSHA) inspection of his place of work when the employee believes that he is in imminent danger from a hazard, or when he feels that there is a violation of an OSHA standard that threatens physical harm. OSHA will maintain confidentiality for the employee; if requested, will inform the employee of any action it takes regarding the complaint; and, if requested, will hold an informal review of any decision not to inspect. Just as in situations of imminent danger, the employee's name will be withheld from the employer, if the employee so requests. Has this provision of the Act resulted in a strengthening or a weakening of the formal internal communications network for reports of actual or potentially unsafe conditions at the worksite? In other words, has the ability of the worker to go directly to OSHA with assured anonymity resulted in any significant change in management's interest in identifying physical (safety) and health hazards at the worksite? What effects have this employee right had on the condition of the workplace in terms of the nature and frequency of safety and health hazards?

- Section 21.(c) of the Occupational Safety and Health Act of 1970 directs the Secretary of Labor, in consultation with the Secretary of Health, Education, and Welfare (now the Secretary of Health and Human Services) to " . . . provide for the establishment and supervision of programs for the education and training of employers and employees in the recognition, avoidance and prevention of unsafe or unhealthful working conditions in employments covered by this Act . . . " How well has this mandate been carried out in terms of: a) the numbers of personnel trained, b) the types of personnel trained (i.e., are those at the higher levels of risk receiving priority in training programs), and c) the quality of the training these personnel received?

- Between 1971 and 1978, the Occupational Safety and Health Administration (OSHA) employed a strategy for providing information and instruction on occupational safety and health to employers and employees of developing a limited number of training programs and delivering them to a small number of workers in high-hazard industries. In 1978, OSHA made the decision to launch a program aimed mainly at developing the institutional competency of key organizations serving employers and employees, including the educational community, to develop and deliver such training. Officially known as the Institutional Competency Building Grants Programs, but labeled the "New Directions" program, the program has been operational since October 1978. How well is the "New Directions" program, referenced above, helping the Secretary of Labor to implement Section 21.(a)(1) of the Occupational Safety and Health Act of 1970?

- How can employers in small business enterprises be convinced of the need for structured safety and health programs efforts when many such establishments may go for years, or even decades, without a single lost-time injury? What motivators have been used effectively with such employers?

- How do a sample of organizations with highly effective occupational safety and health programs maintain a high level of management awareness of the need for occupational safety and health within their organizations? What factors in addition to economic ones are used to achieve and maintain a high commitment to occupational safety and health on the part of the managements within such organizations?

- How do a sample of organizations with highly effective occupational safety and health programs present data on injury, illness, property damage, product liability costs, and on other downgrading incidents to their boards of directors, to corporate executives, and to other top echelon personnel, so as to enable these data to have maximum impact in convincing these individuals of the need to place or to continue to place a high priority on occupational safety and health within the enterprise?

- What roles are computers playing in occupational safety and health program administration within selected industries, and how can computers best be used in corporate management information systems to enhance an organization's occupational safety and health program efforts?

- How can the benefits of an effective safety and health program best be communicated to management, e.g., in addition to the often intense personal suffering and financial loss to the injured worker and his family, worker injuries and illnesses add greatly to workers' compensation costs, they disrupt productivity, increase downtime, disrupt production schedules, and add to hiring and training costs. Further, the bad press which frequently follows a major accident (and sometimes even a minor one) can seriously impair the image of the firm in the community or throughout the country)?

- Is the national infrastructure for providing information and instruction on occupational safety and health hazards and what to do about them adequate to employer requirements for such information and instruction? If it is, how can information on the availability of this infrastructure and its components best be called to the attention of managers? If the current infrastructure is not adequate to the needs of employers, what modifications to it are required?

- What is the most effective vehicle for providing information and instruction on occupational safety and health hazards and what to do about them to employers and employees? Should federal agencies move more toward helping to support the informational and instructional efforts of the insurance industry, for example, rather than initiating, in a sense, competing methods of delivery for such services? What would be the benefits and disbenefits of a closer liaison between the insurance industry and the federal and state governments?

- How can information on the cause of work-related injuries and illnesses, generated by both federal and state governments and by private industry, best be communicated to employers?

- How can management best be taught and convinced that the prevention of occupationally-induced injuries and illnesses is cost-effective?

- Since the supervisor is considered to be a critical link in the management chain within an organization, how frequently do a sample of superintendents in a high-hazard SIC industry make contact with their supervisors (or foremen) to review safety and health conditions, general safety and health policies, and specific situations and conditions? What other types of topics or problems are generally discussed at such meetings? How effective are such meetings perceived to be in terms of aiding the organization to achieve its occupational safety and health goals?

- How do a sample of corporations keep senior management and boards of directors informed of occupational safety and health problems and of actions being taken to correct these problems?

- How do managers of organizations with highly effective occupational safety and health programs issue instructions and otherwise indicate to subordinates what is to be done to implement the organization's safety and health policy, plans and programs?

- Conduct a survey of a sample of organizations to identify and describe their communications systems (i.e., all the ways in which information about the company's philosophy regarding occupational safety and health, its safety and health goals and objectives, and other occupational safety and health matters is transmitted to all employees, supervisory and non-supervisory, at all levels). What is the relationship between the quality of these communications systems and the safety and health records of these organizations?

- Research conducted by the Department of the Army's Personnel Research Office showed that there were significant differences between the way military commanders (managers) and enlisted men (employees) perceived the effectiveness of selected accident prevention countermeasures which had been designed and implemented by military commanders. How do a sample of employers attempt to ensure that there is overall agreement on the perceived effectiveness of the occupational safety and health measures that they develop and implement within their establishments?

- How do a sample of organizations with highly effective occupational safety and health programs motivate their managements to adopt and to maintain a positive posture toward actions designed to reduce or eliminate all types of downgrading incidents within their organizations?

- How do a sample of managers successfully incorporate into their personnel management systems an active health promotion plan that emphasizes the benefits of such a program for a reduction in both job-related and non-job-related injuries and illnesses?

- How do occupational safety and health professional personnel convince management that the first consideration in planning for an occupational safety and health program should be that of determining what the hazards are and how they can best be eliminated or otherwise controlled, and not how much it is going to cost? (Obviously, the cost factor is important, but should it be the single or the most important criterion when planning an occupational safety and health program)?

- How do a sample of employers in high-hazard SIC industries with highly effective occupational safety and health programs establish occupational safety and health goals for their organizations, and to what extent and how are: a) the occupational safety and health staff, and b) employees, involved in such goal-setting?

- In what ways and to what extent are workers' and managers' attitudes toward risk associated with safe and unsafe work procedures? How do a sample of employers attempt to modify such attitudes when this is considered to be in the best interests of both the company and the employees? What successes have been reported in attempts at modifying the attitudes of managers toward risk? Of employees toward risk?

- How do a sample of organizations with highly effective occupational safety and health programs involve workers in identifying the increments of information and instruction on occupational safety and health risks at their worksites and what can be done about them, for the purpose of developing employee informational and instructional programs?

- Some employers have stated that they have not informed their employees about selected health hazards to which the employers are exposed because they did not want to "frighten" them. How do a sample of employers at whose establishments there are significant health risks, communicate information on health hazards to their employees, along with information on actions the employees can take to avoid or minimize exposure to these risks and minimize the effects of such exposures when they do occur. How do these same employers communicate information on health risks to which employees are subjected to the families of these employees? To the community as a whole (e.g., physicians, hospitals, rescue and first aid groups, the news media)?

- Some occupational safety and health professionals believe that, since they are a part of management, they should share only that information with employees which management believes they should share. Others, however, believe that they should share their findings with management and with all employees, without having to request approval from management to do so. What do a sample of employers, occupational safety and health professionals, and employees believe with regard to the providing of such information? What implications do these findings have for the training of managers, for the training of occupational safety and health personnel, and for the training of employees?

- It is sometimes alleged that unsafe and unhealthful working conditions go unreported by employees out of fear of reprisals for "blowing the whistle" on alleged management negligence. To what extent is this the case? How can management, with the participation of employees, establish a system that encourages employees to report unsafe or unhealthful conditions, while at the same time safeguarding them against unwarranted reprisals (e.g., assignment to jobs with little or no promotional potential, supervisory harassment, dismissal, days off without pay, etc.)?

NOTE: Employees have a right to demand safety and health on the job without fear of punishment. That right is spelled out in Section 11.(c) of the Occupational Safety and Health Act of 1970 (Public Law 91-596).

The law says employers shall not punish or discriminate against workers for exercising rights such as: a) complaining to an employer, union, OSHA or any other government agency about job safety and health hazards, b) filing safety or health grievances, c) participating on a workplace safety and health committee or in union activities concerning job safety and health, and d) participating in OSHA inspections, conferences, hearings or other OSHA-related activities.

* A Committee on Public Information in the Prevention of Occupational Cancer of the Division of Medical Sciences, Assembly of Life Sciences, National Research Council, of the National Academy of Sciences, in 1977, made the recommendation that:

> Information about the hazard of a carcinogen in the workplace should (1) be sufficient to permit a job applicant to decide if he wants to work there, or an employee to decide whether he wants to continue working there; (2) tell the worker how to take steps to minimize his own exposure; and (3) be sufficient to permit the worker to assist, to the limit of his capability, in monitoring and improving the environment of his workplace.[38]

* What impact has the Hazard Communication Standard, promulgated by the Occupational Safety and Health Administration (OSHA), had on a sample of organizations, each of which have significant health hazards associated with their operations?

NOTE: The final rule on hazard communications was published in the Federal Register on November 25, 1983. All employers covered by the standard (Title 29, Code of Federal Regulations, Part 1910.1200) are to be in compliance with it by May 26, 1986. The purpose of this standard is to ensure that the hazards of all chemicals produced or imported by chemical manufacturers or importers are evaluated, and that information concerning these hazards is transmitted to affected employers and employees within the manufacturing sector. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets, and employee training. This occupational safety and health standard is intended to address comprehensively the issue of evaluating and communicating chemical hazards to employees in the manufacturing sector, and to preempt any state law pertaining to this subject. Any state which desires to assume responsibility in this area may do so under the provisions of Section 18 of the Occupational Safety and Health Act of 1970 (Public Law 91-596), which deals with state jurisdiction and state plans.

* How do employers in selected high-hazard SIC industries implement the provisions of worker right-to-know laws? How effective are employer programs to implement this type of legislation as determined by inquiries to: a) OSHA, b) states which have OSHA-approved safety and health plans, c) management, d) employee representatives, and e) employees? What improvements are suggested in such programs as a result of this review?

* How important is the provision of information and instruction to employees in terms of hazard identification and control? What role(s) does(do) the provision of information and instruction play in combating occupational safety and health hazards? On what bases were these roles determined?

* There is no known comprehensive data on either the quantity or quality of worker training and education in job safety and health within the United States. There was no baseline of worker knowledge and skills in occupational safety and health at the time the Occupational Safety and Health Act of 1970 was passed, and there isn't any such baseline today. Further, such baseline data are not now being developed. So, the knowledge is limited with regard to who knows what about occupational safety and health hazards and how to correct them, how much training and education and what types of training and education may have taken place, how those who received it were selected, who trained them and their qualifications, at what cost, and what effect, if any, such training has had on occupational injuries and illnesses.

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Examine the feasibility of establishing baseline data for employees in selected high-risk industries (e.g., construction, longshoring, mining, quarrying, etc.) to determine what these workers know about the principal physical (safety) and health risks of their work and what to do about these risks. Such data would be used as a basis for developing information and instructional programs.

- A study sponsored by the National Institute for Occupational Safety and Health (NIOSH), in 1972, investigated safety hazards in the roofing construction industry, and examined behavioral and psychological variables potentially related to high accident occurrence.[39] In response to the question: "How do roofers learn to become safe workers?" Only seven percent of the low accident subjects and 16 percent of the high accident subjects in the sample mentioned formal training, either through the apprenticeship program or other programs sponsored by the company or the union. Only ten percent of the high accident subjects and six percent of the low accident subjects mentioned the foreman as the most important source of knowledge of safe work practices. The overwhelming majority of the subjects in both groups indicated that such knowledge and practices were picked up informally, either by the roofer's own experience, or from older, more experienced co-workers. How representative are the findings of the study referenced above? How do the workers in other high-hazard industries learn about occupational safety and health hazards and what to do about them? What implications do these findings have for managers in terms of the missions and functions of the formal training and occupational safety and health functions in their organizations?

- How do a sample of employers develop communications channels to ensure that in-plant occupational safety and health staff are fully apprised of, and have the opportunity to comment upon, occupational safety and health information provided to corporate management by consultants, insurers, etc.?

- How do occupational safety and health professional personnel in organizations with highly effective safety and health programs achieve and maintain reciprocal, supporting relationships with other staff in these same organizations?

- What are the barriers to a more thorough understanding of occupational safety and health problems in the workplace on the part of management, supervision and employees? How can these barriers be removed or reduced in their effectiveness to permit a more thorough understanding of occupational safety and health problems in the workplace?

- A related question is: How does the social-political structure within the United States (e.g., federal and state government, labor-management relationships, organized labor, special interest groups, intense media coverage, investigative reporting, etc.) affect the understanding of occupational safety and health problems in the workplace, and does this structure help or hinder efforts to find adequate solutions to safety and health problems in the workplace? In what ways? What can be done about it?

- In what ways do employees attitudes and employee morale affect an organization's injury and illness experience? Do such attitudes and morale have an effect on such experience irrespective of the quality of the occupational safety and health program within the organization? Why? Why not?

- Research conducted by the Department of the Army's Personnel Research Office, at its Biological Warfare Laboratories, found that the communication of safety and health information and ideas from one person or group to another was being criticized from several standpoints. Weaknesses were seen in communications from managers to workers, workers to managers, and between divisions within the laboratories. This research tended to support other investigations which have found that the closer the worker is to the actual or potential hazard, the more concerned he tends to be about the hazard. With the above information as a "given," how do successful managers ensure that workers and all levels of supervision and management have the opportunity for, and participate in, discussions relating to the actual and potential safety and health risks associated with their tasks?

- Based on a survey of the types of disciplinary actions taken by a sample of employers against employees who violate standing operating procedures (SOPs) designed for the safety and health of the employee,

to what extent are such measures used? What is the perceived effect of such measures as revealed by interviews with: a) employers, b) supervisors, c) employee representatives (i.e., union representatives), and d) employees who have been disciplined, and e) employees who have not been disciplined?

NOTE: The Occupational Safety and Health Act of 1970 (Public Law 91-596) provides only for employer sanctions by federal authorities. However, the occupational safety and health legislation of some other industrialized Western nations does provide for sanctions against the worker who violates a standing operating procedure which is designed for his safety and the safety of fellow workers and the public.

- How effective are employees sanctions of the type authorized for use in countries such as Great Britain in achieving improved safety and health conditions at the workplace, and in reducing the frequency of repeated violations of standing operating procedures (for safety and health) on the part of individual workers?

- What types of communications problems arise in multi-plant operations and in multi-national corporations? How do these corporations ensure that corporate safety and health policy with regard to occupational safety and health is implemented fully?

- What are the expectations of employers for the informational and instructional programs in occupational safety and health that they develop and schedule for employees? Are these expectations reasonable in terms of what we know about why work-related injuries and illnesses occur? What can be done to alter the expectations of employers, if these expectations are found to be unrealistic (e.g., in those instances where an employer may believe that a specific course will cause the employee to be a "safe" employee)?

- Numerous organizations operate employee suggestion systems, one of the functions of which is to involve employees in the planning and implementation of occupational safety and health efforts within the organization. How effective are these systems in getting employees to submit relevant, well thought through ideas to improve the quality of safety and health within the organization? What efforts do employers make to alert employees to occupational safety and health problems on which they *genuinely want their ideas*? What is the extent of employee participation in such suggestion systems? The rates of acceptance of their ideas? The rates of actual implementation of these ideas? What do a sample of managers, supervisors and employees think about the suggestion system as a device to stimulate employee interest in occupational safety and health?

- Little information is available on attempts to involve the worker's family or his community in safety and health programs. Such efforts have been undertaken in Canada, Sweden, and in the United States where it has been found that the incidence of off-the-job injuries to workers is frequently as much as 20 time greater than it is for injuries incurred on the job. Based on a survey of selected corporations, companies, and establishments, to what extent do these corporations actively promote off-the-job safety and health for their employees and their families? Describe representative off-the-job program activities; how and by whom they are planned; how they are financed; how they are carried out; management, union, and employee attitudes toward such programs; and how their benefits to the organization are assessed. Based on findings, develop a model off-the-job program for use by any employer.

- Among a sample of *workers* in a high-risk industry, how well informed are they with regard to their rights and responsibilities under the Occupational Safety and Health Act of 1970 (Public Law 91-596)?

- A related problem would be to take a sample of *employers* in these same high-risk industries and determine how well informed they are with regard to their right and responsibilities under the Act.

- Examine a sample of complaints filed under the provisions of Section 11.(c)(1) of the Occupational Safety and Health Act of 1970 (Public Law 91-596) to determine: a) the percentage of such complaints which were found to be valid, and b) the actions taken by OSHA and by the employer on those complaints which were found to be valid.

- Determine the most effective ways of identifying and conveying important research findings, and other relevant information which could be used to prevent work-related injuries and illnesses, to occupational safety and health program planners, employers and workers (i.e., what are the best ways to communicate such information?).

- Examine occupational safety and health performance in selected organizations whose managements seem to reflect primarily one of the following theories of the effective use of human resources:

    1. The strength of various human needs as explained by A. H. Maslow.
    2. The two sets of assumptions about human nature propounded by Douglas McGregor.
    3. How our value systems influence organizational behavior, according to Chris Argyis.
    4. The relationship of meaningful work and psychological growth, explained in the work of Frederick Herzberg.
    5. How concern for people and concern for production should be linked together, as explained by Robert R. Blake and Jane S. Mouton.
    6. The continuum of management styles described by Rensis Likert.
    7. The relationship of freedom and responsive behavior, explained by Erich Fromm.
    8. The meeting of basic human needs by coping with reality and showing responsible behavior, as suggested by William Glasser.
    9. The concept of developmental supervision, defined by M. Scott Myers.
    10. The movement toward a flexible and adaptive management structure, as outlined by Warren G. Bennis.[40]*

Which theories of alleged effective use of human resources seem to yield the better records in terms of occupational safety and health for the organization? Can a cause-and-effect relationship be established? Why? Why not?

CONTROLLING

Introduction

> The managerial function of controlling is the measurement and correction of the performance of activities of subordinates in order to make sure that enterprise objectives and the plans devised to attain them are being accomplished.[41]†

Problems associated with the control process, budgetary methods of control, non-budgetary methods of control, and methods for making control effective will appear in this section.

Problem Areas

- Develop a theoretical framework for examining the economic effects of the Occupational Safety and Health Act of 1970 on a specific industry, or set of industries.

- Examine the cost of compliance with the provisions of the Occupational Safety and Health Act of 1970 for a small-, medium-, and large-size employer in: a) a low-risk industry, b) a moderate-risk industry, and c) a high-risk industry.

- A significant share, frequently the majority, of the costs of workplace deaths, injuries and illnesses are borne, not by the employer or his insurer, but by society (e.g., non-work related insurance programs, social programs, volunteer groups such as the American Red Cross, the Salvation Army, and others). What can be done to get employers to internalize more of the costs of deaths, injuries and illnesses occurring at their facilities? How well known to the public are the costs of work-related injuries and illness which are now borne by society, rather than by the employer and, through him, his insurer?

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- Examine the effects of variations in economic conditions on issues relevant to workers' health and safety (e.g., does a recession affect the injury and illness experience of workers within specific industries?). How? Why? How can such effects be minimized?

- Can and should society attempt to place a cost on a human life for the purpose of preparing cost-benefit analyses of proposed occupational safety and health hazard countermeasures? Why? Why not?

- Of the expenditures for occupational safety and health within an organization, should a specified percentage of these funds be reserved for measuring safety and health performance within that organization? If so, on what bases should this amount of funding be determined? If not, why not? On what bases should funds for measuring the effectiveness of safety and health performance be based?

