Management of the Work Environment

Selected Safety and Health Readings

PART III

PROJECT MINERVA

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

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SECTION I

INTRODUCTION

I. INTRODUCTION

Many management decisions require the consideration of the health and safety of the company's employees, customers and the general public. Hiring new employees, developing benefit programs, designing new products, designing new processes, the selection of office equipment and the selection of raw materials to be used in manufactured products are a few examples of frequently made decisions which may be inpacted by managerial concerns for health or safety. Occupational health and safety problems exist in almost all companies, are already a serious problem for many companies and have the potential to cause disastrous consequences for almost any company. Thus, every manager should be aware of potential health and safety problems and should understand the basic strategies which can be used to reduce losses which can result from unsafe operations, exposures to adverse environmental conditions or the marketing of poorly designed products.

Managers must realize that the development of an effective occupational health and safety program is a complex task which requires not only the expertise of specialists from medicine, industrial hygiene, safety and law, but also requires effective leadership from top management and strong support from the entire organization. Although managers do not have to be experts in the technical aspects of occupational health and safety, they must understand some of the basic principles of medicine, industrial hygiene, toxicology, epidemiology and other sciences which provide the techniques required to measure, evaluate and solve occupational health problems. They must realize that these techniques may aid in identifying and understanding health and safety problems but may not be able to provide clear, non-controversial solutions to all problems. Managers should know that there is frequently more than one way to attack a health or safety problem and that the experts may not agree on the 'best' solution.

During the last decade much management attention has been focussed on obtaining better control of health related costs; health care costs, insurance costs, the cost of health and safety programs, the property losses resulting from accidents, and the productivity losses resulting from illnesses. It is generally agreed that the most effective way to reduce health related costs is through the development of safety and health programs which identify and eliminate unnecessary hazards and exposures, and train employees to work safely in an environment which can never be completely risk free. However, other approaches for reducing health related costs are also available. An increasing number of firms have become much more aggressive in dealing with the health care industry in an effort to identify the health care organizations which are willing to provide health care services at the lowest cost or to encourage the development of new health care organizations which will provide needed services. Other companies are implementing programs which attempt to prevent health problems by getting employees to adopt healthier life styles. Many firms are modifying their health benefit programs to require employees to pay a larger portion of their health care costs so they will utilize health care services more prudently or use alternate sources for health care services which are less expensive. Since health care costs are expected to continue to increase faster than most other costs, managers need to be aware of all of the approaches which companies have found to be successful in slowing the rate of growth of their health related costs.

Managers do not have to be experts in cost/benefit analysis but they must understand that measuring and comparing the costs and benefits associated with health and safety programs is difficult and controversial, and may be impossible for those occupationally related diseases which have a long latency period from the time the exposures occur until the disease can be detected. They must realize that the traditional cost/benefit models may not be appropriate for comparing costs and benefits when managers make decisions which can result in serious accidents or illnesses for uninformed employees or customers. They must be willing to consider intangible benefits when evaluating safety and health programs especially if there is strong competition for qualified employees or if the potential health risks from exposure to toxic substances are great.

Managers do not have to be lawyers but they must be aware of existing governmental regulations and must understand a company's legal and societal responsibilities to ensure that its operations and products do not adversely effect the environment or produce unacceptable risks to the health of employees, customers and the public. They must be aware of the potential costs associated with occupationally related health problems. They must understand the changes which have occurred in our society which permit a company to be sued for millions of dollars by employees and customers who claim that the environment in which they worked or the products which they used caused serious health problems.

The purpose of this book is to provide a readily available source of readings which focus on the managerial issues which are associated with occupational health and safety. Many of the articles which are included in the book are from journals which are rarely read by, and are frequently not readily available to, professors and students in schools of business. Reading these articles will not make the student an expert in the technical or legal aspects of occupational health. However, the articles should provide readers with enough knowledge about occupational health to make them aware of the following facts: (1) problems related to occupational safety and health do exist in almost all companies and are serious problems in many companies, (2) these problems frequently involve complex and controversial issues, (3) the problems seldom have simple solutions, (4) proposed solutions are always difficult, and sometimes impossible, to evaluate and thus, (5) the solutions are frequently controversial and seldom possible to justify by a simple cost/benefit analysis. Students who understand these facts will be much better prepared to handle any occupational safety or health issues which must be considered in making managerial decisions.