- Examine both budgetary and non-budgetary methods of control as these relate to the safety and health function within an organization. What are the strengths and limitations of each? Should both methods be used? In what balance?

- How do selected organizations compute the amount of safety and health they should receive as a function of dollar investment? Upon what assumptions are these computations based? How valid are these assumptions?

- How do a sample of managers of organizations with highly effective occupational safety and health programs compute the *direct* (or insured) costs of accidents? What cost items are included? How do these managers use these data to heighten the awareness of subordinate managers and other staff to occupational safety and health problems within their organizations (e.g., do they translate these costs into how much in sales will be required to pay for these direct accident costs)?

  A related problem would be that of determining how a sample of managers of organizations with highly effective occupational safety and health programs compute the *indirect* (or uninsured) costs of accidents. What cost items are included? How do these managers use these data to heighten the awareness of subordinate managers and other staff to occupational safety and health within their organizations (e.g., do they translate these costs into how much in sales will be required to pay for these indirect accident costs)?

  NOTE: The literature on accident costing sometimes treats direct costs as being synonymous with insured costs. However, the latter include compensation payments and insured property damage, while the former include, in addition, uninsured property damage. Payments by insurance companies with respect to insured property damage can considerably understate the total cost of damage because of uninsured risks and the existence of "excess" clauses in insurance policies.

- Development and testing of a model for calculating the direct and the indirect costs of work-related incidents which result in death, injury, illness, or property damage. Upon what bases were these determinations made? How were these cost estimates verified? Are the terms "insured" and "uninsured" truly synonymous with "direct" and "indirect" costs? Why? Why not?

  NOTE: The individual interested in pursuing this or a related topic may be interested in the following reference: Calabresi, Guido, *The Costs of Accidents: A Legal and Economic Analysis*. New Haven: Yale University Press, 1970.

- Is there a single basis for calculating the costs of accidents, or should the methodology chosen correspond to the safety and health policy objectives of the organization? Why? Why not?

- What are accidents actually costing the employer? How do a sample of employers in high-hazard SIC industries compute the costs of accidents? Some employers use three sets of data, namely: 1) the cost of lost workday injuries, 2) injuries which required first-aid, but didn't result in a lost workday, and 3) property damage accidents, where there were no injuries.

  NOTE: Cost items for the *lost workday case* frequently include: direct compensation paid, compensation administration and legal expenses, in-plant medical service, out-plant medical services, safety administra-

tion, time lost—salaried personnel, time lost—hourly personnel, net income lost due to time lost by salaried and hourly personnel, damage to and/or revision of equipment, one-half time productivity of injured, sickness and accident supplement to workers' compensation, loss of income due to inefficiency, fatalities, and permanent total disability.

Cost items for *first-aid injuries* frequently include: time away from job while first-aid is being administered; time spent investigating the incident; time spent revisiting the dispensary, if this proves necessary; time spent by first-aid personnel and cost of equipment used on first-aid cases; and time spent by injured worker's fellow employee(s) rendering assistance and extending sympathy.

Cost items for *property damage incidents* frequently include: damage to materials in storage or process, damage to buildings, overhead doors, equipment, etc.; damage to in-plant vehicles, whether repaired or not; damage to overhead cranes and related equipment; and damage to over-the-road vehicles and equipment, whether repaired or not.

- In the sense that planning is budgeting, to what extent are organizations identifying their dollar losses due to safety and health incidents? Are some organizations setting up special accounts for this purpose and, if so, how are these accounts set up? How are these accounts made visible in at least internal financial or managerial accounting reports, and what has been the experience of employers using such special accounts? As an output of such a study, design a set of accounts for reporting loss due to safety and health incidents within an organization.

- How do managers assess the costs of injury-, illness-, and property damage-producing incidents versus the manner by which occupational safety and health professionals believe that management should assess such costs? What are the differences? Are they significant? What do these differences reveal with regard to management's understanding of the occupational safety and health function, and what do they reveal with regard to the occupational safety and health professionals' understanding of the management function?

- What are the third party effects, externalities, or spillover costs of work-related deaths, injuries, and illnesses and property damage? How were these determined and verified? How can these findings best be disseminated to employers?

- Develop a tangible mechanism for relating dollar costs savings for a business unit having a full-time medical professional on staff, either at the corporate level or the divisional level.

- Examine the budgets of selected organizations with highly effective occupational safety and health programs to determine how much emphasis is placed on providing information and instruction on occupational safety and health to both managers and to non-management personnel. Few doubt the need to provide information and instruction on occupational safety and health for all employees; however, there is little hard data on the amounts budgeted for such information and instruction. Such a study may provide guidance for those employers who are seeking added criteria for allocating their resources for occupational safety and health programs and activities.

- In August 1960, the federal government began a "charge-back" system whereby the heads of federal departments and agencies had to, for the first time, budget for costs associated with occupationally-induced deaths, injuries and illnesses to federal workers. Prior to that time, the U.S. Department of the Treasury simply maintained a fund out of which all such costs were paid. Since the "charge-back" system has now been in place for more than 25 years, has it been effective in containing workers' compensation costs throughout the federal government? If so, what criteria were used in making this determination? If not, what criteria were used in making this determination? Should the "charge-back" system be discontinued? Should the system be revised? If so, in what way(s)?

- What long-term and short-term strategies can be used by the federal departments and agencies to control the cost of workers' compensation? These strategies should address both proposed changes in the legislation governing federal workers' compensation and administrative measures.

- Describe the development and testing of a model for determining cost/benefit ratios for occupational safety and health services.

- Conduct a critical examination of the various parameters that serve as bases for cost-effectiveness evaluation of occupational safety and health programs in industry.

- Jobsite accidents have a costly impact on the $300 billion-a-year construction industry in the United States. Work-related injuries and illnesses, including fatalities, in construction occur at a rate that is 54 percent higher than the rate for all industries, making it one of the most hazardous of occupations. Further develop the Business Roundtable[42] observations regarding the relationships between losses and corporate profit in the construction industry.

- Countermeasures designed to combat occupationally-induced deaths, injuries and illnesses frequently are classified into one of three broad categories, namely: a) those that are educational/persuasive in character, b) those that are technological in nature, and c) those that are regulatory in nature. Often all three types of countermeasures are applied to a particular problem. Examine the cost/benefit of each of these three methods for achieving safety and health improvements within an organization.

- What is the relationship between investment in occupational safety and health programs and activities, and the injury and illness experience of the organization?

- Develop and test a practical, working model which may be used for controlling work-related injury and illness claims. What is needed is a system that can be used by a claims-handler to track the incident from the inception of an occurrence which results in alleged injury or illness, through medical treatment, rehabilitation (if necessary), assignment of disability rating, and return to productive work (where possible), or final separation from the job.

- This problem relates to health hazards in the workplace. If a particular condition is not recognized as being work-related for compensation purposes, then it is unlikely that preventive measures will be set in motion, let alone even considered. What measures can be taken to ensure that the effects of such health hazards are identified early so that preventive actions can be taken much earlier than they now are?

- Develop a report that identifies and assesses the impact of the experience modification factors used by the various workers' compensation boards in the various states.

- Document specific analyses of existing workers' compensation board data to highlight specific problem areas within industries, or trends across industries.

- Document specific examples how effective occupational safety and health programs have impacted favorably the profitability of small-, medium-, and large-size businesses. Discuss the following for each example; a) how the organization identified that it had a problem in occupational safety and health, b) how the organization decided upon the type of occupational safety and health program which would be implemented, and c) how the organization actually went about implementing the programs (e.g., policy, organization, staffing, direction and evaluation of the program).

- Examine safety and health program efforts and their effectiveness in a sample of small businesses in high-hazard industries. The report on such a study should be prepared in a form that could be used as a guide by other small business employers to establish and maintain comparably effective safety and health programs.

- What are the most significant differences between those companies which have outstanding occupational safety and health records and those who do not? How can these differences best be explained?

- Develop a schedule that can be used in conducting comprehensive audits of motor carriers to determine compliance with Parts 390 through 397 and Part 399 of the *Federal Motor Carriers' Safety Regulations*. Estimate the requirements in man-hours and dollar costs to conduct such audits for each of the three types of motor carriers, namely: small, medium, and large.

- Conduct an analysis of the occupational safety and health records of foreign firms which have located in the United States to determine the relationships between their policies, plans, programs and organizations, on the one hand, and their injury and illness experience on the other.

- Conduct a study, or a series of studies, directed to the incentives available for *federal managers,* to determine what types of incentives are effective in causing federal managers at all levels to consider, in plan for, and implement effective safety and health programs. What impact do bonuses have in motivating managers to plan for and follow through on occupational safety and health activities within their organizations. What impact do financial penalties have in motivating these managers to plan and follow through on occupational safety and health activities within their organizations? How much of an incentive, if any, is financial accountability for managers, and at what levels does it serve as an incentive for managers to plan for and implement effective occupational safety and health programs?

- Who should measure safety and health performance within an organization? Why?

- How do selected organizations establish standards and methods for measuring safety and health performance? What should the criteria for such measuring instruments be?

- What are the components of effective injury/illness accountability systems as revealed by a survey of establishments, companies and corporations with highly effective occupational safety and health programs? Describe each of these components and their perceived relationships to the occupational safety and health posture of the organization.

- Two primary methods have been used by management to hold supervisors and managers accountable for the occupational safety and health of their employees, namely: a) the actual injury and illness records within areas of activity for which they are responsible, and b) specific preventive measures taken to recognize, evaluate and control actual and potential hazards within areas of activity for which these supervisors and managers are responsible. Is there any clear, unambiguous data with regard to which method is most effective and under what circumstances, or should both methods be used, and in what mix?

- Conduct a survey to determine innovative methods for reporting safety and health performance in graphical form. What statistics are used besides ''accident-free'' days, etc., and how are such statistics presented?

- Who in the organization should be evaluated for the occupational safety and health performance of the organization (e.g., top management, middle management, supervision, occupational safety and health professionals, others)? Why? What does a sample of organizations within a high-hazard industry show with regard to what categories of personnel are being evaluated for the safety and health performance of their organizations?

- Identify the types of internal injury/illness reports used by a sample of employers with highly effective occupational safety and health programs. What elements of information appear in the majority of these reports? What are the *essential* elements of information contained in these reports? How is this information presented? By whom are such reports prepared? To whom do such reports go? What follow-up actions are taken on the contents of such reports? How is the effectiveness of such reports perceived by management? By occupational safety and health professionals? By occupational safety and health committee members? By others?

- The National Safety Council publishes annually in its *Accident Facts* publication, the incidence rates of principal industry groups. The source of these data are reports of National Safety Council members participating in the Council's *Award Plan for Recognizing Good Occupational Safety Records.* Thus, the rates should not be interpreted as representative of industries represented in the rates listings, nor of the Council member companies. It is commonly believed that those organizations which belong to the Council and those which participate in the *Award Plan* and other Council-sponsored activities are among those organizations with the better occupational safety and health records and thus are not representative of the ''average'' establishment, company, or corporation. Develop a set of guidelines on how accident, injury,

illness, property damage and other data reported by the National Safety Council can best be used by an employer to determine where his organization is in relation to some of the better companies in his industry's SIC.

- What types of comparisons do a sample of employers use when attempting to judge the effectiveness of their own occupational safety and health programs (e.g., do they compare their records with those of their own organization for the preceding year(s), with other organizations in the same SIC industry of approximately the same size, with data reported by the Bureau of Labor Statistics, with data reported by the National Safety Council for its members in the same industry, etc.)? What explanations do these employers give for their use of one or more of the aforementioned criteria? If employers use other bases for comparison, what are these bases, and why and how are they used? Can an organization "compete" with another organization, or can it "compete" only with its own past performance? Why? Why not?

- Should fatalities incurred on the public highways by employees while on official business for their employers be considered as work-related accidents for computing the various rates for the establishment, company or corporation? For example, there are instances of several large manufacturing companies which have outstanding safety and health records at their manufacturing facilities, but who "fall down" in the standings because of their extensive network of sales representatives, some of whom may drive 35,000 to 60,000 miles or more each year. How can data on work-related deaths, injuries and illnesses be recorded in a manner that will ensure that traffic-related fatalities and injuries are not mixed with industrial related fatalities and injuries? Should this be done? What are the advantages and disadvantages of such a recording system?

- Most of the objective performance measures for safety and health program effectiveness are relatively short-term indicators. The accident and injury rates of various types used as performance indicators tend to reflect relatively low-severity and high-frequency kinds of accidents. Long-term effects of exposures to certain health hazards and high-severity, low-frequency accidents tend not to be reflected in the most commonly used performance indicators. Safety and health professionals are often forced into concentrating on the reduction of relatively low-severity, high-frequency accident/injury rates and reduced workers' compensation premiums. Potentially, more serious hazards such as exposures to carcinogens and catastrophic accidents, fires and explosions, may be ignored or given inadequate attention in the process.

Develop performance indicators which take into account high-severity low-frequency hazards and exposures. Secondly, as with other organizational functions, incentives need to be provided which reward safety and health managers for long-term results as well as short-term results.

- Identify and describe in detail the methods used by a sample of organizations with highly effective occupational safety and health programs to identify the major occupational safety and health problems in their organizations (e.g., management information systems; occupational safety and health audits by in-plant staff; occupational safety and health audits by consultants from outside the organization; incident, injury and illness reports, etc.). Discuss the strengths and weaknesses of each of these data sources, and describe how each source may best be designed, implemented, monitored and evaluated.

- Conduct a study of an organization which has had a *dramatic positive turnaround* in terms of its occupationally-induced injuries and illnesses to identify the factors which led to the identification of the problems and the decisions as to which actions to take to solve these problems. Identify also the specific actions that management took to achieve the dramatic improvement in its occupational safety and health record.

A related problem would be to study an organization which has had a *dramatic negative turnaround* in terms of its occupational-induced injuries and illnesses to identify the factors which led to the identification of the problems and the decisions as to which actions to take in the hope of solving these problems. Identify also the specific actions that management took which resulted in a deterioration of performance,

rather than an improvement in performance. Identify the factors which led to the selection of inappropriate remedies for the problem(s).

- Identify a sample of industries in the same SIC classification which have good, fair or poor occupational safety and health records in terms of the all-industry averages for the industry. Examine the occupational safety and health policy documents for these organizations in an attempt to establish a relationship between the policy documents and actual safety and health performance. What is the relationship, if any? Are there significant differences in the policy statements for those industries with good, fair, or poor safety and health records? Are there significant differences in how these policy statements were developed (e.g., to what extent were both line and staff managers involved, to what extent were employees, and where appropriate, their unions involved, etc.)?

- Study methods that are used to assess or estimate types and levels of risk in the operations of selected corporations. How valid are these methods or measures? How much uniformity in the methods used is found within a sample of employers in the same industry group?

- How do plant managers of selected companies organize and conduct plant-wide occupational safety and health inspection and monitoring programs? What devices and/or instruments are employed in monitoring the presence of potentially hazardous radiation, gases, etc.? To what extent do employees participate in these programs? What training do they receive in order to participate effectively? What is the nature of company records of such inspections and monitoring activities? Are any of these activities carried out through what is known as a ''cooperative self-inspection program? of management and labor, under a federal or state occupational safety and health provisions?

- To what extent do corporations with multi-plant operations use the self-inspection method to assist the corporate headquarters to monitor safety and health performance at their field operations? What types of self-inspection checklists and other devices are used? Who develops these instruments? How are these instruments field tested before use? What is done with the results? What are the opinions of a sample of corporate-level and plant-level personnel with regard to the effectiveness of the self-inspection technique as a tool to augment day-to-day plant inspections and periodic inspections, conducted by teams from the corporate headquarters? Based on these inputs, develop a set of guidelines for the use of self-inspection procedures for use with organizations with multi-plant operations.

- Identify and document the following information for safety and health audits currently in use by selected organizations:

     a. Information routinely requested prior to an on-site visit.
     b. Basic criteria for safety and/or health audit.
     c. Minimum data set for contents of exposure monitoring records.
     d. Sequence of on-site audit meetings and activities.
     e. Program element ranking systems.

How much consistency is there in the procedures used by various organizations when performing safety and/or health audits. Is it desirable to have a standing operating procedure (SOP) for all such audits, regardless of the type, size, and risk category of the organization? Why? Why not?

- Document and describe the results a sample of employers in high-hazard industries have had using the NIOSH-produced *Self-Evaluation Instrument*.[43] The Self-Evaluation Instrument (SEI) which is written for specific types of industries, is described in the NIOSH publication referenced below. Within the SEI are comments and questions applicable to specific within-plant situations where both hazards and potential hazards may exist. These sections in the SEI are designed to be reproduced; each section should be given to the persons responsible for supervising the area(s) to which it applies, and they, along with the employee working there, are to complete them. The various responses to the questions may then be used to: 1) analyze the work situation, b) develop a plan whereby corrective action may be taken around work

and production schedules, c) form the basis for educational and training programs, and d) emphasize for employers and employees the areas of potential concern.

* Develop a profile which will show the actual status of occupational safety and health program management within one of the three major groups within the construction industry (e.g., building construction—general contractors and operative builders; construction other than building construction—general contractors; and construction—special trade contractors). These groups are discussed in some detail in the *Standard Industrial Classification Manual.*[44]

* Accident rates are not independent of the size of the plant. The largest size and the smallest size plants have the lowest accident frequency rates as compared to mid-size firms. What types of occupational safety and health program measuring instruments should be used for small, mid—size and large plants? Should there be any difference in the choice of instruments? Why? Why not?

* Develop a methodology that will enable management to rank priorities within an occupational safety and health program. Monetary resources are often unwisely spent on programs and program elements because of the unknown parameters and variables of these programs and programs elements (e.g., costs for specific corrective actions which have worked elsewhere, severity of hazards, frequency of occurrences, etc.). A "risk-ranking" tool would be a helpful aid to management in helping them to determine which programs and program elements should be chosen in place of, or before, other programs and program elements.

* Determine statistically-sound methods for establishing quantitative accident reduction goals and determining whether the established goals have been reached. This would include determining what "satisfactory" indicators of safety and health performance are.

* Investigate and compare the effectiveness (in terms of preventive power, range of applicability, reliability) of different countermeasures or prevention strategies for reducing job-related injuries and illnesses in specific high-risk situations. Examples of prevention strategies include: increased use of occupational safety and health professionals, improved informational and instructional programs for supervisors and employees, improved occupational safety and health legislation, improved inspections, etc.

PROBLEM AREAS LISTED BY OTHER THAN FUNCTION OF MANAGEMENT

Introduction

In this section of this report will be found those problems and problem areas which do not lend themselves to one or more of the five above-referenced functions of management (i.e., planning, organizing, staffing, directing and leading, and controlling).

Problem Areas

* Within a period of some twenty years, many countries in the industrialized Western world seemed to rush into occupational safety and health legislation, sometimes with little justification for doing so, other than the fact that the occupational injury and illness experience within their countries was considered "unacceptable." A preliminary review of the legislative history of this occupational safety and health legislation reveals that little attention was given to alternatives to regulation. Now that the Occupational Safety and Health Act of 1970 (Public Law 91-596) has been on the books for some fifteen years, what has its impact been on this nation's occupational injury and illness toll? Are there other methods that could have been used to achieve comparable, or even better, results? What are these methods, and on what bases has the determination been made that these methods may have proven as effective, or more effective, than the Occupational Safety and Health Act of 1970?

* To what extent is the Occupational Safety and Health Act of 1970 viewed as a "punitive" piece of legislation by a sample of small-, medium-, and large-size employers? On what bases have these perceptions been

formed and do they appear to have merit? What implications do these employer perceptions of the legislation have for both the Occupational Safety and Health Administration (OSHA) and for those states which operate their own programs with OSHA approval?

• What impact has the Occupational Safety and Health Act of 1970 had on selected segments of the economy (e.g., the design, production and sales of personal protective clothing and equipment; the production of texts and other publications on occupational safety and health; the development and offering of professional, non-degree courses, undergraduate, and graduate courses in occupational safety and health; the training and placement of occupational safety and health professionals; and the amount invested in research into the causes of occupational injuries and illnesses and methods by which these causes can be corrected)?