In general, articles were selected for the book because they examine some aspect of occupational health or safety from a managerial perspective. Although many of the readings are concerned with more than one aspect of occupational health or safety, the articles have been divided into five groups depending on the major focus of the article. The articles in the first group are concerned primarily with the management of occupational health programs which are usually designed to identify, treat and prevent occupationally related diseases. The next group of articles focus on the design and management of occupational safety programs, an area of concern for most manufacturing firms for many years. The articles in group three examine some alternative approaches for reducing current occupational health costs through the implementation of various cost control mechanisms, and for reducing future costs through the implementation of programs designed to prevent illnesses and accidents by promoting safe and healthy life-styles. The fourth group of articles examine the issues involved in performing cost/benefit analyses when occupational health or safety are among the factors which must be evaluated. The last group of articles present a variety of perspectives on the historical development of occupational health and safety programs in the United States.

Because it was not possible to reprint all relevant articles, the book also includes an extensive annotated bibliography. Many of the articles in the bibliography are more technically oriented or are concerned with problems in a specific industry. The introduction to each section of the book identifies some of the articles in the bibliography which are closely related to the reprinted articles.

Finally, because the book is intended primarily for professors and students in business administration, we have included a bibliography of 22 cases which are concerned with various aspects of occupational safety and health. Although many of these cases involve some technical aspect of safety or health, we have attempted to select cases which are primarily concerned with management issues.

SECTION II

OCCUPATIONAL HEALTH PROGRAMS

II. OCCUPATIONAL HEALTH PROGRAMS

Occupational health programs provide a variety of services which are concerned with the health of the company's employees. Emergency medical care, physical examinations, preventive medicine, rehabilitation and counseling are among the services which are provided by occupational health specialists. Because of the variety of services involved, one of the major problems in the establishment of an occupational health program is the development of an organization which can effectively acquire the required resources and provide the required services. Although technical skills are essential, strong leadership and good management are also an important element in the development of a successful occupational health program.

The management of an occupational health program is a complex task which requires the selection, development and effective implementation of a variety of programs which not only adequately protect the health of current employees but are also flexible enough to adapt to the changing environments in which they must function in the future. The occupational health program manager must be sensitive to labor relations issues and must deal effectively with controversial government regulations, while engaging in technically sound programs which meet management's objectives in the most cost effective way. Critical decisions must be made without complete information; errors in judgement may result in serious injuries or illnesses and the associated financial losses could seriously impact the company's financial performance and may occasionally result in bankruptcy.

Because occupational health programs vary so greatly in size and focus, it is not possible to identify a single approach which will adequately meet the needs of all companies. To develop a successful occupational health program, managers must select and implement programs which are appropriate for their company. To perform this task it is necessary for the manager to know what type of programs are available, to match the objectives of these programs with the corporate objectives, to select programs which will achieve these objectives in a cost effective way and to develop a strategy for acquiring whatever resources are required to implement the selected programs. Large companies frequently have full-time managers for their occupational health programs and may employ many specialists to provide whatever services are required by the program. Smaller companies must depend on general managers to provide leadership for their occupational health programs and must use part-time consultants to provide the needed services. Since there is no evidence to indicate that any particular approach is always the most effective way to meet a company's health care needs, the articles which are included in this section were specifically selected to illustrate several different approaches which have been used successfully to meet the health care needs of different types of companies.

The first article, which was based on extensive interviews with executives in 29 different companies from 17 different industries, begins with some clear illustrations of the economic consequences of health related problems and develops an approach for organizing an occupational health program which emphasizes the role of the corporate medical department. While many of the problems discussed in this article are applicable to companies of all types and sizes, it is important

to remember that many of the comments are based on interviews with executives from Fortune 500 sized companies. Thus, some of the author's conclusions may not be applicable to medium or small sized companies.

The author of the second article, Thomas McDonagh of the Exxon Corporation, clearly outlines many of the major health related issues which will shape the future development of occupational health programs. Other articles in the bibliography which discuss similar issues include the articles by Cohen (1973), Goldsmith (1976), and Wegman (1978).

The next two articles describe the occupational health programs which have been developed at the New York Telephone Company and the DuPont Corporation. The program at the New York Telephone Company emphasizes the important role played by each individual in managing his or her own health, a concept which is critical to the development of an effective health program. Although few companies can develop health programs as extensive as the program developed by DuPont, the five principles on which their program is based, knowledge, commitment, responsibility, compliance and communication, provide an excellent basis for the development of an occupational health program for an organization of any size. The comprehensive health care strategy which has been developed at IBM is described in an article by Beck (1982), and the Xerox health promotion program is described by Wright (1982).