• What are the perceptions of the utility and fairness of the Occupational Safety and Health Act of 1970 and the way in which it has been implemented by: a) OSHA administrators, b) management, c) labor, and d) a sample of Members of Congress who voted for the legislation? What are the major differences in these perceptions? Upon what data are these perceptions based?

• Conduct an analysis of the impact of the Occupational Safety and Health Act of 1970 on the voluntary safety movement within the United States. Has the Act resulted in a significant diminution of the role formerly played by the voluntary safety movement? Is so, what effects has such diminution had on organizations which would prefer to work with a voluntary safety organization as opposed to a federal or state safety and health regulatory body? What should the role of the voluntary safety movement be now that the Occupational Safety and Health Administration appears to be here to stay? Is there room for both the voluntary safety movement and the federal and state safety and health regulatory system? Explain.

• What impact have the significant shifts in emphasis on the part of various administrations (i.e., Democrat or Republican) had with regard to the manner by which the Occupational Safety and Health Act of 1970 has been enforced. What impact have these changes in emphasis by different OSHA administrators had on actual injury and illness experience in those industries affected by the Act.

• What effect has the selection of non-occupational safety and health professionals to administer OSHA had on the implementation of the Occupational Safety and Health Act of 1970? As of the date of this report, four of the six individuals chosen to head OSHA did not have backgrounds in either occupational safety or health; two had backgrounds in occupational health, while no one had a background in occupational safety. Should an individual heading up the agency be required to have training and actual work experience in either occupational safety or occupational health (or perhaps both)? Why? Why not?

• Have federal and state occupational safety and health standards and other regulations been cost-effective? If so, on what bases was this determination made? If not, what is needed to make such standards and regulations cost-effective? Should such standards and regulations be required to be cost-effective? Why? Why not?

• Examine the principal requirements of federal occupational safety and health standards (i.e., those promulgated by the Occupational Safety and Health Administration (OSHA), and those standards promulgated by states with approved-plan status). Discuss the similarities and dissimilarities in the two types of programs (i.e., federal enforcement and federally-approved state enforcement). Address costs, staffing with safety and health professionals, inspection activities, and enforcement protocols. Identify and discuss the problems you believe might face a corporation with operations in several states, some with federal inspection and others with federally-approved state inspection programs.

• A Task Force established by former President Carter reported that, at best, the Occupational Safety and Health Administration (OSHA) could expect to impact upon 25 percent of the causes of industrial deaths, injuries and illnesses with its focus on promulgating and enforcing occupational safety and health standards.[45] Assuming this to be the case, what are some of the viable alternatives to regulation or supplements to regulation which could substantially increase the percentage of injury and illness causes which could be impacted upon?

- Conduct an examination of a sample of employee complaints submitted to the Occupational Safety and Health Administration (OSHA) under the provisions of Section 8.(f) of the Occupational Safety and Health Act of 1970 to determine: a) how many of them were actually investigated, b) of those investigated, how many were found to be valid, and c) of these, how many related to an imminent danger or a serious hazard as opposed to a non-serious hazard or a condition classified as *de minimus.*

- Identify a sample of organizations that are currently participating in the development of one or more voluntary standards related to their occupational safety and health concerns. Determine: a) whether these organizations have a policy relating to such activity (i.e., participation in voluntary standards development), and b) how they characterize the benefits to their organization of their participation in voluntary standards development. Also, identify the subject(s) addressed by the voluntary standard(s), the agency or agencies sponsoring the development of these standards, and the other private and governmental groups participating in this voluntary standards development effort.

- Citing the essentiality of accurate and reliable data on occupational disease for informed public policy decisions, employer and employee awareness of health problems, and employers' ability to correct harmful working conditions, the Manpower and Housing Subcommittee of the Committee on Government Operations of the House of Representatives released a report on October 5, 1984 with the dramatic title: *Occupational Illness Data Collection: Fragmented, Unreliable, and Seventy Years Behind Communicable Disease Surveillance.* In the introduction to the report, the following statement is made: " . . . Congress recognized the importance of good information systems when it passed the Occupational Safety and Health Act of 1970 (Public Law 91-596). Today, fourteen years after it passage, a crisis exists in the statistics on occupational disease. This bipartisan failure over four administrations has allowed this Congressional mandate to go unfulfilled." The report goes on to say that the Bureau of Labor Statistics' (BLS's) ability to implement an occupational disease statistics program is hampered by the unusual nature of occupational disease, where expertise in epidemiology and occupational medicine is required. For this reason, the authors of the report state " . . . the reporting of these statistics is ill-suited to BLS's limited staff expertise in this area." In view of the fact that data on occupationally-induced illness is acknowledged as being both fragmented and unreliable, how should the Occupational Safety and Health Administration (OSHA) allocate its occupational health compliance inspection resources? How can employers with operations where there are occupational health hazards ensure that they are fully aware of such hazards and that they inform their workers as to the nature and extent of such hazards and what can be done about them?

- To what extent have small business employers taken advantage of the many services that have been made available for them through the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH)? How can the services of federal and state occupational safety and health agencies and of other groups be made more accessible to the small business employer?

- The Educational Resource Center (ERC) program was launched in 1977 by NIOSH as a response to the national need for occupational safety and health professionals. The primary purpose of the ERC program is to develop multidisciplinary training experiences for a variety of disciplines, including occupational physicians, occupational nurses, industrial hygienists, and safety professionals. Currently, there are 15 of these Centers distributed geographically throughout the United States. To what extent are these Centers and their mission known to employers and employees and their representatives? Of those employers who know of the Centers, what is their estimate of their effectiveness? How extensive is the use of the continuing education programs developed and conducted by these Centers?

- Section 21.(c)(2) of the Occupational Safety and Health Act of 1970 directs the Secretary of Labor (in consultation with the Secretary of Health, Education and Welfare (now the Secretary of Health and Human Services) to consult with and advise employers and employees, and organizations representing employers and employees as to effective means of preventing occupational injuries and illnesses. How well has this mandate been carried out by OSHA? On what bases was this determination made?

- Conduct an analysis of undergraduate programs of study in occupational safety and health within the United States to determine program emphasis, program requirements, relevance of courses to the major occupational safety and health problems of American business, entrance into program requirements, exit (graduation) requirements, amount and type of off-campus study in actual establishments, involvement of industry officials in program design, conduct of program and evaluation of program, and other factors. What are the perceived significant shortcomings of current programs and what actions are required to correct these shortcomings?

  A related study would be an analysis of graduate programs of study in occupational safety and health within the United States to identify the factors identified above.

- The curricula through which many of today's occupational safety and health practitioners passed was heavily oriented toward manufacturing processes and materials which have changed dramatically in recent years. What are some of the more effective ways by which today's occupational safety and health professionals can be "re-tooled" to become more attuned to the realities of today's industries? Are a sample of occupational safety and health professionals aware of their need for "re-tooling." If not, what explanations do they provide for their perceptions?

- The typical program of studies in business management will prepare the individual for a career in management, but it is rare when such a program of studies contains any significant increment of information or instruction on the occupational safety and health problem and how it impacts business.

  Frequently, the individual with a business management background is the individual who will make the decisions as to what types of occupational safety and health efforts the establishment, the company or the corporation will have and the numbers and type(s) of individual(s) who are required to staff such a function. What is the best way to ensure that the student of business management, both at the undergraduate and the graduate levels, has received enough information and instruction on occupational safety and health to make informed decisions regarding this extremely critical management function?

- What role(s) should establishments, companies and corporations play in ensuring that this nation's schools of business management include appropriate increments of occupational safety and health information and instruction in their curricula? What role(s) are they now playing? How effective have the managements of establishments, companies and corporations been in influencing the curricula of schools of business management?

- Why has there been such a paucity of information on occupational safety and health in management texts and in publications such as the *Harvard Business Review,* and why have management meetings rarely included occupational safety and health topics (other than occupational and environmental legislative issues) on the agenda for such meetings, conferences, symposia and other gatherings? What can be done to correct this problem?

- Conduct an examination of the effectiveness of selected programs funded under the Occupational Safety and Health Administration's Institutional Competency Building Grants Program (popularly labeled "New Directions" program). For example, what specific long-term programs have been instituted as a direct result of the program? What impact has the program had on the permanent staffing of occupational safety and health positions in specific industries, in trade associations, and in national and international labor organizations?

- How does the small business manager learn, understand, and develop a desire to provide the same protection for his workers that one normally expects from the managements of larger organizations?

- Survey a sample of small business employers in a high hazard industry with highly effective occupational safety and health programs, to identify how they receive information and instruction on occupational safety and health with regard to such factors as management leadership, assignment of occupational safety and health responsibility, maintenance of safe and healthful working conditions, an adequate and effective medical capability, full compliance with the recordkeeping and reporting requirements of the Oc-

cupational Safety and Health Act of 1970, adequate information and instruction to all employees regarding physical (safety) and health hazards and what to do about them, and methods by which all employees can be motivated toward improved safety and health, etc. What implications do these findings regarding how small business employers receive occupational safety and health information and instruction have for federal and state regulatory agencies?

- Among a sample of small-, medium-, and large-size establishments in the same SIC industry, identify the types of publications (their titles, publishers and years of publication), of the most commonly used desk references (both federal and non-federal) in the area of occupational safety and health. Identify also the types of occupational safety and health organizations in which either safety and health staff or the organizations have memberships (e.g., National Safety Council, National Fire Protection Association, etc.). What patterns seem to emerge with regard to which types of organizations have which types of references and memberships in selected organizations? How significant are these data in terms of the injury and illness records of these same organizations?

- What are the major similarities and the major differences in occupational safety and health program elements in selected government agencies (both state and local) as compared with private organizations that employ approximately the same numbers of people in essentially the same types of tasks? Describe the similarities and differences in terms of policies, budgeting, staffing, injury/illness records, and other relevant factors.

- Investigate the effects of the physical environment in offices on workers' health (e.g., examine the health effects of variations in ventilation and air quality, lightning, noise levels, heating systems, video display terminals, chemicals contained in fluids and compounds used in reproduction equipment, etc. Prepare findings in a form suitable for employee information and instruction programs.

- Document the creation and development of the occupational safety and health function within an organization to reflect such factors as changes in mission and function of the organization, managerial changes at the top and at middle management levels, impact of federal, state and local regulations, impact of organized labor, and the state of the economy (e.g., unemployment, inflation, taxes, etc.).

- What is the extent of the use of added incentives such as pay, compensatory time off, and other types of recognition for those who work at increased risk within selected industries in the United States? What effects, if any, does this practice have on inhibiting the discovery and application of effective countermeasures for physical (safety) and health risks at the workplace?

- Compare different methods of accident investigation to determine which method(s): a) consistently yield similar results when used by different investigators, and b) provide information useful for developing effective prevention programs. Develop new methods if none are shown to be effective in terms of criteria a) and b).

- Conduct in-depth investigations into specific types of accidents and incidents with the goal of establishing the pre-conditions or critical circumstances preceding these accidents, and thus discover the causes of the accidents. Current technologies often establish only the most immediate "cause" of the accident (e.g., fell from ladder, etc.), which may not provide information which is meaningful for planning accident prevention strategies.

- Currently, about half of all fatal motor vehicle accidents involve drinking drivers. This would presumably mean that about 15 percent of work-related deaths involve a worker who is driving while under the influence of alcohol. Conduct a survey of employer programs designed to impact the "driving while under the influence of alcohol" problem among their employees who are required to operate motor vehicles in over-the-road situations as a part of their job. How can management's interest be heightened to the problem of motor vehicle deaths being the leading cause of workplace deaths? For a number of years, 30 percent of all occupational deaths have occurred in the mobile workplace (i.e., automobile, truck, bus,

etc.). In addition to 30 percent of all the occupational deaths occurring, there is an inordinate number of injuries that occur to workers in their mobile workplaces.

- Survey a sample of organizations in high-hazard industries to identify the kinds of employee assistance programs (EAPs) which the managements of these industries have set up to respond to the needs of workers who are abusing alcohol or other drugs, or who have emotional, financial, marital, or other problems that may affect their productivity or type of performance on the job. What evidence is there to indicate the level of success of such programs? What are the costs of such programs in terms of the return obtained from them? How are such programs financed?

- Identify and describe the forms and other aids used by organizations to assist physicians in taking an occupational history of a patient and the development of a form which will consolidate all of the information which is considered essential for a physician to have on a worker. Development of a plan for getting such a form and its instructions introduced into the medical profession on a nationwide basis.

- Study the insurance risk management field to determine the impact that large-scale disasters have had on its philosophy and practice (e.g., the kepone tragedy, asbestos litigation, the MIC release at Bhopal, India, etc.).

- Conduct a critical review of litigation involving occupational safety and health professionals (i.e., instances where occupational safety and health professional staff members have been named in cases brought against an employer where one or more employees have suffered injury or illness because of alleged incompetence on the part of such personnel). What implications do these findings have for: a) employer selection of occupational safety and health personnel, b) employer oversight of the activities of such personnel, and c) the professional preparation of such personnel?

- An examination of the contributions of the organized labor movement to improved occupational safety and health in the workplace.

- What has been the injury and illness experience in those organizations where organized labor has taken an aggressive stance with regard to improved safety and health at the worksite? Has this experience been better than would have been achieved without such involvement on the part of organized labor? Why? Why not?

- Examine occupational safety and health policies, programming and results in employee-owned companies and corporations. How do these differ from the policies, programs and results achieved by the organization before it was taken over under an employee stock ownership plan?

- Why have system safety analytical techniques not been used more extensively to solve occupational safety and health problems? To date, these techniques have been used almost exclusively to control the safety of very expensive and potentially very dangerous products of the aerospace industries (e.g., rockets, aircraft, etc.).

- Injury-producing accidents in the contract construction industry in the United States continue to occur at an alarming rate. For example, while only five percent of the workforce is engaged in construction, this workforce suffers 20 percent of all work-related fatalities. Among the more serious types of accidents in construction are those associated with cranes. Such accidents continue to increase in number and severity as these machines grow in size and in number. MacCollum[46] had identified 20 crane failure modes, in which the likelihood and severity of injury and damage has been found to be high. Among a sample of small-, medium-, and large-size construction companies, to what extent are managers and construction superintendents familiar with the work of MacCollum and others with regard to crane accidents and their causes, and how such accidents can be prevented? Among these same people, of those who are familiar with the work of MacCollum and others, what specific actions have they taken to correct the failure modes involved in crane mishaps?

- To what extent do a sample of U.S. manufacturing plants identify "defective design" as an accident cause when investigating mishaps at their establishments? If "defective design" is used as an accident cause, on what bases did management decide to use the term? If the term is not used, why isn't it?

- Investigate the degree to which poor equipment design and poor quality of materials and maintenance contribute to accidents among a sample of high-hazard SIC industries.

- Any employer can claim a service that he is already paying for, at least in part. That service is professional help from his insurance carrier. The American Insurance Association reports that more than 10,000 safety engineers and other occupational safety and health professionals are now employed by insurance companies to serve the safety and health needs of policyholders. To what extent is a sample of employers, especially small business employers, utilizing the services of their insurance carriers? To what extent are these same employers utilizing the services of the Occupational Safety and Health Administration's Regional and Area Offices for advice and counsel? And, to what extent are these same employers using the free, on-site consultation services provided by the states and by private consultants under the provisions of the Occupational Safety and Health Act of 1970 (Public Law 91-596)?

- In the context of potential injuries and illnesses among his employees, and the potential of litigation involving alleged injuries due to product design, what criteria are being used by employers who determine that they will opt for self-insurance rather than go outside the corporation for such protection?

- The following candidate project was among those submitted by the staff of the Construction Safety Association of Ontario, Canada. Because of the detail in which this particular candidate project was submitted, it is reproduced in its entirety.

CONSTRUCTION SITE MONITORING PROPOSAL

Candidate Problem

Purpose: To determine the order of magnitude of the money involved in loss due to downgrading incidences such as job interruptions, operations problems, accidents and injuries on a construction job site.

Once this has been determined, then it will be possible for contractors to assess the costs and corresponding benefits from making the necessary changes to control these losses. Combining this information with some optimization model, it should be possible to determine the point at which a minimum expenditure will result in a maximum return.

Goals

1. To develop an audit system for construction management which will indicate management deficiencies in relation to construction site operations and safety.

2. To develop planning and control system for construction site operations to assist contractors in achieving more efficient construction sites and safer work places.

Problem definition: The portion of the construction industry in Ontario that is involved with commercial and institutional construction is primarily represented by three groups, namely: a) clients, b) general contractors, and c) subcontractors.

A substantial number of injuries that occur in this sector of the industry are due to "improper control" of sub-trades by the general contractor.

The "improper control" takes the form of:

1. Interferences due to many subcontractors working in one area at one time. This creates housekeeping problems, unexpected appearance of workers and materials, material storage problems, confusion and conflict.

2. Materials handling and stockpiling problems due to access time and work area confinement. This requires double handling and an increase in resultant exposure time to possible risk of injury.

3. Poor emphasis by general contractors on safety of subcontractors due to lack of financial return for their efforts and reluctance to take risk of directing the workforce.

4. Other problems that result from scheduling practices, availability of services, assistance or access due to conflicting interests of the parties involved.

Premise of Research

Previous research has indicated that there is a direct correlation between increased accident frequency and poorly controlled jobs. There is also a correlation between job profits and job control/efficiency, and total cost.

The premise of this research, therefore, is that by improving job-management skills in the areas of planning, organization and job control, that a contractor will increase his job efficiency which should result in a reduced number of accidents, an increase in profits to general- and sub-contractor, and a reduction in cost to the owner.

Purpose of Research

To reduce the accident frequency by:

1. Client insistence (by contract incorporation) on more efficient, cost effective, safe control of subcontractors.

2. General contractor commitment to better communication and efficient control of subcontractors.

3. The time, space and opportunity for the subcontractor to perform the work in a safe, efficient manner.

Stumbling Blocks

1. Clients

   a. Often clients are not staffed to monitor, control or enforce a contract situation with a general contractor.
   b. Control by client requires risk of liability of possible back charges due to interference.
   c. Clients are often one-time builders and are not willing to incur additional costs in order to reduce involvement during construction stage. They are only interested in: 1) what the project is, 2) when it will be completed, 3) how much it will cost, and 4) possible delays.
   d. Standard contracts.
   e. Clients are often not aware of the savings in time and money that result from selecting safe and efficient general contractors.

2. General contractors

   a. Usually bid work on firm price and will not see a return on capital investment necessary to control a contract where the amount has not been accounted for in the bid.
   b. Many general contractors do not have available staff to properly control a jobsite.
   c. Superintendent/Project management education has not been well developed on the practical level of job control.
   d. General contractors are not willing to make initial capital investment.
   e. Many general contractors do not have equipment available for materials handling/control systems.

f. Many general contractors are not willing to incur risk of liability of claims for interference with subcontractors.

3. Subcontractors

   a. "Low men on a totem pole" are not in control of general contractor's involvement.
   b. Access time to site often is limited, allowing little choice and thus high potential accident situations.
   c. Subcontractors often have other jobs and schedule work when access is available.
   d. Subcontractors anticipate the problem that they will face and build a cushion into the bid to take care of inefficiencies.

4. Results of present system

   a. Higher accident frequencies than necessary when a job with good controls is compared with one with poor controls.
   b. Higher costs due to necessary "built-in" contingencies to account for conflicts that filter up to the client/owner.
   c. Possible poor working relationship between client and general contractor or general contractor and subcontractor.

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ADDITIONAL MANAGEMENT-RELATED PROBLEMS IN OCCUPATIONAL SAFETY AND HEALTH

INTRODUCTION

In addition to those problems and problem areas suggested by publications referenced and discussed in Appendix A of this report, entitled "Review of the Literature," and by those problems and problem areas identified by the many individuals and organizations contributing to this study, and whose inputs appear in Section II of this report entitled "Candidate Research Problems in Occupational Safety and Health by Specific Functions of Management," there are other sources of information on problems and problem areas in occupational safety and health on which initial or further study is indicated. It is the purpose of this Section of this report to identify and discuss some of these latter sources.