A growing number of companies are beginning to develop preventive medicine programs which are designed to reduce health care costs by improving employee health. The next article, by Andrew Brennen, describes five specific programs which have been implemented at Metropolitan Life Insurance and provides some of the economic information which was used to justify the programs. The sixth paper, by Bruce Dickerson, discusses the preventive health programs which have been developed at IBM as a part of the company's extensive benefit program. Rather than emphasize cost effectiveness, IBM tries to provide relatively low cost programs which utilize existing community resources when possible, thus providing the flexibility required to meet the needs of more than 200,000 employees in more than 300 locations. Preventive medicine programs are also discussed in the articles by Fielding (1979), Pearson (1983), and Brennen (1981).

Another important aspect of a health care program involves training employees to recognize and avoid health hazards. Although large companies are able to develop their own training programs, most small companies do not have adequate resources to develop effective training programs. The next two articles discuss two different approaches for developing such programs. One program was developed under an OSHA grant to the painter's union to train members of the union to recognize and avoid health and safety hazards associated with the painting trades. The second article describes the role of a nonprofit advocacy organization in helping to train workers in two small companies to detect, report and correct hazards in their working environment. The article by Brown (1979) in the bibliography describes some of the difficulties involved in the development of a union oriented program to train hospital workers to recognize the occupational hazards to which they are routinely exposed.

It is usually impossible for small companies to hire all of the skilled personnel who are required to implement an internal occupational health program. The last paper in this section describes a hospital-based occupational health program that serves sixty firms in Massachusetts on a non-contractual, fee for service basis. This type of health care service is clearly an excellent way for smaller firms to acquire the resources which are required for a strong occupational health program.

II. OCCUPATIONAL HEALTH PROGRAMS

1. Is There a Doctor In-House?
   Diana Chapman Walsh
   Harvard Business Review
   July/Aug 1984

2. Management of an Occupational Health Program Within an Industrial Setting
   Thomas J. McDonagh
   Journal of Occupational Medicine
   April 1984

3. Managing the Health of the Employee
   Gilbeart H. Collings, Jr.
   Journal of Occupational Medicine
   January 1982

4. A Company's Duty to Report Health Hazards
   Bruce W. Karrh
   Bulletin of the New York Academy of Medicine
   September 1978

5. Worksite Health Promotion Can Be Cost-Effective
   Andrew J. J. Brennen
   Personnel Administrator
   April 1983

6. A New Model for Employer-Provided Health Education Programs
   O. B. Dickerson and C. Mandelblit
   Journal of Occupational Medicine
   June 1983

7. Training: OSHA's New Frontier
   Francis X. Burkhardt
   AFL-CIO American Federationist
   July 1980

8. Health Hazard Surveillance by Industrial Workers
   David H. Wegman, Leslie Boden, and Charles Levenstein
   American Journal of Public Health
   January 1975

9. A Hospital-Based Occupational Health Service
   Robert J. McCunney
   Journal of Occupational Medicine
   May 1984

Is there a doctor in-house?

Diana Chapman Walsh

A remedy for urgent corporate health concerns may be found within company walls

Today some companies face health-related problems so serious as to threaten their very survival. These usually arise from lawsuits against the manufacturers of hazardous substances or products, but they may involve employees in the workplace as well. To help them gather data on such matters and deal with them in good time, this author says companies may want to strengthen their in-house medical function. Traditionally, the company doctor was located at the end of some dark corridor practicing "occupational medicine" and routinely signing forms needed by the government and the corporation. Now, it could make sense for others to follow some leading-edge companies who are strengthening their medical departments and giving them a more strategic role.

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The economic health of a corporate enterprise, and sometimes its survival, depends more and more on the physical and emotional health of individuals in and around it. If this appears to be an overstatement, consider the following:

☐ Protecting employees from harm arising from their work profoundly challenges many companies that handle hazardous materials. The imbroglio in the late 1970s over the pesticide Kepone cost Allied Chemical at least $25 million in fines, lawsuits, and research grants. Already the Kepone of the 1980s – dioxin, the by-product of several chemicals manufactured by Dow Chemical – is imposing costs on the manufacturer, which has taken a drubbing in the mass media, as Allied did over Kepone, and as Manville has done over asbestos, a substance said to claim an American life about once every hour.[1] Facing some 20,000 lawsuits, at a rate of about 400 new cases each month, in August 1983 Manville filed its highly publicized petition for Chapter 11 bankruptcy. In spite of the litigation, victims and their families are absorbing some two-thirds of the costs, and the Chapter 11 reorganization has not shielded Manville from controversy.

☐ Even companies whose technologies do not apparently involve hazards face complex challenges to ensure occupational health when stress is included as an environmental "toxin." Polaroid Corporation discovered this in March 1983 when a former employee and his family won $1.64 million in an out-of-court settlement on the grounds that he assaulted his wife and son and attempted suicide because of "careless, negligent, and unskillful" treatment by members of the company's medical and counseling staffs. As the cause of his distress, he cited job pressures and management changes owing to difficulties the company was having with the development of a new camera.