There are three major sources to which an individual interested in an occupational safety and health-related research topic may go to help him to identify a problem or problem area. These three sources are: a) publications (books; texts; articles; and reports of proceedings of conferences, symposia and other meetings); b) organizations whose missions include the advancement of occupational safety and health in the workplace, and c) individuals who have established credibility in the field of occupational safety and health or in a related field, including the management of the occupational safety and health function in an enterprise. Each of these sources will be discussed in turn.

PUBLICATIONS AS A SOURCE OF PROBLEMS AND PROBLEM AREAS IN OCCUPATIONAL SAFETY AND HEALTH

A major source of problems and problem areas in occupational safety and health are selected references in occupational safety and health. In Appendix C of this report are some of the basic references in occupational safety and health. A review of the tables of contents and the introductory and concluding sections of these publications will provide the student of business management with ideas on the nature and magnitude of the occupational safety and health problems in business, industry and government, and with information on current approaches being used to impact this problem and the effectiveness of these approaches. Further, these texts frequently identify specific problems and problem areas for which adequate solutions have not yet been found.

Another source of problems or problem areas are books on occupational safety and health problems written by investigative reporters, consumer activists, and others with a keen interest in the impact of occupationally-induced deaths, injuries and illnesses on society. Examples are Paul Brodeur's *Expendable Americans* (Viking Press); Roy Davidson's *Peril on the Job* (Public Affairs Press); Alice Hamilton's *Exploring the Dangerous Trades* (Little, Brown and Company); Thomas F. Mancuso's *Help for the Working Wounded* (International Association of Machinists and Aerospace Workers); Joseph A. Page and Many-Win O'Brien's *Bitter Wages* (Grossman Publishers); Rachel Scott's *Muscle and Blood* (Dutton Publishers); Jeanne Stellman and Susan Daum's *Work is Dangerous to Your Health* (Pantheon Publishers); and Franklin Wallick's *The American Worker: An Endangered Species* (Ballantine Books). There are many other such books, but those identified above are the more publicized ones.

Another major source of problems and problem areas in occupational safety and health and in related fields are those books which represent compilations of articles on various facets of safety and health in general,

and on occupational safety and health in particular. Reading the articles in these publications will provide the individual who is contemplating research in the area of occupational safety and health with different points of view on how selected occupational safety and health problems should be approached. Each of the 11 publications referenced below contains an excellent collection of such articles and reports, which some feel are among the best in print, and many of which would otherwise not be generally available.

Reference: Widner, Joanne T., Editor, *Selected Readings in Safety: A Collection of Articles by Leaders in the Safety and Loss Control Profession.* Macon, Georgia: Academy Press, A Division of the International Safety Academy, 1973.[1]

Description: In the Foreword to this publication, the editor states:

> . . . Pooling our experience and knowledge can only be of mutual benefit; in a growing, developing field, we learn from our associates. It has been our primary aim, in *Selected Readings in Safety* . . . , to acquaint you with a few of our "associates," the proponents of modern principles of safety and loss control management. If this can give you one more workable tool for the practice of your crafts, our mutual task will be advanced.[*]

Thirty-five articles or reports are reproduced in the above-referenced publication without editorial comment.

Reference: Ferry, Ted S., and Weaver, D. A., *Directions in Safety: A Selection of Safety Readings for the Student and the Practitioner and for the Teacher and the Safety Professional.* Springfield, Illinois: Charles C. Thomas, Publisher, 1976.[2]

Description: In the Introduction to this publication, the editors state:

> No one book gives a comprehensive picture of the safety profession, not even a few books. Even when the best of the safety books are shelved together, the concepts, functions, and scope of the safety profession are not readily discernable. Many of the finer writings are not even in safety books, journals and magazines. Many are in books, professional journals and publications which bear no safety label, thus making it impractical for the lay reader, or even the safety professional, to gain a full appreciation of the profession.[†]

Forty-three articles are presented in four parts in this publication without editorial comment.

Reference: Petersen, Dan and Goodale, Jerry, *Readings in Industrial Accident Prevention.* New York: McGraw-Hill Book Company, Inc., 1980.[3]

Description: In the Preface to this publication, the editors state:

> As we compiled this collection of readings, we tried to focus not only on where the profession seems to be going but also on what has already happened to bring us to where we are now. In some sections, we have included philosophies which diametrically oppose one another. In most cases, such arguments still have not been resolved, but we felt it is important to be aware that the *argument* exists. . . . [‡]

Thirty-one articles and reports are reproduced, with editorial comment, in this publication.

Reference: Eckenfelder, Donald J., Consulting Editor, *Readings in Safety Management.* Park Ridge, Illinois: American Society of Safety Engineers, 1984.[4]

Description: In the Foreword to this publication, the consulting editor states:

> The articles selected for this . . . compilation represent some of the best writing on the overall topic of safety management to have appeared on the pages of the American Society of Safety Engineers' *Professional Safety* magazine during the past decade. Some of these articles will contain a few stimulating thoughts; others are filled with them. Reten-

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[†] Reproduced with peermission from Charles C. Thomas, Publishers.
[‡] Reproduced with permission from McGraw-Hill Book Company, Inc.

tion and application of the principles contained in this publication will help the reader to become a better manager and a more valuable resource, not only in his or her professional dealings, but in personal relationships as well.[*]

Eighteen articles are reproduced, without editorial comment, in this publication.

Reference: Peters, George, Consulting Editor, *Readings in Product Liability*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[5]

Description: This publication consists of 14 selections. In the Foreword, Peters writes: "Almost anyone involved in safety-related tasks should at some time stop and wonder about the possibility of personal involvement in some future "liability situation." This publication, Peters concludes, "provides a ready reference of concepts, ideas and recommendations to help orient and instruct those who need useful information on product liability and civil liability."[*]

Reference: Petersen, Dan, Consulting Editor, *Readings in Behavioral Issues in Safety*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[6]

Description: This publication consists of 17 selections. Writing in the Foreword of the publication, the Consulting Editor states: "Over the years, safety programs have concentrated on the 'Three E's' of Safety'—Engineering, Education and Enforcement. During these same years, the behavioral scientist has been researching what determines behavior while at work. As a result of 60 or more years of research on people in organizations, we now know that we in management have many options beyond the "Three E's."[*]

Reference: Russell, John E., Consulting Editor, *Readings in Workers' Compensation—Loss Prevention/Loss Control*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[7]

Description: This publication consists of 20 selections. Commenting on the publication, the Consulting Editor writes: "The articles selected for these readings were picked to offer an example of the diversity of the subject matter that has appeared in *Professional Safety* over the past several years. It will provide a review to the experienced safety professional, and to the inexperienced safety practitioner an introduction to this important facet of study."[*]

Reference: Rinefort, Foster C., Consulting Editor, *Readings in Cost Benefit/Control*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[8]

Description: This publication consists of 13 selections. The Consulting Editor writes: "It is hoped that this book of readings will stimulate continued and further interest in this subject. Of greater importance, it is hoped that it will encourage others to do research, to write and to further explore ways to apply techniques of cost benefit/cost control to the important subject of injury prevention."[*]

Reference: Cumming, III, Rick, Consulting Editor, *Readings in Stress Management*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[9]

Description: This publication consists of 10 selections. Commenting on the publication, the Consulting Editor writes: "Although physical stresses such as noise, cold, heat, glare, etc., have been well documented, it is apparent from this selection of articles that an increasing concern of safety and health professionals is mental/emotional stress. . . . The following articles are a good start in learning about this increasingly important topic."[*]

Reference: Mosely, Ralph, Consulting Editor, *Readings in Noise Control and Hearing*. Park Ridge, Illinois: American Society of Safety Engineers, 1985.[10]

Description: This publication consists of 14 selections. The Consulting Editor writes: "These articles selected for this compilation represent the best writing on this subject to have appeared in *Professional Safety* during

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the last 10 years. Look through and use the best ideas you can find. Just one borrowed idea can save many frustrating hours of trial-and-error activities."

Reference: MacCollum, David V., Consulting Editor, *Readings in Hazard Control and Hazardous Materials.* Park Ridge, Illinois: American Society of Safety Engineers, 1985.[11]

Description: This publication consists of 22 selections. The Consulting Editor writes: "Physical hazards as sources of misdirected energy or as threats to health and be categorized into easily identifiable groups. The articles from *Professional Safety* carried in this publication fall into four basic groups: Environment, Mechanical, Chemical Reaction, and Electrical. Four other articles appear under the 'General' category. . . . When the knowledge of a competent safety professional is used in combination with the absolute support of top management to control all hazards, effective hazard control is achievable."*

Still another significant source of information on problems and problem areas in occupational safety and health are articles which have appeared in the professional journals of organizations such as the American Society of Safety Engineers *(Professional Safety)*, the System Safety Society *(Hazard Prevention)*, and the American Industrial Hygiene Association *(Journal of the American Industrial Hygiene Association)*. Frequently, the writers of these articles identify problems and problem areas which they consider to be in need of further research. In Appendix A of this report, entitled "Review of the Literature," the articles by Lederer and Rinefort are examples of those which contain specific recommendations for initial or further research into occupational safety and health-related topics.

A further source of information from publications comes from a review of the proceedings of conferences, symposia, and meetings of organizations such as the National Safety Council, the American Society of Safety Engineers, the Human Factors Society, the System Safety Society, the American Industrial Hygiene Association, and the American Occupational Medicine Association. Still other groups such as the American Psychological Association have divisions or sections within their organizations which are dedicated to the study and resolution of occupational safety and health problems.

Another source of information from publications is that contained in publications such as *Dissertation Abstracts*, a service to which virtually all institutions of higher learning in the United States contribute. By reading the abstracts of those studies which relate to an occupational safety and health problem and then studying the complete research document, one will often find a section entitled "Recommendations for further research." These recommendations are the result of a careful analysis of a specific problem or a series of problems and reflect what the investigators believe are significant problems which remain to be solved.

A still further source of information in publications form which may help the student seeking to identify and define a problem in an occupational safety and health related area are the sections of texts on research methodology which relate to the selection and formulation of a research problem. The courses in which such texts are used normally devote a significant amount of time to the identification and definition of research problems.

Another source of publications and reports on occupational safety and health related topics is the federal government. Following are brief descriptions of the major types of publications and reports produced by agencies of the federal government (or by contractors for these agencies) which should be of value to the graduate student interested in pursuing a research project in an occupational safety and health related area. Five types of sources are discussed, namely: a) analyses of occupational fatalities, b) worker injury reports, c) reports of health hazard evaluations conducted by NIOSH, d) NIOSH and OSHA information sources, and e) other government information sources.

Analyses of Occupational Fatalities

This is a series of special studies of occupational fatalities relating to selected operations, which OSHA produces in its Directorate of Technical Support and makes available to the public through the National Tech-

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nical Information Service (NTIS) of the U.S. Department of Commerce. The purpose of these analyses is to provide information that would highlight areas of interest for standards review and development, to aid in regulatory assessment, in training and education programs, in consultation programs, and in targeting compliance efforts. Another use of these reports is that of identifying problem areas for both line and staff personnel within an organization. To date, eleven (11) studies have been published and are available from the NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Titles and order numbers of these studies appear below:

Occupational Fatalities Related to Fixed Machinery. May 1978. PB-80-181035.

Occupational Fatalities Related to Scaffolds. May 1979. PB-80-182009.

Occupational Fatalities Related to Roofs, Ceilings, and Floors. November 1979. PB-80-161136.

Selected Occupational Fatalities Related to Oil/Gas Well Drilling Rigs. June 1980. PB-80-226939.

Occupational Fatalities Related to Miscellaneous Working Surfaces. April 1982. PB-83-125732.

Selected Occupational Fatalities Related to Fire and/or Explosions in Confined Work Spaces. April 1982. PB-82-237314.

Selected Occupational Fatalities Related to Lockout/Tagout Problems. August 1982. PB-83-125724.

Selected Occupational Fatalities Related to Grain Handling. January 1983. PB-83-170795.

Selected Occupational Fatalities Related to Powered, Two-Point Suspension Scaffolds/Powered Platforms. March 1983. PB-83-194050.

Selected Occupational Fatalities Related to Oil/Gas Well Drilling and Servicing. December 1983. PB-84-159095.

Worker Injury Reports

Worker injury reports (WIR's) are prepared and published by the U.S. Bureau of Labor Statistics (BLS) of the U.S. Department of Labor. The Bureau operates two principal data systems, the Annual Survey of Occupational Injuries and Illnesses, and the Supplemental Data System (SDS). A less known data system operated by the BLS is one which collects and reports data on how and why injuries occur among workers engaged in selected activities and among workers who have received selected types of injuries at work. To date, BLS has conducted and reported on 15 such surveys as a part of its WIR program. The titles of these 15 reports, along with information on where they may be obtained follows:

Reports which may be purchased from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161:

a. Survey of Ladder Accidents Resulting in Injuries, PB-83-207985 (1978).
b. Survey of Welding and Cutting Accidents Resulting in Injuries, PB-83-208017 (1978).
c. Survey of Scaffold Accidents Resulting in Injuries, PB-83-208009 (1978).
d. Survey of Power Saw Accidents Resulting in Injuries, PB-83-207993 (1978).

Reports which may be obtained at no cost from the Office of Occupational Safety and Health Statistics, U.S. Department of Labor, Room 4014, 601 D Street, NW, Washington, DC 20212:

a. Accidents Involving Eye Injuries, Report No. 597 (1980).
b. Accidents Involving Face Injuries, Report No. 604 (1980).
c. Accidents Involving Head Injuries, Report No. 605 (1980).
d. Accidents Involving Foot Injuries, Report No. 626 (1981).

Reports which may be purchased from the Superintendent of Documents, U.S.Government Printing Office, Washington, DC 20402:

a. Injuries Related to Servicing Equipment, Bulletin 2115 (1981).
b. Back Injuries Associated with Lifting, Bulletin 2144 (1982).
c. Work-Related Hand Injuries and Upper Extremity Amputations, Bulletin 2160 (1982).
d. Injuries in Oil and Gas Drilling and Services, Bulletin 2179 (1983).
e. Injuries Resulting from Falls from Elevations, Bulletin 2195 (1984).
f. Injuries in the Logging Industry, Bulletin 2203 (1984).
g. Injuries Resulting from Falls on Stairs, Bulletin 2214 (1984).

Each of the above-referenced reports includes a copy of the data collection instrument in the form of a survey questionnaire, which can be reproduced and used by an employer to collect similar data for his operations.

Reports of Health Hazard Evaluations (HHEs)

A Health Hazard Evaluation (HHE)is a study of a particular workplace, such as a department of a particular factory, or industrial plant. The study is done as a service by NIOSH, to the workers, brought on by exposure to toxic chemicals or materials during a work process. An HHE is conducted to find out whether there is a health hazard to workers caused by exposure to toxic chemicals or materials. An individual worker can request an HHE on behalf of himself and two other workers. Any officer of a labor union which represents the workers for collective bargaining purposes may submit an HHE request on behalf of the workers. Any management official may request an HHE for the employer. Such requests should be sent to:

Hazard Evaluations and Technical Assistance Branch (HETAB)
NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226
Phone: (513) 841¢4382

That office will send anyone interested in an HHE a copy of the form ''Request for Health Hazard Evaluation.'' To date, thousands of HHE's have been conducted by NIOSH. Reports which are prepared for each HHE represent a significant data source from which a student of business management or another discipline may identify problems or problem areas on which research or further research on management as it relates to occupational safety and health is indicated.

OSHA and NIOSH Information Sources

Both the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) are doing a creditable job of alerting the public to the materials that they produce and that they have had produced for them under contract. NIOSH and OSHA have mailed millions of copies of publications on health and safety work practices and guides. NIOSH and OSHA also answer thousands of requests annually from people in all kinds of jobs, with all kinds of occupational safety and health related problems. Some requests are for NIOSH and OSHA publications; others are for answers to specific technical information questions. Because much of NIOSH's and OSHA's information is in publications, very often a question from an employer or employee, or another individual, can be answered by referring to such publications. NIOSH and OSHA send catalogs of the publications that are available, or provide specific information from their libraries or computers to those making inquiries.

Inquiries on NIOSH publications and training programs should be sent to:

NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226

Inquiries to OSHA for such information should be sent to:

> Office of Information
> OSHA
> U.S.Department of Labor
> Washington, DC 20210

Two additional sources of information are the NIOSH Technical Information Center and the OSHA Technical Data Center, both of which are described in Appendix F.

Other Government Information Sources

There are three major information sources within the federal government from which the employer, the employee or others can obtain information on publications and training materials in occupational safety and health. These, along with their mailing addresses are:

1. U.S. Government Printing Office, Washington, DC 20402. (Ask for listing of publications in occupational safety and health).

2. National Audiovisual Center, Washington, DC 20409. (Ask for copy of publication Media for Safety and Health).

3. National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22151. (Ask for listing of publications and other reports on occupational safety and health).

ORGANIZATIONS WITH AN OCCUPATIONAL SAFETY AND HEALTH RELATED MISSION AS A SOURCE OF PROBLEMS AND PROBLEM AREAS

The second major source of problems and problem areas in occupational safety and health is represented by those organizations whose missions include the reduction of occupationally-induced deaths, injuries and illnesses in the workplace. Here, we are talking about organizations such as the National Safety Council, the American Public Health Association, the American Cancer Institute, the American Center for Quality of Work Life, the Women's Occupational Health Resource Center of Columbia University, and others. Some of these organizations have extensive capabilities in the area of research into significant occupational safety and health problems, as well as extensive publications on the occupational safety and health problem.

Many other organizations are active in identifying occupational safety and health problems and in attempting to learn how these problems may best be combated, despite the fact that this is not their principal mission. Included among these groups are the international and national labor organizations; the various trade associations; public interest groups; and institutions of higher learning, especially those which have been designated as Educational Resource Centers (ERCs) by the National Institute for Occupational Safety and Health. Many other institutions of higher learning, while not designated as ERCs, also offer substantial programs of study in occupational safety and health, and publish reports on the subject.

International and national organized labor groups can provide a valued source of information on occupational safety and health problems needing initial or further study. Some unions have well-established occupational safety and health staffs, and some conduct research on safety and health hazards to which their members are exposed while at work. An excellent example of such a labor organization is the International Brotherhood of Painters and Allied Trades (Washington, D.C.). Still other labor organizations contract with research organizations and with universities to conduct research for them.

Trade associations represent a good source of information on occupational safety and health problems and problem areas by specific industry. For example, in the high-hazard contract construction industry, organizations such as the Associated General Contractors of America, Inc., and the National Constructor's Association (both located in Washington, D.C.); and the Associated Builders and Contractors (located in Alexandria,

Virginia), can provide information on research already completed and on problems needing initial or further study within the construction industry. The National Maritime Safety Association (located in Philadelphia, Pennsylvania) is in a position to provide comparable information on the marine cargo handling (longshore) industry. The same is true of literally hundreds of such trade associations, the names and mailing addresses of which may be found in directories of such associations in any major library.

Public interest groups such as the National Center for Public Policy Research, the Health Research Group, the Workplace Health Fund, and the Center for Science in the Public Interest (all located in Washington, D.C.), have shown a keen interest in improved safety and health at the workplace and have taken actions in this regard. There are other such organizations located throughout the United States. For example, INFORM (located in New York City) is a national, non-profit group that analyzes and reports on the influence of U.S. corporations on the environment, their employees and consumers. INFORM has done much to improve occupational and environmental health within the United States.

Another valuable source of information on what is going on in organized labor groups, trade associations and other non-profit organizations in the area of occupational safety and health are the reports generated by those organizations which have participated in OSHA's Institutional Competency Building Grants Program (popularly labeled "New Directions") since the Fall of 1978. To date, literally hundreds of such organizations have received grants to develop and deliver training and education and related services to their members. For a listing of the names and mailing addresses of organizations which have participated in this program, one may write to the Office of Training and Education, OSHA, 1555 Times Drive, Des Plaines, Illinois 60018. This listing includes the name and mailing address of the project officer, a synopsis of the work done, and whether the project is of a planning or a developmental nature.

INDIVIDUALS WHO HAVE ESTABLISHED CREDIBILITY IN OCCUPATIONAL SAFETY AND HEALTH OR IN A RELATED FIELD AS A SOURCE OF PROBLEM AREAS

The third major source of problems and problem areas in occupational safety and health is represented by those individuals who are professionals in occupational safety and health, or who work in related activities in any one of a number of areas in the field (e.g., practitioners, researchers, academicians, consultants, managers, investigative reporters, and others). A good place to begin to locate these individuals is to make a listing of those editors and authors of texts, articles and other reports on occupational safety and health-related topics. Another method of locating these individuals is to study the proceedings of conferences, symposia, meetings and other gatherings to identify who is working (or who has worked) on what types of problems. Staff specialists on occupational safety and health in organizations such as the National Academy of Sciences, the Congress' Office of Technology Assessment, and federal government agencies such as OSHA and NIOSH, offer still another source of knowledgeable individuals who are current in the state-of-the-art with regard to occupational safety and health. Still another source of such individuals are the membership rosters of organizations such as the American Society of Safety Engineers, the American Industrial Hygiene Association, the American Conference of Governmental Industrial Hygienists, the System Safety Society, the National Safety Management Society, the Human Factors Society, the American Occupational Medicine Association, the American Board of Industrial Hygiene, and the Board of Certified Safety Professionals of the Americas, Inc., and other such groups. Finally, those who have conducted research into occupational safety and health problems and whose findings have been reported in publications such as *Dissertation Abstracts* or the *Journal of Safety Research* represent still another source of individuals with expertise in this field.

Generally, any of the above-referenced individuals will welcome inquiries from graduate students and from others who are contemplating the study of an occupational safety and health related problem or problem area.

A STRUCTURE WITHIN WHICH PROJECTS IN OCCUPATIONAL
SAFETY AND HEALTH CAN BE GENERATED

Professor A. R. Hale of the Delft Technical Institute in the Netherlands, one of the individuals polled for input to this report, provided the model which follows. As Professor Hale says of the model:

> . . . you can generate projects on the basis of either:
>
> 1. How do organizations carry out/manage the whole process for one hazard?—and why in that way? or
> 2. How do they carry out one step for a range of hazards—and if that differs across hazards—how and why? or
> 3. How successful are they at doing it? or
> 4. Who is involved in the steps and why?

You can study either one organization or compare several on all the above types of questions.

You can also generate problems by asking how safety and health goals conflict with or contribute positively towards each of the other goals of an organization (e.g., quality, productivity, market share, public image, profit, etc.), and how the conflicts are/can be minimized and the contributions maximized. As an aside, I am particularly keen to promote projects which portray safety and health in a positive light (e.g., as spurs to innovation, selling features of products, attraction for staff morale/retention, etc.).

Another group of projects comes from the questions surrounding measurement: How do you measure the size of your safety and health problems? How do you evaluate your success in controlling them? How do you discover where the resistance in an organization is to successful control (e.g., in attitudes and beliefs, management systems, etc.).

Yet another group of projects comes from the question of how and how far you incorporate safety responsibilities and tasks into the tasks of other staff, and how far you give them to specialist safety and health staff.

Another group of projects comes from the interaction between the organization, government, the public and other interest groups on safety and health. How do they interact? (who does what?); How should they interact? What effect does their behavior have (e.g., public protest, media coverage, enforcement action, court actions, insurance premiums, strikes, government standards, international pressure, etc.). You can also ask how organizations try to influence those other groups over standards setting, publicity, information provision/withholding.

You can also use safety projects to test management theories (e.g., what implications do different motivation theories have for the management of safety and health? Do they give consistent predictions? How do you treat safety and health as 'goods' in economic calculations, etc.)?

The last groups of problems I can think of concerns the dynamic aspect of safety and health (e.g., how is new technology altering the problem or the means available for its solution?). How are changes in industrial organization affecting the problem (size, structure of industry, export of dangerous technologies to developing countries, etc.). Again, as an aside, there is a whole series of questions for those who may become international managers about the relationship of health and safety problems and their solution to national culture, religious beliefs, state of technological development, other health priorities, etc.[12]

CHECKLIST FOR ANALYSIS OF HAZARDS AND OTHER
RISKS IN RELATION TO THE BUSINESS PLAN

In order to assess the range of possible dangers that operation of a business can pose, it is important to consider both the types of accidents, etc., which may happen, and the activities in which they may occur. Therefore, two dimensions are important in defining the dangers to which the activities of any organization, no matter what its size, may give rise.

(1) Components of a Business: (any of which can either introduce dangers or be damaged)	People Equipment/Machinery/Articles Buildings/Environment Materials/Substances
(2) Input/Output:	Acquisition Use Sale/Advice/Disposal

1. Components of the Business:

These are the resources which the business person needs to carry on his work. Money has been left off the list, not because it is unimportant either to the business or to safety, but because it is not a primary source of hazards. It is a resource which is turned into one of the other four factors (i.e., people, equipment, environment, materials), and thereby introduces or eliminates hazards. Equally, money does not usually become directly damaged (except sometimes in the case of fire), but it is in the form of financial losses that damage to the other resources may be most sharply felt.

Types of Harm (See also accident and disease statistics)

Employees are subject to:

- injury (e.g., from machinery, chemicals, transport (including road, rail and air transport during work), falls, fire, hand tools and equipment, etc.

- chronic disease, either physical or psychological from exposure to toxic and carcinogenic chemicals, noise, vibration, poor working posture, stress, etc.

Inhabitants (both people and the natural environment) living near the factory are subject to fire, explosion, chronic disease and, in addition annoyance (e.g, from noise and noxious odors).

The buying public is also subject to injury and disease directly by their use of the product, design or construction, or by the use others make of it, or the way in which they dispose of it. They may also be subject to non-physical losses (e.g., time, convenience, embarrassment, etc.) if the product goes wrong or does not live up to claims made for it.*

Plant, building, equipment, materials and vital business documentation and computer records are subject to physical damage, fire and explosion, structural failure, flood other natural disaster,* theft,* biological attack.*

Product may be destroyed, or be of insufficient quality to sell.*

The whole organization's existence may be threatened by resultant loss of business, failure to fulfill orders or legal restrictions imposed upon operation.

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*Not dealt with in this input.

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Factors Which May Produce or Prevent Harm

The aspects of the four resources which feed into a hazard assessment are set out below. Clearly the four resources will interact with each other, as is implied below:

People:
- individual differences in susceptibility to the substances used (e.g., dermatitis, asthma, stress tolerance)
- physical ability to use equipment (e.g., strength, height, dexterity)
- professional and practical skill/knowledge to avoid errors and danger
- personality to avoid danger/operate safe systems

Equipment:
- suitability for anticipated uses
- reliability/structural integrity
- dangerous parts/processes
- compliance with standards
- emergency and personal protective equipment

Environment:
- access/egress (especially in emergency)
- layout for use
- physical environment (e.g., lighting, heating, ventilation)
- structural adequacy

Materials:
- toxicity
- flammability
- reactivity

2. Input/Output:

This dimension considers the business as a "system" which brings in resources from the outside, carries out some form of transformation on them, and then sends them out in a changed form to the customer or the environment. Much of this activity is carried out deliberately (e.g., buying in raw materials, selling product); some may occur as a result of inadvertence or lack of checking (e.g., purchase of contaminated materials, release of pollution). The aim of the business should be to ensure that as few hazards as possible are brought into the organization, as few as possible created in it, and as few as possible exported.

This dimension applies not only to businesses which manufacture a product, but also to service organizations. They bring problems and expertise into the organization and must be careful of the quality of both; they export advice which may be used to design or construct other buildings or equipment and they are professionally liable for the quality of that advice and for making sure that it does not result in harm to others.

Acquisition:
- purchase specifications
- vetting (reviewing), examining against specification
- in-house design processes
- modification for use (e.g., training of people, adaptation of machines to special use, alteration of buildings

Use:
- procedures/systems of work
- wear out and maintenance
- monitoring and supervision
- personal accident insurance
- transfer of people

Disposal:	— product safety
	— professional liability
	— waste disposal and pollution
	— professional liability

MANAGEMENT OF HEALTH AND SAFETY

In considering what provisions will need to be made for the control of the hazards which you specified earlier in this input the following checklist will be useful.

Management process:	Information collection
	Decision-making
	Implementation
	Monitoring/Evaluation
	Trouble-shooting/Crisis management

This is the normal process by which managers control their business activity and make informed decisions. Safety is a criterion of business operation comparable to profit, quality, turnover, and business survival. It needs to be managed in the same way, and therefore someone in the business must be responsible for each of the following tasks:

Information collection:	— accident analysis
	— risk assessment
	— collection of legal and technical standards and obligations
	— inspection

Decision-making:	— allocation of priorities
	— choice of prevention methods
	— design of technical solutions
	— establishing responsibilities/organizational solutions

Implementation:	— training
	— installation of safeguards
	— implementation of safe procedures
	— management of insurance

| Monitoring: | — supervisory responsibilities |
| | — routine measurement/inspection |

Crisis management:	— evacuation
	— first aid
	— fire-fighting
	— compensation claims, etc.

SAFETY IN THE BUSINESS PLAN

The sections below correspond to the aspects or stages in the development of the business plan. They indicate the questions related to safety which are important at each stage.

Overall Concept

Since the business plan is primarily aimed at acquiring finance for a new or expanding business, safety may best be handled under the guise of management of an important aspect of non-speculative risk, i.e., the prevention of financial loss from unplanned occurrences (e.g., personal accident to key staff, high servicing or warranty claims for faulty products, prosecution for contravening federal or state occupational and environmental regulations, products or professional liability, etc.). Three broad principles of risk management cover the actions that the entrepreneur can take against such risks:

1. Risk reduction: anticipation and prevention of accidental losses by good diagnosis, planning and control of activities.
2. Risk transfer: insurance against accident and liability.
3. Risk retention: allocation of contingency funds to cover accidental eventualities.

Entrepreneurs must have the ability to anticipate and to quantify, as far as possible, the sources and consequences of such accidental loss in order to decide upon the correct balance of the three for their business, and to incorporate into the business plan the appropriate management and financial provisions for that balance.

1. Industry, the company and its products

    * What are the possible dangers associated with both the manufacture and the use of your proposed product?
    * What are the potential consequences of giving advice of poor quality?
    * What are the consequences of work being stopped by serious damage to your premises, or equipment, injury to yourself or other key member of your staff, or by order of an inspector, etc.?
    * What laws, standards, or customer safety specifications may apply to your product area?
    * What are the possibilities of using safety (allied to quality and reliability/trustworthiness) as a selling point for the product?

2. Market survey

    * Are customer purchase decisions constrained or influenced by their own or imposed safety standards or other criteria?
    * Are new regulations or standards on safety likely to alter the market sixe or share?
    * If warranty/servicing/reliability are key features of market penetration, how can you predict and reduce the probability of failures/breakdowns?

3. Marketing plan

    * What is the effect on pricing policy of safety requirements related to: a) product design to meet product liability, and b) the fixed overhead for safety of product manufacture?
    * How will product literature include requirements for safe use, etc.?
    * What will be the cost of servicing and replacement of the predicted rate of faulty products?

4. Design and development

    * What safety criteria exist for the design of your product and what are the penalties of failing to meet them?
    * Are there safety problems in your business area, now or in the future, which "drive" the design or development process?

5. Manufacturing and operations

- How will the provisions of federal and state occupational and environmental regulations constrain the choice of your operating location?
- What are the federal and state occupational and environmental requirements which constitute a fixed overhead on your operation?
- What monitoring activities and expertise will you need to implement to ensure the safe operation of your plant, equipment and processes and disposal of toxic wastes?
- How many safety considerations alter your decisions either to make or buy-in particular components, materials?
- What are your liabilities for product quality and reliability?
- What are your professional liabilities for advice given by yourself or your staff?

6. Management team

- How will you allocate responsibility fo r safety and quality assurance and for insurance?
- How will you cope with absence of key staff through accident or illness?

7. Critical risks and problems

Summary of all the above areas to discuss risks to:

- Key personnel and skills from personal accident.
- Production and meeting of deadlines from accidents or from orders made under federal or state occupational and environmental regulations and requirements, causing machinery, processes to be put out of action or restricted in use.
- Capital from product or professional liability suits.

8. Financial plan

- What financial provision will you need to make for risk reduction activity in your company?
- What financial provision do you need for risk insurance, and for contingency fund for risk retained in the business?[1]

CONCLUDING REMARKS

In this section of this report, an attempt has been made to acquaint the individual who may be considering conducting research in an occupational safety and health-related area with some of the major sources from which information may be obtained on problems and problem areas which need initial or further research. However, it would be well for the prospective researcher to bear in mind Pasteur's observation that "In the field of observation, chance favors the prepared mind." Thus, it is essential that the student contemplating taking on a problem in this area have validated his interest in the subject and be willing to devote himself fully to the task of problem identification and its resolution. The better prepared the student is in his understanding of the occupational safety and health problem and the effectiveness of current countermeasures, the better chance he has of identifying and formulating a worthwhile problem in this highly important area, and of carrying out the other research tasks associated with the problem selected for study.

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APPENDIX A

REVIEW OF THE LITERATURE

INTRODUCTION

The literature review as reported here is presented in two parts, namely: 1) information on listings of occupational safety and health-related topics which those individuals or organizations which generated the listing considered to be in need of investigation or further investigation, and 2) publications which provide summaries, critiques or commentaries on the types and quality of research conducted on occupational safety and health related topics.

Literature on management-related problems in occupational safety and health is scarce. A search of the literature for safety in general, and for occupational safety and health in particular, reveals few efforts to identify problem areas suitable for research. The reason for this paucity of information seems to be that many researchers and others frown upon compiling lists of problems needing to be solved, since they feel that anyone who cannot identify such a problem on his own is an unlikely candidate to solve such a problem. Happily, not all researchers or safety and health practitioners share this view. Professional societies regularly invite their members to submit papers for publication or discussion on topics which the officers or members of the boards of directors of these organizations consider to be in need of initial or further study. And, even highly prestigious groups such as the National Academy of Sciences identify, describe and publicize problem areas in the hope that this will stimulate investigation into these problem areas on the part of the scientific community. For example, the July 1985 issue of *Professional Safety,* the journal of the American Society of Safety Engineers, contains this invitation:

> Articles concerning the following subjects are actively being sought. Manuscripts should include specific examples that have been successful, i.e., how to develop, how to evaluate, and how to implement. Ideal are case histories, special problems, recommendations and solutions. Here are the suggestions:
>
> Women in the workplace
> Hazard communication: right to know
> Major disaster/crisis management
> Innovations in fire protection
> New technology in security systems
> Seat belt law(s)*

LISTINGS OF OCCUPATIONAL SAFETY AND HEALTH PROBLEMS CONSIDERED TO BE IN NEED OF INVESTIGATION OR FURTHER INVESTIGATION

A few organizations in the safety and health field, and still fewer in the *occupational* safety and health field, have generated listings of problems that are considered suitable for individual or group research, either as research studies to be conducted in conjunction with graduate study, or as research projects to be sponsored by a private or a public organization. The few listings which have been generated are somewhat dated. And, some of these are unpublished listings which were developed for use by those within the organizations or institutions whose staffs generated them. The latter listings identified by the writer are not included in this report because of their privileged nature.

More effort has gone into generating candidate problems for research in the areas of highway safety and traffic safety than has gone into generating candidate problems for research in the areas of occupational safety and health. In the area of highway safety, traffic safety, and safety education, for example, the National Commission on Safety Education,[1] the National Safety Council, in cooperation with the Center for Safety Education, New York University,[2] the now defunct President's Committee for *Traffic Safety,*[3] and

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the National Highway Safety Bureau (now the National Highway Traffic Safety Administration) of the U.S. Department of Transportation[4] have generated and published listings of suggested topics for university graduate theses and dissertations. The publication of the National Highway Safety Bureau, prepared by Dr. William E. Tarrants, is especially comprehensive, listing candidate projects under sixteen different classifications. Another publication, prepared by the writer for the then National Highway Safety Bureau, identifies and describes opportunities for research and program development in the Bureau for university personnel who are on sabbatical leave.[5]

It is interesting to note that while the Congress of the United States becomes concerned enough during the 1950's to hold hearings on research needs in traffic safety,[6] no Congressional committee then or since has seen the need to hold such hearings to identify perceived research needs in occupational safety and health.

In the area of occupational safety and health, the following efforts provide clues to problems which are perceived by some as in need of examination or further examination. Each is identified and described briefly. With few exceptions, all are quite dated. Nonetheless, evidence suggests that many of the problems identified have not yet been adequately investigated and reported in the literature, despite their being identified as problems more than twenty years ago.

Reference: American Society of Safety Engineers and the Center for Safety Education, New York University, *Human Factors Research in Occupational Accident Prevention: Its Status and Needs.* New York: Center for Safety Education, New York, University, 1962.[7]

Description

To get some indication of the nature and dimensions of present knowledge and needs of human factors research in occupational accident prevention, with a view to possible applications, an assessment was undertaken of selected research reports and interpretive literature. Beginning with studies more or less specifically concerned with occupational safety, the search led to a large complex of widely scattered literature directly or indirectly relatable to accident prevention and control. This involved a vast amount of materials in disciplines ranging from industrial psychology and human factors engineering, to orthopsychiatry and biomedical engineering. Research needs identified were classified into the following categories:

    a. Men and work
    b. Workers and their physical environment
    c. Workers and their social-psychological environment
    d. Accident investigation
    e. Safety programming*

Since this publication had limited distribution and is now out of print, parts of the section on "Safety Programming" are reproduced below for the benefit of the reader:

SAFETY PROGRAMMING

Questions for Researchers

- What safety programming appears desirable for industries with seasonal employment?

- What diagnostic procedures can now be employed to detect undesirable results of chemical exposure and physical-environmental stress before permanent or serious damage occurs?

- What programs are feasible to permit workers to verbalize their feelings and reduce muscular tensions in order to lower their accident potential?

- In what ways should the worker's family be encouraged to support or participate in the company's safety program?

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- What training should supervisors be given, and how, to help them spot indicators of potential accidents, such as unusual work errors or changes in everyday manners and habits? How far should a supervisor go in dealing with an emotionally disturbed employee?

- What do behavior sampling techniques reveal regarding qualifications that make for effective safety leadership among management personnel? How can these be developed?

- As with management personnel, what determinations and recommendations can be made in the case of labor representatives?

- What kinds of off-the-job safety programs are feasible for selected industries in view of company size and community characteristics? What training of supervisory and other management personnel is recommended to help further such off-the-job safety programs?

- What provisions should be made for safety indoctrination and counseling of new employees? What provisions should be made for safety indoctrination and counseling of veteran employees?

- What criteria or formulae may be recommended for the formulation and presentation of safety rules and regulations?

- What is revealed by a clinical study in depth of the thoughts and feelings evoked by negative and gruesome informational media? What criteria or formulae may be recommended for development and selection of safety posters, films, etc.?

- Can we hypothesize that reward and punishment are complementary aspects of one and the same process? What are some of the potentials in the utilization of positive and negative educational approaches in varying combinations?

- What contributions can simulation techniques make to the development of safe work attitudes?

- How can simulation devices contribute to the development of safe work skills?

- What methods can be recommended for motivating supervision and other management personnel with regard to accident prevention?

- How can quality control techniques be adapted for increasing safety in selected work activities?

- Among industrial and business establishments of different types and sizes, how are plant or company safety programs best organized and administered?

- What characteristics distinguish successful safety programs of trade associations?

- What characteristics distinguish successful safety programs of labor unions?