☐ In Minnesota, Blue Cross payments for psychiatric conditions and chemical dependency more than doubled between 1976 and 1980 (a 115% rise in five years, compared with increases of 58% in hospital charges and 45% in the consumer price index). Treatments in that state for chemical dependency accounted for 20% of all inpatient days in 1980, and 89% of all chemical dependency charges were for inpatient care. New York State recently passed legislation mandating coverage of outpatient treatment for alcoholism, but the new law may stimulate more treatment at all levels, including hospital treatment, and further escalation of costs.

☐ Most experts now agree that medical care per se cannot control the broad patterns of morbidity and mortality, and some call for a "public health

Editor's note: All footnote references are listed at the end of the article.

revolution" to alter behavior and environments that are inimical to health. The "lifestyle" message has been so influential that a comprehensive and attractive "plan for health" may soon become an essential ingredient in the competition for skilled and professional labor.

But emphasizing lifestyle alone smacks of "blaming the victim." When companies subscribe to a public health emphasis they find themselves forced to recognize the role that unwholesome environments play in chronic disease. Reputable epidemiologists blame occupational exposures for 10% to 33% of all cancers and argue that reducing such risks is one of the most promising applications of preventive medicine.[2] This thinking culminated during the 1970s in major federal legislation.

If the implementation of OSHA (Occupational Safety and Health Act) and TOSCA (Toxic Substances Control Act) seems pro-industry now, persistent public concern will probably drive the regulatory pendulum back. Meanwhile, local jurisdictions, including city councils and state legislatures, are becoming more aggressive. At least six states are considering bills to regulate the manufacture or use of video display terminals in the workplace. Many more states are debating, and 13 have already passed—with strong backing from organized labor—chemical labeling and "right to know" statutes designed to educate employees and empower them to react to the hazards of their workplaces. These measures are harbingers of a new concern with environmental hazards.

As these accounts show, health-related issues come from many directions and can have far-reaching effects on a company's public image and its bottom line. In addition, of course, health care costs are a widely recognized source of concern for corporations. Between 1977 and 1983, average expenditures for health benefit plans increased, in round numbers, from $1,250 to $2,000 per employee and from 9% to 11% of payroll costs. At the current growth rate (between 1980 and 1982), the nation will spend $922.8 billion on health care in 1990 and, by the year 2000, $3.64 trillion, or 19% more than the entire 1982 gross national product of $3.06 trillion.

These trends worry many managers, who are as a consequence groping for answers to health-related questions that are highly complex—scientifically, economically, legally, socially, ethically, and administratively.

Corporate occupational medicine

At least 75% of the *Fortune* "100" companies maintain a medical department—a seemingly obvious resource for managers confronted with questions that lie on the boundary between management and the practice of medicine. A few—like Eastman Kodak, Exxon, DuPont, AT&T, Ford, and General Motors—have been carving out a management niche for medicine in business for most of the century. Others—including Alcoa, Allied, Citicorp, Gillette, General Mills, IBM, Johnson & Johnson, Kimberly-Clark, Monsanto, Xerox, and some major insurance carriers—have designed and filled that niche in more recent decades.

Even so, 700 physicians at most practice full-time in corporations and well over half of these are concentrated in a few large companies: more than 200 are in the erstwhile Bell System, more than 100 at GM, some 75 at DuPont, and 50 each at Kodak and IBM. Some 4,000 U.S. physicians report occupational medicine as their primary specialty; most of these practice part-time in several organizations. Although occupational medicine theoretically covers 60% of the adult patient "market" (that is, workers on their jobs), it involves less than 1% of all practicing physicians. This disparity has various causes; one factor is what might be called occupational medicine's "strategic deficit."

In *The Social Transformation of American Medicine*, Paul Starr traces the extraordinary "social privilege, economic power, and political influence" enjoyed by modern American physicians to the fact that they stand between the buyers and sellers of health care, which gives them a "strategic advantage."[3] Those practicing occupational medicine, however, face a handicap. Corporations stand between this medical specialty and its natural market, the employee. Senior managers figure decisively in the articulation of priorities for health and the initiation of health care policies, and the support of line managers is indispensable for carrying out policies. Thus the question of the role of medicine within a company becomes both a business and a medical problem. Responsibility for the full spectrum of health issues has been fragmented and decentralized in most companies, but the delivery of in-house medical services has traditionally been the province of occupational physicians.