- In what ways can community safety resources or services be better utilized? What specific arrangements are needed and feasible in the case of small business and industrial establishments? (pp. 25–26).*

Reference: Rockwell, Thomas H., "Research Needs in Occupational Safety," *Bulletin No. 243 (Proceedings of the President's Conference on Occupational Safety)*. Washington, DC: Bureau of Labor Standards, U.S. Department of Labor, March 6–8, 1962, pp. 112–114.⁶ Rockwell's presentation at the President's Conference on Occupational Safety was also published under the same title in the January 1963 issue of the *Journal of the American Society of Safety Engineers* (pp. 15–20).

Description

This paper is developed around three sets of what the author terms "Representative Fundamental Questions in Accident Causation," as follows:

A. Some representative fundamental research questions in accident causation—general:

    1. What distinguishes the injury accident from the near accident or no-injury accident? Are the latter useful predictors of the former?

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2. Is an accident sequence a go-no-go situation, or does the accident cascade to an explosive point? Can an accident be structured in time sequences, and if so, are there reversible elements?

3. Are accidents probabilistic in nature and hence subject to the laws of chance? Or contrary-wise, is every accident unique in terms of its causation and its consequences?

4. How can we measure the unsafeness of an act or a condition? What does *safe* mean? Is this relevant to consequences or antecedent conditions?

5. What do we mean by the terms *risk* and *hazard?* Can these be scaled to permit statements of relative degrees of hazard and risk?

6. How are unsafe conditions and unsafe acts interrelated? Dounsafe acts breed unsafe conditions and vice-versa?

7. What is the role of compensatory behavior in accident progression?

8. It is necessary to wait for accidents occur in order to study them? Are there intermediate criteria, such as unsafe behavior, which are available and which lend themselves to statistical and scientific analysis?

9. What constitutes safe operator behavior? Is it necessary for us to understand what safe operator behavior is before we can talk about unsafe behavior?

B. Some representative fundamental research questions in accident causation—behavioral factors:

1. What constitutes risk-taking in accidents? What are the personality correlates of high risk acceptance?

2. What do we mean by *the alert operator?* How do we measure this? Can alertness be regulated by procedural or engineering changes?

3. What constitutes a safety attitude? What are its determiners? Do attitudes precede or are they concurrent with accidents? How stable are attitudinal postures? To what extent do sociological pressures and cultural and economic backgrounds affect operator attitudes toward safety?

4. What is the effect of maturation on safety behavior?

5. What effect does fatigue have on sensory, motor and cognitive processes in the safe performance of a task? How is it manifested in operator behavior? Can it be detected at its outset?

6. What are the ranges of human tolerance to physical, biological and emotional stress? Can stress be quantified and can one measure an operator's response to stress?

7. What role does emotion play in accident causation? Can emotional cues which often precede unsafe acts be detected?

8. What is the relationship between physiological impairment (either temporary or permanent) and worker behavior?

9. What is *functional* age and how is it related to safety performance?

10. Does man have a channel capacity in terms of his ability to organize sensory inputs relative to the task. If so, can sensory or cognitive overload or underload lead to unsafe performance?

C. Some representative fundamental research questions in accident causation—environmental factors:

1. What are the safe acceptable limits of occupational hazards such as noise, toxic chemicals, temperature, etc.?

2. What are the dimensions of physical stress in the workplace?

3. Can we identify the sensory, motor and cognitive demands of a particular task on the operator?

4. How do unsafe conditions affect operator performance safety-wise?

5. To what extent does homogeneity built into a task facilitate or inhibit long term safety behavior?

6. How can innate and learned behavioral responses be utilized in equipment design?

7. Is it possible to design tasks and machines which provide positive protection and yet minimize restrictions on operator movements?

Reference: Jacobs, Herbert J., (then of the Public Service Research Institute, Inc., Stamford, Connecticut) "Conceptual and Methodological Problems in Accident Research." Undated.[9]

Description

In his paper, Jacobs suggest and discusses the following organization of research activities:

Table I

ACCIDENT RESEARCH PROBLEM AREAS

I. Accident Causation (and Severity) Research

    A. Investigation and Analysis of Individual Accidents

    B. Investigation of Accidents Classified by Risk Situation

    C. Investigation of Accident-Generating Individuals, Situations or Processes

II. Accident Prevention Research

    A. Countermeasures Development Research

    B. Countermeasures Effectiveness Evaluation

    C. Countermeasures Acceptability Evaluation

III. Accident-Related Behavioral Research

    A. General Behavioral Processes

        Examples: Risk perception

                Risk taking

                Learning

                Relative motion perception

                Attitude formation

    B. Specific Behavioral Processes

        Examples: Driving behavior

                Drinking behavior

                Formation of attitudes toward safety

Reference: National Institute for Occupational Safety and Health, Health Services and Mental Health Administration, Public Health Service, U.S. Department of Health, Education, and Welfare, *The Present Status and Requirements for Occupational Safety Research.* Atlanta, Georgia: National Institute for Occupational Safety and Health, 1972.[10]

Description

This report presents the safety research findings and recommendations of Arthur D. Little, Inc., which conducted a year-long study for the National Institute for Occupational Safety and Health (NIOSH). The objectives of this study were to assist NIOSH in the development of an occupational safety and health research program by: summarizing the present status of occupational safety research, assessing the need for developing additional research, developing a priority rating system for occupational safety research projects, and preparing a priority listing of specific research projects for in-house, contract and grant safety research by NIOSH. Information was collected from the technical and trade literature; universities and research institutions; federal, state and local government agencies; industrial and labor organizations and societies; and specific investigators, through a literature survey, letter inquiries, and a review of occupational accident reports, and personal and telephone interviews. This information was analyzed for occupational safety research. A priority rating system was developed and then tested with a sample of research projects. Approximately 100 safety research projects were identified, half of which were related to general subjects such as accident investigations; causative factors; psychological, motivational, management, and educational research; and half to the development of criteria and standards in occupational safety.

In the section of the report entitled "Occupational safety needs and related research—opinions of those interviewed," the following statement is made under the heading "Management Research:"

> Several persons believed that too much emphasis was placed on developing technical ways to prevent accidents and that better management techniques were needed. There was some question as to whether the OSHA approach of policing plants to identify code violations is the most effective way of motivating management to correct hazardous conditions. A better method might include studying the overall economics of safety programs, including demonstrations of how a well-managed safety program can save money for industry. (p. 63).

In the section of the report entitled: "Specific research projects," the following five candidates research area are identified under "Management-oriented research:"

1. Define the role of safety personnel. How they most effectively fit into the management structure, what kind of educational background they should have and what kind of relationship they should have with the personnel department, administration and workers?

2. Study the effectiveness of providing a feedback system to industries to show them how their accident experience compares with similar industries and which summarizes their total compensation claims and relates this to projected costs for specific industries.

3. Compare the management practices of companies with good safety records—similar companies with poor safety records. Find out how they differ in their view of accident causes and in their programs to reduce accidents. Determine the transferability of practices from one company to another.

4. Study the role of the purchasing agent in evaluating equipment to meet safety criteria. Determine whether additional safety training can help improve company safety performance.

5. Develop a comprehensive safety program for small industries and methods of implementing these programs at low cost to the small industry. (p. 83).

Reference: Rinefort, Foster C., "The Economics of Safety: How Much Risk is Acceptable, if Any?" *Professional Safety.* July 1979. pp. 44–47.[11]

Description

This paper reviews both selected discussions of the subject of economics of occupational safety and those studies which are judged by the author to be the most complete or most relevant. One of the, if not the, most extensive known cost-benefit analysis of occupational safety was conducted by the writer as his doctoral dissertation at Texas A&M University.[12]

One of the conclusions reached as a result of this review of selected studies regarding the economics of occupational safety is, not surprisingly, that more research is needed and that the results of both current and future research need to be communicated in some clear way to those people who can effectively utilize the research findings. Rinefort also suggested that research is needed to provide better answers to the following questions:

1. Should we attempt to estimate the monetary values of the lives of people in our society and, if so, what basis should be used?

2. What are the effects of workmens' compensation insurance requirements upon work injuries in various industries and jurisdictions?

3. What is the complete role of wage differentials or payments for hazardous occupations in various sectors of the economy?

4. In what way can government most effectively contribute to work injury prevention?

5. What are the components of successful occupational safety programs in various industries?

6. What are the relationships between work injury rates and employee turnover, absenteeism, available supervision, labor force demographics and varying economic conditions?

7. What are the economics of safety as determined by cost-benefit analysis in the service, construction, utility, transportation, communication and mining sectors of the economy?

8. What are the complete economics of occupational safety, including the estimated effects upon all affected parties, or the externalities or spillover effects? (pp. 46–47).*

Reference: Petersen, Dan, ''Professionalism—A Fourth Step,'' *Professional Safety.* November 1982, pp. 37–39.[13] (Reprinted with permission).

Description:

Petersen, in commenting on professionalism in the safety field, suggested the following questions as needing to be examined by safety professionals in any attempt to examine a part of the theoretical base upon which he apparently believes some safety professionals now function:

1. What causes an accident?
2. What is the relationship between serious and non-serious (injuries)?
3. Is the foreman the key man (i.e., the key to success in accident prevention)?
4. Do inspections reduce accidents?
5. Does an accident investigation procedure control accidents?
6. Does recordkeeping reduce accident occurrence?
7. Do safety campaigns and gimmicks work?
8. Does safety training beget safe behavior?
9. Do five-minute safety talks improve the (safety) record?
10. Do rules and enforcement improve behavior?
11. Does preaching and teaching change worker attitude? (pp. 37–39).*

It will be noted that in the literature reported to date, the little information that is available attempts to get primarily at safety-related types of problems. Few of the problem areas identified relate to the huge and complex problem of occupational health either at the worksite, or among the families of workers.

Reference: Research Branch, Occupational Health and Safety Division, Alberta Workers' Health, Safety and Compensation, *Setting Priorities for Occupational Health and Safety Research.* Edmonton, Alberta, Canada: Alberta Workers' Health, Safety and Compensation, December 1983.[14]

Description

This thoroughly researched and documented paper describes a study undertaken by the Occupational Health and Safety Division to identify those research areas with the highest potential significance for occupational health and safety in Alberta, Canada. The study is described by its author, Keith Smith, thusly:

> Initially, 20 knowledgeable health and safety professionals in government and industry provided 185 research area suggestions during a structured interview. These suggestions were compiled into 58 distinct research areas, reflecting six major themes or categories

for occupational health and safety research. These research themes were: *program issues; psychological, social and economic issues: technologies, work procedures and equipment issues: chemical issues: data gathering and analysis, and needs assessment issues: and physical and biological issues.*

In the second stage of the study, 65 individuals familiar with occupational health and safety concerns in Alberta rated the potential value of each of the 58 research areas and also indicated which five areas they felt were most, and least, important.

In general, a high level of consensus emerged on the relative importance of the major research categories and on specific research issues. Overall, research areas in the program (evaluation) category averaged the highest ratings of potential value while research areas in the physical and biological issues category received the lowest ratings.

Occupational health and safety professionals appeared to be calling for more investigation of practical problems and for less attention to issues with few practical applications or which are already well funded and well researched elsewhere. Particular emphasis was placed on the need to evaluate the effectiveness of existing and new program (prevention) strategies.

Program issues were considered to be those representing concerns about evaluating the effectiveness of different aspects of occupational health and safety programs (training, accident investigation, promotion, legislation). In the *program issues* category, the research which was considered of the *highest priority* was that of designing effective programs to provide occupational health and safety information and services to small businesses, while the *lowest priority* was given to conducting a literature review on the development and implementation of prevention strategies.

In general, a high level of consensus emerged on the relative importance of the major research categories and on specific research issues. Overall, research areas in the *program (evaluation) issues* category averaged the highest ratings of potential value while research areas in the *physical and biological issues* category received the lowest ratings.

Reference: Waldrop, Sidney, "Upfront—Questions for Consideration," *Professional Safety.* February 1984, pp. 1, 13–14.[15] (Reprinted with permission).

Description

Mr. Waldrop, in a letter to the editor of *Professional Safety,* the journal of the American Society of Safety Engineers, identified topics which he felt would be of interest to readers of the *Journal.* Since some of the subject areas Mr. Waldrop identified can be developed into substantive research projects, the list of topics he suggested is reproduced below:

1. Can people be effectively motivated to want safety in their everyday activities? Should they?
2. How can people be best motivated and influenced to act safely in their occupations.
3. What should be the roles of schools, service agencies and individual professionals in the development of overall risk management, safety and health maintenance measures?
4. What are the complete economics of our present and proposed safety and health efforts including effects upon the lives, lifestyles and finances of all parties involved or influenced?
5. What are, and what should be, the limits of an individual's or company's right to privacy when public health and safety are involved? What about a worker's right to know regarding his own exposures and medical records?

6. Should government follow, ignore or lead in risk management, safety and health efforts? If or when involved how can it most effectively function? Should there be multiple levels and agencies involved or should one or two super agencies be established for these efforts?

7. How does environmental degradation affect our safety and health? What are effective ways of avoiding this degradation? . . . of improving our ecology?

8. Can we identify and control environmental, physical and psychological stresses of jobs? . . . employee selection methods to avoid injuries relating to those stresses? . . . control employees and/or job stresses to prevent workers from becoming "accident" or "disease" prone?

9. Can, or should, safety and health programs and their results be subjected to meaningful "cost-benefit" analyses as they presently exist? Can analyses be developed which are more meaningful? Should people's lives, disabilities, lost work days, damage to or loss of embryos be considered in the analyses? How?

10. What are the total effects of public health programs like chlorination and fluoridation of drinking water? . . . pasteurization of milk? . . . mandatory immunizations? . . . food additives like iodine in table salt? . . . food quality and sanitation inspection? . . . warning notices on cigarettes? . . . standardized labeling of chemicals, pesticides and other commercial products? Which ones are effective and which should be abandoned or changed? How? Why? Are new programs needed?

11. What form of training is best for alerting people to the inherent dangers and of hazard control methods relating to their facilities, building, areas, animals, machines, equipment and disease vectors to which they are or could be exposed?

12. How can "acceptable" levels of exposure to work contaminants be established? How can possible delayed biological effects of exposures be studied, eliminated or controlled?

13. What are "acceptable" standards of risk in our work situations? . . . public transportation? . . . private transportation? . . . living environments (radiation, air and water pollution, etc.,)? . . . homes? Why the differences between these "acceptable" levels?

14. What should be the function of and distinctions between the various safety, health and risk management professions? What overlap is desirable? Undesirable? How should efforts of the various professions be coordinated?

15. How can safety, health and risk management professionals be best educated and trained? How should they be supervised? What management system or systems work best for organizations and agencies which employ or use them? What methods are best for their continuing proficiency training and upgrade?

16. What are the most effective management, accountability, training, discipline, administrative control and personnel practices for use in achieving overall efficiency by an employer? . . . the government? . . . a school? . . . through a contract? Are they the same as for a best overall safety, health and risk management program?

17. What is and what should be the role, if any, of wage differentials for hazardous work? . . . emergency response actions? . . . other known job stresses?

18. Is there or can there be developed a fair system of compensation of victims for injury incurred when a supplier provides a product which is as safe and environmentally acceptable as the "state of the art" permits but which is later found to cause injury? Should a supplier be responsible when a product is misused, improperly maintained or altered and an injury results? Should a supplier be responsible for injuries resulting from standard substances believed to be relatively safe when properly used in accordance with recognized practices but which are afterwards found

to cause cancer or other delayed biological damage? How can products be adequately tested for their total safety?

19. Can or should there be more emphasis on prevention of diseases and/or their control prior to obvious clinical symptoms or irreparable damage? How? Should we strive toward more recognition of the work and environmental relatedness of disease with an eye toward prevention or should our limited resources be used to treat diseases as they occur? Why?

20. How can job stresses like noise, temperature extremes, radiation, vibration, repeated minor trauma, work pressures, high or low atmospheric pressures, air and water contaminants, etc., be best controlled? Should personnel selection and assignment procedures by employers, job placement and training agencies, schools and similar agencies consider these stresses? How? Should allergies and possible allergic sensitization be considered? How should possible effects on offspring and future generations be handled? What about the concept of equal employment opportunity?

21. What should be the role of personal protective equipment? Should it ever be used as a substitute for engineering or administrative controls? Should its use be restricted to emergencies only? Should its use be mandatory or only voluntary? How should it be selected, inspected, used and maintained?

22. Should jobs be designed so that they can be performed with equal safety by both sexes? . . . young and old alike? . . . immunized and unimmunized? . . .tall and short? . . . handicapped and able-bodied? . . . right or left handed people? . . . etc.? How can we design jobs to meet both equal opportunity and occupational safety and health requirements? How can we best avoid aggravation of any pre-existing conditions which could cause additional injury or disability?

23. What are the relationships between work death or injury and disease frequency and severity rates upon employee morale, turnover, absenteeism, types and availability of supervision, labor force makeup and varying economic conditions? Why?

24. What is, and what should be, the overall effects of insurance (workers' compensation, liability, property loss, casualty, etc.) and social welfare programs upon loss control, safety and health efforts? . . . upon our professions? How do they affect rehabilitation programs? . . . length of time away from job?

25. Are there safer and more efficient methods of handling, transporting, and disposing of materials? . . . ''hazardous'' substances? . . . wastes?

26. How can fires, explosions, spills and inadvertent releases of hazardous substances best be prevented? . . . controlled when they do occur? How should emergency response personnel be trained and equipped for response to these incidents? How can emergency crews be both quickly notified that a response is needed and told of the hazards and precautions needed during a response to ''off site'' or ''transportation'' incidents for which they may not be trained or equipped?

27. How can the safety and health of investigators, support and emergency personnel and the public be protected from injury and disease resulting from research activities involving hazardous substances, unknown materials, sources of radiation, infectious agents, biological hazards, etc.?

28. How can the inherent hazards of infectious disease agents and the unknown delayed low level hazards of chemicals which could result in pathological damage to the user, the user's family or offspring be controlled? How best can injury or disease be avoided by persons whose work or lifestyle xposes them to such hazards?

29. How can the injuries and zoonotic diseases be avoided by persons who live or work with or around animals?

30. What should be the role of safety, health and risk management professionals in relation to inspection, investigation and regulatory agencies (OSHA, NIOSH, police, fire and arson investigators, and in-house officials checking for possible disciplinary or legal actions)? How can "confidential" or "privileged" information, the non-confirmed opinions or victims and witnesses relating to causes of incidents be handled? How and at what point in an "accident" investigation should the investigation be turned over to law enforcement officials should an unlawful act be suspected as its cause?

What should be done with accident prevention information collected in the investigation prior to reaching this point? How can "evidence" be preserved by non-law enforcement investigators so that it can be used in legal prosecution should that become necessary? What about accident investigation statements by the victims or witnesses which could contain self-incriminating evidence.

What about information collected during "criminal" investigations that could be used in safety, health or loss control efforts if immediately available but confidentiality is wanted by "law enforcement" personnel? What about information collected by law enforcement personnel that can be used in safety, health or risk management actions but not used or suitable for use by them in their prosecution of the case?*

Reference: Lederer, Jerome F., "Six Unresolved Safety Problems," *Professional Safety.* July 1985. pp. 21–25.[16]

Description

This article discusses the following six problems and problem areas: fire following a survivable crash, economic constraints on safety, psychological pressures to take chances, terrorism, the paradox of the microchip, and drug abuse. The author, in his concluding remarks, observes: "Other unresolved safety problems could be added . . . Examples are Murphy's Law (If anything can go wrong, it will!), bogus parts, and inadequate communication. Some problems may be solved by research, some by laws properly enforced, some by public pressure, and some by improved supervision and education. Some may never be completely solved." (p. 25).*

In line with Lederer's recommendation that drug abuse be highlighted as an unresolved safety problem, a Columbia Broadcasting System (CBS) special report aired during the week of July 14, 1985, reported that drug abuse costs American industry some $26 billion each year.