The complexity and urgency of the health issues on the corporate agenda have outdated the old-style Band-Aid station in an untraveled back corridor. It makes even less sense to have the chief executive's private physician don his white coat and stethoscope to follow his patient, as General Pat-

ton's doctor did, onto the field of battle. But if the old models no longer fit, would a new model look more promising?

Tapping in-house expertise

With this question in mind, I conducted more than 100 interviews with physicians, their superiors, and other managers in 29 *Fortune* "500"-size companies. I found a few senior executives who looked to their corporate physicians for advice on all kinds of sensitive and weighty matters but many others who implied that physicians have what sociologist Thorstein Veblen called a "trained incapacity" that prevents them from managing effectively.

I found one corporate doctor in a company producing pharmaceuticals and health care products who was orchestrating the work of a panel of distinguished scientists he had commissioned to interpret some perplexing data showing chromosome anomalies among a small group of the company's 40,000 employees. "Toxicology is where the action is," he insisted. Another – the only full-time physician employed by a public utility with some 4,000 employees – had wanted to learn toxicology but never found the chance. The closest he came to handling public health problems was when he fielded complaints about conditions in the washrooms.

Some corporate physicians saw the necessity of demonstrating a positive return on investment, but others denigrated "the cost-benefit stuff" as "pseudo-science." Some saw the escalation in costs of employee health benefits as an opportunity to expand their own turf, while others skirted it as the province of someone else. A few quoted Drucker, exhorting their peers to become better managers; many were chary of straying too far from Hippocrates and Ramazzini (the sixteenth-century Italian physician known as the father of occupational medicine). Diversity of opinion was so great that the main purpose of company-sponsored health programs seemed almost up for grabs.

Patterns of practice

Out of all this chaos, however, an underlying pattern of practice began to take shape. It led ultimately to the medical department functional framework shown in *Exhibit I*, which, for the corporate manager seeking to assess or redefine the contribution of medicine in a business, can serve as a model and identify potential tensions. The framework shows how some companies are expanding their views about their stewardship for health. It also may point the way to underlying conflicts that have constricted that thinking in the past.

As the exhibit shows, a medical axis and a managerial axis divide a company's internal health programs into four major sectors. The medical axis extends from a focus on individually oriented clinical medicine to one directed to entire populations. The management axis extends from an operational, day-to-day concern with immediate needs to a strategic, longer term, and more anticipatory view of the company's goals.

In the three traditional sectors – health care service, medical adjudication, and environmental health – companies face new pressures and opportunities as well as long-standing problems. As they seek to cope with these issues, some companies move into the fourth sector – strategy formulation, which is just beginning to evolve. The development of this fourth sector is best understood within the context of a medical department's more traditional activities in the three established sectors.

My interviews convinced me that company executives can liberate their thinking about the interplay between management and medicine – and thus maximize the health of employees as it affects "corporate health" – if they will acknowledge and confront long-ignored conflicts in the roles of in-house health professionals.

Health care service

Many company medical programs grew up through a kind of vertical integration, as corporations with remote operations – in railroading, lumbering, shipbuilding, and the like – took responsibility for primary health care functions they were unable to purchase. Such companies treated their eligible workers as a capital asset and health maintenance as a business cost. Some economists foresee renewed interest in this strategy as health care costs continue to climb.[4]

Medical politics have overshadowed this economic logic, however. For years a sharp line, drawn by the American Medical Association, adhered to by industrial physicians, and deferred to by corporate managers, limited corporate health programs to the treatment of illness or injury arising out of work.

The distinction between occupational and nonoccupational illness has always been elusive, and now in policy statements organized medicine has begun to redraw the traditional lines. Some corporations now provide a wide range of primary health care services on their premises. These tend to be capital-

intensive companies with robust profits, few serious health hazards, and one or several large concentrations of employees in central locations. Some formerly operated in remote sites where medical resources were limited; others have perceived the need to augment medical services in the community after opening a new plant or moving to a new location.

Strong in-house medical programs also come from a corporate emphasis on positive employee relations or from the public image a company is cultivating. For example, the youthful cachet of companies like Johnson & Johnson, PepsiCo, Kimberly-Clark, Xerox, and Campbell Soup makes sense of their visibility in "health promotion." Some companies, like Control Data, develop employee health programs as prototypes for services that they eventually intend to market.

In status-conscious companies, the medical program may be an executive perquisite. Or such a program may constitute a response to external pressures following a health-related crisis, as occurred at Allied after Kepone and at Manville as the dimensions of the asbestos problem came to light.

Expanding in-house services

In-house health programs often move through predictable stages. In addition to staff physicians, a company may hire part-time specialists, for example in internal medicine, dermatology, orthopedics, and psychiatry. It may then contract for special services with vendors, or very occasionally may bring the benefit package into a closed system of financing and services in the form of a corporate-sponsored health maintenance organization.

Opinion is divided as to where companies ought to draw the line. It can be argued that offering expanded primary health care makes sense economically and medically. Since many large companies provide some periodic screening and preventive health services, and conduct government-mandated medical surveillance, a company choosing not to deliver more extensive primary care from its medical department is paying twice for the same care – once in the capital investment already sunk in the medical operation and again through its contributions to employee health benefit plans.

An in-house medical department can save time otherwise lost from work, and a high-quality, comprehensive health program is good for morale and for the medical department's credibility. Well executed, it is also good medicine and by integrating work histories and the company's screening data into a comprehensive and continuous system may provide a service that is superior to outside primary care. An integrated health care system allows corporate physicians to practice their clinical skills and therefore attracts first-quality practitioners. Proponents of expanded company health care systems argue that having first-quality doctors is the surest way to upgrade occupational medicine and bring it into the mainstream of good primary care.

Critics challenge both the economic and the medical premises of such arguments. Contend-

Overview of the study

The purpose of this study was to find the leadership of corporate occupational medicine and to discover how these leaders viewed their roles, their profession, and its future; what problems they perceived; and what solutions they were pursuing. I wanted to assess the effect of their approaches on the medical profession, on the companies as a whole, on employee-patients, and on the public at large.

With this task in mind, I defined a leadership pool and learned as much as I could about the content and context of the work of these leaders. My sample was gradually accumulated through an informal network analysis. Since a goal of the research was to capture new trends, I skewed the sample intentionally but not systematically in favor of companies with a strong emphasis on health.

In all I conducted 127 interviews, averaging about an hour and a half each, in some 29 different companies from 17 different industries. Except for 7 unranked companies, all in the sample fell within the top 250 in terms of 1982 sales on the *Fortune* "500" listing; 14 were among the top 100 in dollar turnover. In numbers of employees, the companies ranged from 3,800 to 404,000, with a median of 72,591. Most of the employees in 17 companies belonged to unions, whereas most of the employees in the other 12 did not. Twenty-four had their headquarters in the northeastern United States.

Of the 127 interviews, 37 were with corporate physicians and the remainder with representatives of other functional units in the companies I visited, and with informants in labor, the government, and academia. The first 61 interviews were open-ended and constituted an exploratory phase of the study. I next studied 5 companies through structured interviews with the corporate medical director and, at each of the 5 companies, representatives of all the major disciplines and departments involved in corporate health programming. In this phase of the research, I wanted to characterize as fully as possible the role of pressures and conflicting expectations on the corporate medical department.

It should be emphasized that, while it has advantages, such an exploratory study produces hypotheses and tentative conclusions that need further validation.

ing that companies expanding their primary care services are probably paying more for health care, the critics claim that the data accumulated are insufficient to prove that employee visits to an expanded in-house medical department have replaced their use of outside services covered in a benefit plan. Companies offering extensive primary care have not shown a measurable decrease in their premiums or substantiated the claim that in-house location saves time away from work.

Furthermore, the counterargument runs, most large corporations are too widely spread out geographically to make a large health care department practical in more than one or two locations. Moreover, dependents, who account for at least two-thirds of a company's health care costs, are rarely covered. If spouses and children receive care elsewhere, a company health service effectively isolates patients from their family context.

Those who see occupational medicine in the vanguard of the new national strategy of health promotion and disease prevention worry that industry-sponsored health care is a diversion that may duplicate and undercut the existing health infrastructure. Others doubt that companies can do an adequate job of employee health protection – their unique responsibility – when they dilute this mission with primary care services generally available in the community.

Most companies currently stand on a middle ground; their medical departments serve a brokering function. They maintain collegial ties with a far-flung outside medical network, screening employees and referring them for needed care, and following up afterwards. They informally monitor quality of referred care by consultations and by watching the forms that come through from outside practitioners for disability and other insurance claims.

As this brokerage function evolves, a company medical department can be more aggressive in managing situations that could compromise health. The company's attitude is communicated to outside medical providers and the medical department becomes more activist and anticipatory – thus, more strategic – in its outlook.

An innovative model

New York Telephone Company's health care management program is a good example of a system that developed into a defined relationship to outside health care providers as a broker and advocate for employees' care. Until the AT&T breakup, the medical department of New York Telephone consisted of 234 professional, paraprofessional, and support personnel, including physicians, that added up to 39 full-time employee equivalents. This staff served some 80,000 employees and prided itself on its ability to intervene in outside patient-physician relationships where there were "malfunctions."