PUBLICATIONS WHICH PROVIDE SUMMARIES, CRITIQUES OR COMMENTARIES ON THE TYPES AND QUALITY OF RESEARCH CONDUCTED ON SAFETY AND HEALTH RELATED TOPICS

Following are references to and descriptions of eight publications which not only summarize selected investigations into injury and illness causation, but which also comment on the methods and approaches used. As such, these publications should be of interest to anyone planning to do research into occupational safety and health related problems. Unhappily, none of these publications identify or discuss occupational safety and health in terms of the management context within which the occupational safety and health function is carried out. References are listed in order of date of publication.

Reference: Larson, John C., et. al., *The Human Element in Industrial Accident Prevention.* New York: Center for Safety Education, New York University, 1955.[17]

Description

The authors of this publication, in its preface, state:

> This publication is an attempt to report, analyze, and interpret an extensive accumulation of important but widely scattered research on the relationship of human factors to

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the cause of industrial accidents . . . The book contains summaries of more than a hundred studies, which were screened from some five hundred abstracts culled from nearly one thousand references to safety that appeared in medical, psychiatric, ophthalomological, optometric, psychophysical, psychological, and sociological journals, texts, and periodicals. (p. 3).*

The book is divided into two sections, and contains nine chapters, as follows:

Section One: Hiring and Procedures and Safety

    I. Psychophysical Characteristics
    II. Psychological and Sociological Characteristics
    III. Medical and Physical Effects

Section Two: Postemployment Practices and Safety

    I. Safety and Adjusting to the Job
    II. Training Programs and Accident Prevention
    III. Physical Working Conditions and Safety
    IV. Morale, Job Satisfaction, and Accident-Injury Rates
    V. Predicting Accidents
    VI. Industrial Accident Research: A Critique

Appendixes:
    A. Training Supervisors and Foremen
    B. Training Workers
    C. Improving Morale and Job Satisfaction
    D. Safety Meetings and Improving Morale*

Reference: Suchman, Edward A., and Scherzer, Alfred L., *Current Research in Childhood Accidents.* New York: New York, Association for the Aid of Crippled Children, 1960.[18]

Description

The basic purpose of this report is two-fold: first, to assess critically the current state of accident knowledge and research and, second, to point out new directions for further work. The report is designed to serve as a source book of existing knowledge, as a review and evaluation of current research methods, and as a guide and stimulus for the planning of future research and prevention programs in the area of childhood accidents. The report is divided into the five following areas: 1) some conceptual approaches to the accident phenomenon, 2) the extent and significance of the accident problem, 3) evaluation of current data and theory, 4) methodological approaches to the study of accidents, and 5) specific areas of needed research.

Reference: Haddon, William Jr., Suchman, Edward A., and Klein, David, *Accident Research: Methods and Approaches.* New York: Harper and Row, Publishers, 1964.[19]

Description

This book, despite its 1964 publication date, is still considered the finest publication in the field of accident research. The purpose of the book, as explained in its Preface is:

    . . . to bring together within a single volume, significant studies in accident research and to embed these studies as examples in a text dealing with the methodology of accident research. These two aims are somewhat antithetical. If we were concerned solely with anthologizing the best of the literature, our selections might have been of generally higher quality and of narrower range and variety; but because we have been concerned with the instructional value of the selections, we have had to modify the criteria

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of the anthologist. First, in order to represent all approaches to research, we have had to include studies that are not inherently excellent but constitute the best available work in areas not hitherto characterized by work of high quality. Secondly, in order to demonstrate certain common methodological errors, we have have to include studies which embody such errors and are seriously weakened by them. (p. vii)

The book is divided into the following ten chapters:

Chapter 1: Toward a Science of Accidents Research
Chapter 2: Some Approaches and Pitfalls
Chapter 3: Data Sources and Methodologies
Chapter 4: The Search for Cause
Chapter 5: Behavioral Research on Accidents
Chapter 6: Psychological Approaches
Chapter 7: Research on Accident Proneness
Chapter 8: Social and Cultural Factors
Chapter 9: Factors that Determine Injury
Chapter 10: Research in Accident Prevention*

Reference: Surry, Jean, *Industrial Accident Research: A Human Engineering Appraisal.* Toronto, Ontario, Canada: Department of Industrial Engineering, University of Toronto, January 1969.[20]

Description

The study which led to the preparation of this report was commissioned by the Minister of Labor, Province of Ontario, in an attempt to ". . . evaluate those factors which may have a bearing on developing new ways to limit industrial accidents and deaths."

As explained in the Preface to this publication, this report is:

. . . an appraisal of industrial accident research from the particular point of view of human engineering. Accident research has long attempted to find common denominators among the human and environmental antecedents of accidental injuries, while recently human engineering has developed certain skills and knowledge in the study of the interactions between humans and their environment and can thus add to the development and improvement of accident research . . . (p. i).

Surry's report is divided into three parts containing a total of eight chapters as follows:

Part I: History and Development of Accident Research

Chapter 1: History of the Safety Movement and Accident Statistics
Chapter 2: Development of Accident Research
Chapter 3: Conceptual Models of the Accident Process

Part II: Factors Relating to Accident Frequency

Chapter 4: Personal Factors
Chapter 5: Environmental Factors
Chapter 6: Injury Agent Factors

Part III: Institutional Countermeasures to Industrial Accidents

Chapter 7: Applied Techniques for Accident Prevention and Consequent Minimization
Chapter 8: Recommendations for Future Progress

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Appendices to this report include:

Appendix A: Comparison of Accident Research Activity in Industry and Other Fields
Appendix B: A Critique of Accident Proneness Research
Appendix C: Analyses of Accidents Resulting from Impact From Moving Objects and Falls

Reference: Pfeifer, C. Michael, et. al., An *Evaluation of Policy Related Research on Effectiveness of Alternative Methods to Reduce Occupational Illness and Accidents.* (PB-242-222). Springfield, Virginia: National Technical Information Service, U.S. Department of Commerce, July 1974.[21]

Description

This report summarizes the results of a comprehensive literature review and evaluation of research on alternative strategies for reducing occupational illness and accidents. Several approaches were used to locate literature, including professional and automated search services, manual searches, etc. Each reference surviving the screening process was evaluated with regard to internal validity, external validity, and policy utility using a six-pointscale. Ten percent of the articles were rated independently by a second reviewer as a check on reliability. Reliability of ratings was not a problem, and minor discrepancies were resolved by group discussion.

Critical reviews of the literature are presented for six general approaches to accident and illness reduction, namely: 1) behavioral approaches, 2) occupational health approaches, 3) applied ergonomics, 4) occupational biomechanics, 5) systems engineering approaches, and 6) investigative and statistical approaches. In addition, suggestions are made for future research in each area. A research agenda is included as an appendix. Separate bibliographies are included for each of the six general approaches.

Reference: Cohen, Alexander, "Factors in Successful Occupational Safety Programs," *Journal of Safety Research,* Volume 9, Number 4, December 1977. pp. 168–178.[22]

Description

This article reviews relevant research on successful occupational safety programs and reveals a number of factors of particular significance. As described by the author:

> . . . (this) review of relevant research on successful occupational safety programs reveals a number of factors of particular consequence. Evidence of a strong management commitment to safety and of frequent, close contacts between workers, supervisors, and management on safety matters loom as the two most influential and dominant factors. Other relevant factors include workforce stability and personnel practices that promote such stability (i.e., well developed selection, job placement, and advancement procedures), stringent housekeeping and effective environmental controls, training emphases on early indoctrination and follow-up instruction, and special adaptation of conventional safety practices to enhance their suitability to the workplaces in question. Overall, it was suggested that maximally effective safety programs in industry will be dependent on those practices that can successfully deal with "people" variables. (p. 168)*

Cohen reviews eight studies which utilized three different approaches to obtain their data samples, namely: 1) opinion polls, 2) analyses of factors common to companies having outstanding safety performance, and 3) comparisons of safety program practices in companies with high versus low work injury rates. Major findings of these eight studies are summarized in terms of the following nine general factors: 1) management commitment, 2) hazard control, 3) safety training, 4) safety motivation, 5) employee support, 6) inspection and communications, 7) accident investigations and recordkeeping, 8) make-up of the workforce, and 9) safety committees and safety rules.

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Reference: Hahn, Clifford P., "Overview of Models of the Accident Phenomenon," in Petersen, Dan and Goodale, Jerry, *Readings in Industrial Accident Prevention*. New York: McGraw-Hill Book Company, Inc., 1980.[23]

Description

This paper, originally presented at the Annual Professional Development Conference of the American Society of Safety Engineers in Dallas, Texas in 1973, provides an overview of a number of models of the accident phenomenon. Much of Hahn's paper is based on work reported earlier by Surry, whose report is referenced earlier in this Section.

Reference: *Proceedings of a Symposium on Occupational Safety Research and Education*, held September 3–5, 1980 at Morgantown, West Virginia. Published by the National Institute for Occupational Safety and Health. Cincinnati, Ohio: NIOSH, February 1982.[24]

Description

This publication reports on the proceedings of a symposium, the main objective of which was to provide a common forum for exchange between the research and academic components of the safety discipline. The three objectives for the symposium were: 1) to bring educators and safety researchers together to establish better communications between the two, 2) to exchange ideas about research activities and needed curriculum improvements through guided discussion and presentation of papers, and 3) to articulate preliminary guidelines for instructional and research programs.

Under the heading "Occupational Safety Research," the following papers were presented and discussed:

- Labor needs in research
- Injury epidemiology
- Accident-injury study
- Design safety—an overview, which included the following papers: 1) machine guarding, 2) machine guarding simulation, 3) multiple purpose machinery, 4) a quantitative approach to safety assessment of the workplace, 5) handles for sharp tools, and 6) accidents and sociotechnical systems: principles for design
- Ergonomics in occupational safety, which included the following papers: 1) occupational injuries and worker capabilities, 2) ergonomics at punch presses, 3) strength testing/employee placement on physically strenuous jobs, and 4) stress-related risk factors
- Personal protective equipment, which included the following papers: 1) status of eye protective equipment, and 2) behavioral approaches to personal protective equipment usage
- Using economic incentives to improve occupational safety.

Under the heading "Occupational Safety Curricula: New Directions," the following papers were presented and discussed:

- Educational program approaches, which included the following papers: 1) safety education in labor studies programs, 2) business emphasis in safety, 3) public health emphasis in safety, 4) educational program approaches—engineering, 5) ergonomics as a basis for graduate education in occupational safety: a multidisciplinary approach involving engineering, psychology, and public health, and 6) overview of educational approaches
- Industrial input for safety and health curriculum
- Labor needs in safety education
- The need for university and union cooperation in research and education for construction
- Issues in developing university labor-management activity on occupational safety and health
- A position paper—core programs requirements
- Safety faculty requirements

- Faculty requirements: university expectations
- Constraints to developing curricula and administering programs in occupational safety.

Under the heading "Dialogue: Academia and Research," the following papers were presented:

- Continuing education for professional development
- Model for a national system for continuing education
- Prerequisites for incoming students: undergraduate and graduate programs
- Prerequisites for incoming students: undergraduate and graduate programs (Two separate papers on this subject were presented)
- The evaluation of educational programs in occupational safety.

CONCLUSION

As indicated in the introduction to this Section of this report, both listings of proposed research projects in occupational safety and health and comments and critiques on research reported in the literature are scarce. Moreover, most are quite dated. It seems that in the 1950's and 1960's, there was more interest in generating interest in research into the causes of accidental deaths, injuries and illnesses than there has been during any period since that time. Further, there is almost nothing in the literature which attempts to relate management philosophy and practice with safety and health program effectiveness. Further, the great bulk of the occupational safety and health related research reported to date focuses on the physical (safety) hazards of the worksite, rather than upon both safety and health hazards and their recognition, evaluation and control. Despite these shortcomings, a review of the publications referenced in this section should provide the individual who is considering conducting research in an occupational safety and health related area with a considerable background on what has been done in the past and what some perceive as the most pressing occupational safety and health problems facing managers both in the near- and the long-term.

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STUDY PROTOCOL

HOW THE STUDY UPON WHICH THIS REPORT IS BASED WAS CONDUCTED

The study upon which this reports is based was conducted to identify candidate problems and problem areas in occupational safety and health which are considered suitable for research by those pursuing graduate programs of study in business management. The description of problems and problem areas which appear in the report was generated following an analysis of the following data sources, each of which is described in turn.

The first step involved a review of the literature on occupational safety and health, and consisted of the identification of articles and reports which identified problems and problem areas in occupational safety and health which were considered in need of investigation or further investigation. Such articles and reports proved to be scarce. Moreover, the bulk of the information that was identified was, on the whole, quite dated. Fortunately, however, for the purposes of this study (but not for the occupational safety and health field), many of the problems identified in these articles and reports remained uninvestigated despite the age of some of the articles and reports and the prestige and the extensive circulation of the journals in which, and the bodies to which, the problems and problem areas had been reported initially. The purpose of this step in the study was to ascertain what had already been done and thereby avoid unnecessary duplication of effort.

The second step involved the identification of articles and reports which commented upon the nature and quality of research that had already been conducted in the field of occupational safety and health. The objective of this task was to identify those problems and problem areas which, while already investigated and reported upon in the literature, were still considered to be in need of studies which would either further validate the original research findings, or would shed more light on the problem or the problem area than the research which had already been conducted had done.

The third step involved examining the literature of both occupational safety and health (especially those articles, reports and other publications which discussed the management-related aspects of occupational safety and health programs and other initiatives), and the literature of management in general. The objective of this search was to identify management-related problems and problem areas in occupational safety and health which the authors of those articles, reports and other publications had found during their research and study.

The fourth step involved a search of *Dissertation Abstracts* for the past five years to identify the amount and nature of research which had been done in the area of occupational safety and health as it relates to management functions. This search established that very few individuals pursuing graduate degrees in business management, or in other disciplines, had chosen a topic related to occupational safety and health. While this paucity of research proved disappointing, it lent further confirmation to the hypothesis that little research on occupational safety and health as it relates to management functions has been done and reported in the literature.

The fifth step was to identify a number of occupational safety and health practitioners and others (e.g., managers, academicians, and labor officials) and, through personal contact and telephone interviews, obtain their perceptions of what the major occupational safety and health problems in their organizations are and which appear to be related, in some manner, to: a) a lack of understanding of the occupational safety and health problem and how it may be approached effectively by managers, and b) a lack of understanding on the part of occupational safety and health practitioners of the management function and how to get things done within the management system.

The sixth step was to identify a number of occupational safety and health practitioners and others (e.g, managers, union officials, individuals in academia, and consultants in occupational safety and health) and contact them by letter, inviting them to identify representative problems and problem areas in occupational safety and health program management which are: 1) in need of further study, and 2) suitable for investigation by graduate students in business management type programs of study. To aid the prospective respondents, five functions of management were identified and under each function, examples of the types of problems or problem areas for study which might appear under each were identified to serve a prompting or recall function for those invited to respond.

A copy of this letter of invitation appears at the end of this section of this report. Copies of the letter were sent, by name, to 195 individuals. In some instances (e.g., the National Association of Manufacturers, the U.S. Chamber of Commerce, and Organization Resource Counselors), the letter asked for input which would represent a consensus of a sample of the membership. In addition to requesting input from specific individuals and organizations, an invitation was extended to the readers of selected publications read by large numbers of managers, labor union personnel, occupational safety and health professionals and individuals from academia, to submit their views on problems and problem areas which they considered in need of investigation and which they felt were suitable for research by those majoring in business management type programs of study. A copy of the "Invitation to Readers" statement which was sent to these publications is enclosed at the end of this section of this report. The invitation, as originally written, was published by editors of *Professional Safety,* the monthly journal of the 25,000-member American Society of Safety Engineers, and of the *Safety Management Newsletter,* a service provided to subscribers to the *Safety Management Planning Manual,* a publication of the Merritt Company, Santa Monica, California.

The seventh step in the conduct of the study upon which this report is based involved taking the input received from the six major data sources identified above, analyzing these data, and assigning problems and problem areas identified to one of the six major areas, namely: one of the five commonly accepted functions of management (i.e., planning, organizing, staffing, directing and controlling), or to a sixth "not elsewhere classified" category to accommodate those problems and problem areas which did not fit easily into one of the five aforementioned classifications. Some of the problems and problem areas identified are reported simply as questions. In other instances, they are presented in the context of a narrative in which the problem or problem area are identified. Many of the problems and problem statements will need to be reworked, and many will need to be delimited, before they will be suitable for research. Further, it will be up to the individual planning to conduct the research to formulate his problem statement and his proposed approach to it, and to defend his choice of topic and proposed research methodology to his major professor and/or thesis sponsor to his committee, and to get their approval before proceeding further.

The final section of this report contains a discussion of how an individual may find management-related problems in occupational safety and health beyond those which appear in, or are implied by, those identified in this report.

In the Appendices to this report are found: a) a review of the literature on occupational safety and health research, b) the study protocol (i.e., how the study upon which this report is based was conducted), c) selected references on occupational safety and health which are considered important for those with business or management type backgrounds, d) selected references on research methodology and on writing theses and dissertations (many institutions publish their own manuals on conducting research and writing up the findings, and virtually all institutions of higher learning offer courses in research methodology for those pursuing, or interested in pursuing, an advanced degree), e) information on basic federal occupational safety and health legislation and on the five organizations created by this legislation, and f) information on the OSHA Technical Data Center and the NIOSH Technical Information Center.

Following is a copy of the letter sent to those from whom input to this study was solicited:

I am preparing a report for the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services, which will identify representative problem areas in occupational safety and health program management which are (1) in need of further study, and (2) suitable for investigation by graduate students in business management type programs of study. The availability of the final report would be announced widely throughout the university community, and copies would be sent to all schools of business management whose deans or directors requested a copy. Graduate students who are required to prepare a research paper or thesis as a part of their program of studies would be made aware of the report in the hope that it would stimulate them to select a problem on occupational safety and health as the focus for their research.

I plan to generate candidate problem areas by: (1) reviewing the literature on occupational safety and health program management, (2) analyzing selected reports generated by the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, and the National Safety Council, (3) discussing the project and its purposes with practicing occupational safety and health professionals and soliciting their comments, and (4) inviting inputs from selected occupational safety and health practitioners and researchers and others holding significant positions of leadership in the field of occupational safety and health.

Because of your prominence in, and contributions to, the field of occupational safety and health, I am inviting you to contribute to this report by identifying problem areas which you consider to be in need of investigation or further study and which you consider to be relevant to, and within the capabilities of, graduate students in business management and related fields of study. (Many of those in graduate programs of study in business administration have undergraduate backgrounds in economics, law, engineering, operations research, and many other disciplines).

Please do not be unduly concerned about the format for the problem(s) or problem area(s) you submit. I will restate them, if necessary, in a manner suitable for further refinement and delimitation by graduate students and their advisors. Also, there are some problems which could easily relate to more than one management function. Here, again, I will make such a determination if necessary.

Tentatively, I have decided to group problems identified into one or more of the following five major functions of managements. Under each function of management, I have included examples of the types of problems or areas for study which might appear under each.

PLANNING. Examples:

* An examination of the methods used by selected organizations to establish occupational safety and health goals.

* A study of how selected organizations develop and implement plans for reaching their occupational safety and health goals.

* What constitutes a "reasonable" budget for occupational safety and health activities within an organization of specified size and mission.

* What an employer can reasonably expect to achieve with a specified investment in occupational safety and health activities.

ORGANIZING. Example:

* Is there an optimal location for the safety and health function within an organization? If so, what is this location and on what basis(es) has this determination been made? If it is determined that there is not an optimal location for the safety and health function within an organization, why isn't there, and on what basis(es) has this determination been made?

STAFFING. Example:

* On what basis(es) should occupational safety and health program activities be staffed within an organization. For example, should the numbers and types of occupational safety and health professionals, paraprofessionals and technicians employed be based on the size of the workforce, the levels of risk within the organization, geographic spread of the organization's operations, management philosophy within the organization, on all of these factors, or on other factors (specify)?

DIRECTING. Examples:

* How do managers of organizations with highly effective occupational safety and health programs issue instructions and otherwise indicate to subordinates what is to be done to implement the organization's safety and health policy, plans and programs?

* What types of communications problems arise in multi-plant operations and in multi-national corporations, and how do these corporations ensure that corporate safety and health policy with regard to occupational safety and health is implemented?