Some cases involved mistakes on the part of the attending physicians (improper or no diagnosis, inadequate or harmful treatment, excessive costs) and others were considered "abuses of the system," such as "excessive absence" or "employee noncompliance." Still others entailed "inappropriate" or "unnecessary" costs for hospitalization, surgery, or ambulatory care. A few actual cases will give a flavor of the kinds of contributions to corporate well-being that this medical department has made.

☐ An employee's personal doctor was giving him ointments for a persistent rash on the palms of his hands until a company physician suggested that the outside practitioner order a blood test for syphilis. The test was positive; the disease was treated.

☐ An employee scheduled for a hemorrhoidectomy checked in with the company medical department for an informal second opinion and mentioned that the surgeon's secretary had quoted a fee of $450. The company medical department's investigation confirmed the qualifications of the surgeon and the need for the operation. "Just for good measure," and to express the company's interest in the case, a company physician called the surgeon, discussed the patient's lack of complicating problems, and inquired what the fee would be. The answer: $250.

☐ Forgetting to take her lithium, a manic-depressive office worker periodically lost control, disturbed her coworkers, missed work, and was hospitalized more than once. The company medical department arranged with her psychiatrist for routine company counseling and blood lithium testing, and her "course was smoothed significantly."

☐ The neurosurgeon who had scheduled a disk-removal operation for an outdoor craft worker with a long history of low back pain told a company physician that he would know at what level the disk was protruding "once we get in for a look." The company physician's preoperative examination of that patient, in the hospital, disclosed no disk protrusion at all. Advised that the insurance would not cover the procedure, the surgeon discharged the patient, who recovered and returned to work after medical treatment on an ambulatory basis.

In these and many similar cases, New York Telephone provided management of medical situations that were being mishandled, rather than direct therapy. An important caveat is that, unlike companies in more hazardous industries, the telephone company can apportion a large share of its medical resources into general health maintenance, as distinct from environmental health concerns. Also, as a public utility, it

can recover the costs of this program through government-ratified telephone rates.

But no company can succeed at managing health care unless employees elect to cooperate. New York Telephone's corporate medical director, Dr. Gilbeart H. Collings, says he recognized this requirement early on in his endeavor to improve company management of elective employee care:

"The question was, how would we do it, where would we get the forces? We couldn't get the state to set us up in business. The medical society wasn't about to give us a mandate. I woke up one morning to the realization that the key was the individual employee. If we could get employees to give us the authority, then we could begin to manage the system. We could shorten hospital stays and direct people to competent doctors—anything was possible with that authorization from the employee—that would be our lever."

If employees are the lever, though, the fulcrum on which it rests is their confidence and trust. Trust is a commodity many in-house medical departments have long struggled, sometimes vainly, to engender, often because misunderstandings arise in the medical adjudication sector. This, then, is one instance of conflict that can arise between the different roles corporate medical departments traditionally have played.

Medical adjudication

The need for someone to certify a claimant's eligibility for insurance first drew physicians into a medical adjudication role. Within the company, medical adjudication functions now include professional involvement in various industrial relations applications—fitting workers to jobs through preplacement examinations; preparing, and sometimes presenting, the medical evidence for workers' compensation or tort liability cases; probing for medical reasons and remedies when an employee performs poorly; verifying the illness of those who have been absent; and making arrangements for rehabilitation, job adjustments, and other accommodations to hasten an employee's return to work.

A doctor for the situation

Often what transpires in the practice of corporate in-house medicine is a kind of "doctoring for the situation," in which the physician weighs competing interests instead of acting in the isolated interest of an individual patient. The analogy is to Justice Louis D. Brandeis's notion of "lawyering for the situation," which he expounded in 1916 when his ethics were being scrutinized. Doctors and lawyers "for the situation" serve more than one client in a transaction. Since they act as mediators or arbitrators orchestrating for all the parties, they cannot rely on unequivocal rules of role to tell them where their loyalties lie. Instead they have choices to make between the interests of several clients.

Tensions arise in medical adjudication when these interests diverge, as they inevitably do at times. They diverge, for example, when a fertile woman is excluded from a high-paying job involving work with well-controlled teratogens because she lacks the legal authority to "hold the company harmless" in anticipation of an injury that *could* befall a fetus she *could* conceive. They diverge also when the medical department uncovers a medical condition that renders the employee a poor risk for a promotion he or she desires and deserves. And they diverge when an employee dying of cancer or some other disease of uncertain origin believes that the decisive exposure occurred on the job, while the company blames outside exposure or personal habits.