<u>CONTROLLING</u>. Examples:

- An examination of both budgetary and non-budgetary methods of control as these relate to the safety and health function within an organization.

- How selected organizations establish standards and methods for measuring safety and health performance. What the criteria for such measuring instruments should be.

- How safety and health performance standards are applied with an organization.

- Who should measure safety and health performance within an organization, and why.

- Of the expenditures for occupational safety and health within an organization, should a specified percentage of these funds be reserved for measuring safety and health performance? If so, on what basis(es) should this amount of funding be determined?

NIOSH is attempting to influence the curricula used to prepare professionals who work full-time in occupational safety and health and for those professionals who serve in support roles. Already successful in influencing the curricula for engineers, architects, science teachers, and vocational education instructors, NIOSH has now chosen to work with schools of business management in its efforts to provide more of today's and tomorrow's managers with information and instruction on occupational safety and health, so that they will be better able to participate in generating, supporting and evaluating safety and health initiatives within their corporations, companies and establishments.

To date, NIOSH has provided schools of business management with case studies, books of selected readings on occupational safety and health, and lessons on selected occupational safety and health subjects for use in their curricula. Now, NIOSH would like to stimulate research into occupational safety and health related problems by those pursuing advanced degrees in business management subjects. As a matter of interest, more than 600 American institutions of higher learning now award the Master of Business Administration (MBA) degree to some 63,000 individuals each year. Many other institutions of higher learning offer advanced degrees in areas such as ''General Administration,'' ''Accounting,'' and ''Internal Auditing.'' Thus, those enrolled in business management type programs of study are considered an important population to attempt to reach with information and instruction on occupational safety and health.

Thank you very much for your consideration of this report. May I have your reply not later than June 15, 1985.

Sincerely,

Earl D. Heath, Ph.D., P.E., C.S.P.
Occupational Safety and Health Consultant
624 South George Mason Drive
Arlington, Virginia 22204

Following is a copy of the ''Invitation to Readers'' which the editors of selected periodicals were asked to publish for the purpose of soliciting additional input for the study. The ''Invitation'' appeared in *Professional Safety*, the monthly journal of the American Society of Safety Engineers, in the *Safety Management Newsletter*, a monthly publication of the Merritt Company, Santa Monica California, and *Hazard Prevention*, the bi-monthly Journal of the System Safety Society.

AN INVITATION TO READERS

Earl D. Health, Ph.D., P.E., C.S.P., a frequent contributor to (name of periodical inserted here), is preparing a publication which will identify and describe candidate occupational safety and health problems which are considered suitable for research by those pursuing graduate degrees in business administration or business management. In addition to problems identified as a result of a review of the literature on occupational safety and health program management, and inputs from selected safety and health practitioners and others, Dr. Heath will welcome descriptions of problems which any of the readers of (name of periodical inserted here) may want to share with him. Readers desiring to submit descriptions of such problems should send them to Dr. Heath at 624 South George Mason Drive, Arlington, Virginia 22204. He will then structure them into problem statements suitable for investigation.

Copies of the publication that Dr. Heath is preparing for the National Institute for Occupational Safety and Health (NIOSH) will be made available to the deans and directors of schools of business who indicate an interest in receiving such a publication. The publication is a part of NIOSH's effort to impact schools of business management with more information and instruction on occupational safety and health.

APPENDIX C

SELECTED REFERENCES IN OCCUPATIONAL SAFETY AND HEALTH

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APPENDIX D

SELECTED REFERENCES IN RESEARCH METHODOLOGY AND IN WRITING THESES AND DISSERTATIONS

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APPENDIX E

THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 (PUBLIC LAW 91-596)
—AN OVERVIEW—

1) the Occupational Safety and Health Administration (OSHA) U.S. Department of Labor,
2) the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services,
3) the Occupational Safety and Health Review Commission (OSHRC),
4) the National Advisory Committee on Occupational Safety and health (NACOSH), and
5) the National Commission on State Workmen's Compensation Laws.

The Occupational Safety and Health Act of 1970 (Public Law 91-596)

In general, coverage of the Act extends to all employers and their employees in the 50 states, the District of Columbia, Puerto Rico, and all other territories under Federal Government jurisdiction.

As defined by the Act, an employer is any " . . . person engaged in a business affecting commerce who has employees, but does not include the United States or any State or political subdivision of a State." Therefore, under the Act's coverage come employers and employees in such varied fields as construction, longshoring, agriculture, law and medicine, charity and disaster relief, organized labor and private education. Such coverage includes religious groups to the extent that they employ workers for secular purposes.

The following are not covered under the Act:

* Self-employed persons;
* Farms at which only immediate members of the farm employer's family are employed; and
* Workplaces already protected by other federal agencies under other federal statutes.

But even when another federal agency is authorized to regulate safety and health working conditions in a particular industry, if it does not do so in specific areas, then Occupational Safety and Health Administration (OSHA) standards apply.

As OSHA develops effective safety and health standards of its own, standards issued under the following laws administered by the Department of Labor are superseded: the Walsh-Healey Act, the Service Contract Act, the Arts and Humanities Act, and the Longshoremen's and Harbor Workers' Act.

Federal agencies are covered by the Act, with each agency required to establish and maintain an effective and comprehensive job safety and health program. Such a program must be consistent with OSHA standards for private employers. The Secretary of Labor must provide federal agencies with guidance to assist them in maintaining an effective program for their employees.

Individual agencies may, at their option, establish safety and health committees composed of an equal number of management and employee representatives. Committees have access to agency information on hazards in the workplace and monitor agency performance including inspections. Also, they have the authority to request an OSHA inspection if at least half of the committee is dissatisfied with agency response to a safety or health problem. OSHA has general inspection authority for agencies which do not set up committees.

OSHA provisions do not apply to state and local governments in their role as employers. However, the Act does provide that any state desiring to gain OSHA approval for its private sector occupational safety and health program must provide a program which covers its state and local government workers, which is at least as effective as its program for private employees.

The Occupational Safety and Health Administration (OSHA)

Under the Occupational Safety and Health Act of 1970 (Public Law 91-596), the Occupational Safety and Health Administration (OSHA) was created within the U.S. Department of Labor to:

- Encourage employers and employees to reduce workplace hazards, and to implement new or improved existing safety and health programs;
- Provide for research in occupational safety and health and develop innovative ways of dealing with occupational safety and health problems;
- Establish "separate but dependent responsibilities and rights" for employers and employees for the achievement of better safety and health conditions;
- Maintain a reporting and recordkeeping system to monitor job-related injuries and illnesses;
- Develop mandatory job safety and health standards and enforce them effectively; and
- Provide for the development, analysis, evaluation and approval of state occupational safety and health programs.

OSHA is, in brief, the Federal agency that establishes safety and health standards, and then enforces them. It helps establish, monitor, and evaluate State programs; it conducts training and education; and it directs Federal funds to support all these activities.

While OSHA continually reviews and redefines specific standards and practices, its basic purposes remain constant. OSHA strives to implement its Congressional mandate fully and firmly with fairness to all concerned. In all its procedures, from standards development through implementation and enforcement, OSHA guarantees employers and employees the right to be fully informed, to participate actively and to appeal actions.

In order to fulfill its mandate to improve the work environment of employees, OSHA must maintain an efficient and equitable enforcement effort. Through authority provided by the Act, the agency has the right to inspect any workplace covered, to issue citations for alleged violations of occupational safety and health standards, and to propose monetary penalties. Employers convicted of willful violations involving the death of an employee may face criminal charges, with fines of up to $10,000 or imprisonment for up to six months, or both. Civil penalties as high as $10,000 may be proposed for willful or repeated violations of specific Federal standards or of the general duty clause of the Act. (The Act's "General duty clause" (section 5.a.(1)) requires each employer to provide "employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees").

While considerable progress has been made since the Act became effective, job safety and health leaders realize that progress cannot be made solely through enforcement efforts. Certainly, citing violations as they are found and persistent policing of business and industry will remain an integral part of OSHA's national program. But, for job safety and health to progress from a basic right to a reality, workers and employers must be aware of the problems and they must cooperate with OSHA and with each other.

OSHA is emphasizing voluntary compliance through education, training, and information. American business people are becoming more aware of their responsibility for seeing that their employees have a workplace that is free of safety and health hazards. To encourage that trend, OSHA has made available, through State and private sources, on-site consultation programs to help employers achieve voluntary compliance with occupational safety and health standards and other requirements of the Act. Consultants can visit a worksite and familiarize employers with the Act and with their responsibilities under the law. These visits are not formal inspections; therefore, they do not carry the risk of citations for violations. However, if imminent dangers or serious hazards are discovered during the visit, they must be corrected immediately.

The mailing address of the Occupational Safety and Health Administration is: OSHA, U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, DC 20210.

National Institute for Occupational Safety and Health (NIOSH)

The National Institute for Occupational Safety and Health (NIOSH) was established within the U.S. Department of Health, Education, and Welfare (now the U.S. Department of Health and Human Services) under the provisions of Public Law 91-596—the Occupational Safety and Health Act of 1970. Administratively, NIOSH is located within HHS's Centers for Disease Control.

As the Federal agency responsible for formulating new or improved occupational safety and health standards, NIOSH not only carries out HHS's responsibilities under the Act, but also the health program of the Federal Coal Mine Health and Safety Act of 1969 (Public Law 91-173). NIOSH is the principal Federal agency engaged in research, education and training in a national effort to eliminate on-the-job hazards to the health and safety of America's working men and women.

Under the Act, NIOSH has the responsibility for conducting research designed at producing recommendations for new occupational safety and health standards. These recommendations are transmitted to the U.S. Department of Labor, which has the responsibility for the final setting, promulgation and enforcement of the standards.

In the case of the Federal Coal Mine Safety and Health Act, NIOSH transmits recommended health standards to the U.S. Department of Labor, whose Mine Safety and Health Administration (MSHA) has the enforcement responsibilities under that law.

NIOSH's main research laboratories are in Cincinnati, Ohio, where studies center on the effects of exposure to hazardous substances used in the workplace, as well as on the psychological, motivational, and behavioral factors involved in occupational safety and health. Much of the Institute's research focuses on specific health and safety hazards such as asbestos, beryllium, carbon monoxide, lead, mercury, noise pollution, heat stress, and others.

At NIOSH's Appalachian Center for Occupational Safety and Health (ACOSH), in Morgantown, West Virginia, research is being conducted on the problem of coal workers' pneumoconiosis (''black lung disease'') and on other occupational respiratory diseases. Thousands of coal miners have been given X-rays and medical examinations as part of the research effort into the causes and characteristics of ''black lung disease.''

Education and training are also major functions at NIOSH. Under the Act, NIOSH is required to conduct '' . . . education programs to provide an adequate supply of qualified personnel to carry out the purposes of this Act . . .'' There is, at present, a shortage of occupational safety and health professionals. NIOSH has embarked upon a training grant program to develop two-year, baccalaureate and graduate programs in colleges and universities across the nation. These programs, coupled with the programs at Educational Resource Centers (ERC's) which train occupational physicians, occupational nurses, industrial hygienists and other occupational health scientists, and safety engineers, and with an expanding short-course training activity conducted at the Cincinnati laboratories, are helping to produce an adequate number of qualified personnel to deal with the problems of occupational safety and health.

NIOSH also maintains staff in ten Regional Offices throughout the United States. The Regional Offices are the focal points for special surveys and evaluations of existing occupational safety and health problems, consultative services to the states, and other activities.

The mailing address of the National Institute for Occupational Safety and Health is: NIOSH, Centers for Disease Control, U.S. Department of Health and Human Services, 1600 Clifton Road, Atlanta, Georgia 30333.

The Occupational Safety and Health Review Commission (OSHRC)

The Occupational Safety and Health Review Commission is an independent agency of the U.S. Government. It is not connected in any way with the U.S. Department of Labor or the Occupational Safety and Health Administration. There are three Commission members who are appointed by the President of the United States for six-year terms, and some forty-five Administrative Law Judges who have career tenure. The judges

hold hearings and decide contests arising under the Occupational Safety and Health Act of 1970. The judges' decisions are reviewed and commission members have the authority to change those decisions.

Cases that come before the Commission begin with an inspection conducted by OSHA, an agency of the U.S. Department of Labor.

When the OSHA inspector finds what is believed to be a violation of the Act, OSHA will notify the employer in writing of the nature of the alleged violation and the period of time OSHA deems reasonable for its abatement (correction). This document is called a Citation. The period of time stated in the citation for the correction of the alleged violation is called the Abatement Period. The Act requires that the employer immediately post a copy of the citation in a place where affected employees will take notice of it.

OSHA is required to notify the employer in writing of the penalty, if any,proposed to be assessed for each violation it has alleged. Presently, theproposed penalty is stated in the citation, but it may be stated in a separatedocument. In either case, the employer must be notified of the proposedpenalty by certified mail.

If, within fifteen working days of receipt of the proposed penalty (Mondays through Fridays, excluding Federal Holidays), the cited employer does not contest the citation or proposed penalty, and the affected employees or their authorized representative (Union) do not contest the proposed abatement period, the citation and proposed penalty become the final order of the Commission and are not subject to review by any court or agency.

The mailing address of the Occupational Safety and Health Review Commission is: OSHRC, 1825 K Street, NW, Washington, DC 20006.

National Advisory Committee on Occupational Safety and Health (NACOSH)

Section 7.(a)(1) of the Act establishes a National Advisory Committee on Occupational Safety and Health consisting of twelve members appointed by the Secretary of Labor, four of whom are to be designated by the Secretary of Health and Human Services, and composed of representatives of management, labor, occupational safety and health professions, and the public. The members are selected on the basis of their experience and competence in the field of occupational safety and health. The Committee advises, consults with, and makes recommendations to the Secretary of Labor and the Secretary of Health and Human Services on matters relating to the administration of the Act. All meetings of the Committee are open to the public and a transcript of Committee proceedings is available for public inspection.

The mailing address of the National Advisory Committee on Occupational Safety and Health is: NACOSH, U.S. Department of Labor, 200 Constitution Avenue,NW, Washington, DC 20210.

National Commission on State Workmen's Compensation Laws

Section 27.(b) of the Occupational Safety and Health Act of 1970 established a National Commission on State Workmen's Compensation Laws. The purpose of this legislation was to authorize an effective study and objective evaluation of State workmen's compensation laws in order to determine if such laws provide an adequate, prompt, and equitable system of compensation for injury or death arising out of or in the course of employment. The Commission was to be composed of 15 members, to be appointed by the President from among members of State Workmen's compensation boards, representatives of insurance carriers, business, labor, members of the medical profession having experience in industrial medicine or in workmen's compensation, and representatives of the general public. The Commission was directed to transmit to the President and to the Congress not later than July 31, 1972, a final report containing a detailed statement of the findings and conclusions of the Commission, together with such recommendations as it deemed advisable. On the ninetieth day after the date of submission of its final report to the President, the Commission was to cease to exist. The report called for in the Act, entitled The Report of the National Commission on State Workmen's Compensation Laws, was delivered on July 31, 1972, and the Commission went out of existence on October 31,1972. Of the five organizations established by the Occupational Safety and Health Act of 1970, the Commission on State Workmen's Compensation Laws was the only one specified as having to cease to exist after a certain date.

APPENDIX F

NIOSH/OSHA SOURCES FOR OCCUPATIONAL TECHNICAL DATA AND INFORMATION

Occupational Safety and Health Administration Technical Data Center (OSHA/TDC)

Mission: Established in 1972, in response to the technical information needs of the OSHA National Office and field staffs, the Technical Data Center's mission is to provide these offices with timely, comprehensive and current technical information.

Users: The TDC's resources are committed primarily to OSHA needs. Other Government libraries and other libraries are served through interlibrary loan channels. Non-government personnel may use the TDC during official working hours (8:15 a.m. to 4:45 p.m., except weekends and official government holidays) for reference purposes.

Subjects: The information needs of OSHA met by the TDC include disciplines such as:

- Industrial toxicology
- Health physics
- Environmental health
- Ergonomics
- Physiology
- Safety engineering
- Industrial medicine
- Sanitation
- Industrial Hygiene

Collection: The TDC's collection is concentrated in the fields of occupational safety and health, chemistry, toxicology, biology, and environmental engineering and science. The six main divisions of the collection are:

1. The BOOK COLLECTION which contains about 12,000 titles on subjects of interest to the OSHA staff. It includes a reference collection of encyclopedias, handbooks, subject and language dictionaries and other specialized guides, such as the *Code of Federal Regulations.*

2. The JOURNAL COLLECTION which contains about 300 titles, many available on microfiche. A complete list of the journals and the years covered is available upon request.

3. The journal collection which is entered through the INDEXING AND ABSTRACTING TOOLS, such as chemical abstracts.

4. The MICROFORM COLLECTION which contains dissertation abstracts, standards material, product catalogs, journals, back issues of the *Federal Register,* and microfiche editions of technical papers, reports, and publications.

5. GOVERNMENT PUBLICATIONS, such as National Bureau of Standards (NBS) standards, National Institute for Occupational Safety and Health (NIOSH) publications, criteria document references, and old public health service publications, which are maintained in file cabinets.

6. MATERIAL SAFETY DATA SHEETS from various companies which are available on the shelves and in file cabinets.

Docket Office: As the public reading room for OSHA rulemaking files, the Docket Office (Room S-6212, Frances Perkins Building, 200 Constitution Avenue, N.W., Washington, DC 20210) maintains an extensive collection of unpublished reports and exhibits in various areas of OSHA rulemaking interest. Transcripts of meetings of the National Advisory Committee on Occupational Safety and Health (NACOSH) and various types of impact statements are also located in this office.

Location of the OSHA TDC: Room N2439, Frances Perkins Building, 200 Constitution Avenue, NW, Washington, DC 20210); Phone: (202) 523-7900 or 7894.

National Institute for Occupational Safety and Health Technical Information Center (NIOSHTIC)

File Description: NIOSHTIC is NIOSH's bibliographic information data base for the retrieval of literature in the field of occupational health and safety. In January of 1984 NIOSHTIC consisted of 105,000 documents. It is updated monthly with approximately 1,000 documents.

About 150 current, English language technical journals provide the majority of additions to NIOSHTIC annually. Other documents included are: NIOSH Criteria Documents and their references; Health Hazard Evaluations/Technical Assistance Reports; industrial hygiene surveys; field studies; final contract reports and grant reports; current documents selected from CIS, the International Labour Organization's computerized occupational safety and health data base in Geneva, Switzerland; and translations acquired by NIOSH. Retrospective information, dating back to the 19th century, is also acquired and entered.

Because NIOSH examines virtually all aspects of adverse effects experienced by workers, much of the information contained in NIOSHTIC has been selected from sources that do not have occupational health or safety as the primary orientation.

Subject Coverage: Virtually every aspect of occupational health and safety, including sampling and analytical methods, personal protective equipment, engineering controls, toxicology, epidemiology, industrial hygiene, pathology, analytical chemistry, education and training, medical monitoring, diagnostic techniques, safety research and practices, and behavioral and motivational studies, are in the data base. Also included are the personal files of Dr. Wilhelm C. Hueper, occupational cancer researcher; personal files of Dr. Wolfgang von Oettingen, researcher in industrial toxicology; citations from Frank Patty's text, Industrial Hygiene and Toxicology, Volumes I and II; Dr. William Lloyd's files on epidemiology; and the personal files of Jane Lee on occupational health nursing. Documents must be applicable to occupational health and safety and must also meet one or more of the specific areas of interest cited below:

• Behavioral Sciences	• Epidemiology	• Occupational Medicine
• Biochemistry	• Ergonomics	• Pathology
• Chemistry	• Hazardous Wastes	• Physiology
• Control Technology	• Health Physics	• Safety
• Education	• Histology	• Safety and Health Programs
• Engineering	• Metabolism	• Toxicology

Location of the NIOSHTIC: NIOSHTIC Project Officer, NIOSH, 4676 Columbia Parkway, Cincinnati, Ohio 45226.