Such situations make the employee an involuntary patient who would rather avoid an encounter with the medical department altogether. Spokespeople for organized labor insist that a corporate physician cannot possibly hope to "establish common cause with the worker" in other kinds of interactions if he or she performs these adjudicatory functions.[5] For the patient's personal physician, too, the company's medical adjudications can be unwelcome intrusions although they may be beneficial if they draw the doctor's attention to relevant information about the work situation or if they result in job accommodations, such as a lightened work load, a different shift, a shorter day, rest breaks, or medical oversight in the plant during a convalescent period.

Adjudications also serve employees' interests if they remove them from the care of physicians who have been managing their cases poorly or prescribing needlessly intensive treatment, as in the examples cited earlier. The company will also gain if the interventions telescope the employee's recovery and cut down on absenteeism, or if they obviate health care expenditures covered in a benefit plan.

Although certainly part of the company, the line manager supervising a disabled employee uses a simpler calculus. The problem is to put out a product efficiently and expeditiously; health care costs that appear on different financial reports seem remote. The line manager may want the employee back on the job or may be looking to the company physician to provide an excuse to get rid of a troublesome worker. Both situ-

ations can create conflicts, as can demands on corporate staff from personnel and legal officers to have company physicians make a reasoned medical judgment in an acrimonious case and stand publicly behind it.

Role conflicts

When pressures build, company physicians have several lines of defense. First, they can insist that they will best serve the needs of the organization by giving precedence to the needs of individual employees, because, as some told me, "the benefit to the company is the aggregate good that we do for individuals." But some situations strain this defense and push company physicians to draw a strict line between their function of supplying medical definitions and that of personnel administrators, line managers, and other managers in applying these definitions in disputes involving jobs or the allocation of scarce resources. This passive resistance often creates resentment among those who face the problem and who may come to look on company physicians as poor team players and incompetent managers.

In the medical adjudication sector, corporate physicians are aware of a contradiction between their organizational roles and the patient-doctor relationships they need to provide health care services. Ambivalence draws them back from organizational demands they feel are inappropriate, and this selective retreat sometimes makes them appear aloof and arrogant to other managers.

These conflicts arise when the operational role and the clinical role of company MDs coalesce. They accept the work that comes their way and do their best, case by case. But many cases plunge them into an already charged situation – dealing with an employee whose supervisor thinks he has been absent too often or too long, or is performing inadequately, or one who is disabled or ill and blames work exposures. Or they may be called on to deal with an employee who may have been exposed to harmful agents or one who has to be reassigned because of an actual or potential sensitivity to a substance he or she works with, or who is disqualified for a promotion on medical grounds.

In such situations, it is difficult for the doctor to contribute much toward a solution that will satisfy all the principals. If, however, these problems can be anticipated through systems developed for this purpose, and, where possible discussed in joint deliberations with labor representatives, then there can be hope of resolving them before they escalate. In terms of the model, this means moving up the managerial axis toward the strategic sector.

Formal strategies can then be developed, with appropriate input from affected parties, to cover the following sequence of situations:

1 When a company physician examines an employee for whatever reasons, the ground rules have already been spelled out. Employees are aware of the purposes of the examination, the uses to which the findings will be put, the form in which they will be reported, and to whom, and the opportunities they will have to review and rebut the findings. This "Miranda-like" warning is analogous to the informed consent procedure required in all research involving human subjects.[6]

2 After the examination, the physician scrupulously adheres to the seventh principle in the American Occupational Medical Association's code of ethics, namely that "physicians should treat as confidential whatever is learned about individuals served, releasing information only when required by law or overriding public health considerations, or to other physicians at the request of the individual according to traditional medical ethical practice; and should recognize that employers are entitled to counsel about the medical fitness of individuals in relation to work, but are not entitled to diagnoses or details of a specific nature." Although several of OSHA's regulations on hazardous substances recognize this ethical precept, it lacks general legal and regulatory support. Explicit corporate policy supporting the code is therefore extremely important.

3 When an examination uncovers a problem, the medical department takes steps to make sure the individual receives prompt and competent treatment. The company has a stated policy to strive for consistency and fairness in cushioning the effects of illnesses or injuries through appropriate accommodations and just compensation.

4 When an individual's health problem does come to light, a formal system exists to match it with other evidence, in the company or outside, that might begin to implicate as a potential occupational stressor a substance, a process, or a physical or social arrangement in the workplace. Line managers are accountable, in their performance appraisals, for the effectiveness of health monitoring of employees and workplaces under their aegis.

5 If unhealthful patterns come to light, the company moves quickly and effectively to correct the situation and communicate relevant information to all parties with a need to know – employees, former employees, labor representatives, customers, competitors, the government, the medical profession, and the research community.

6 Meanwhile, the company is taking constructive steps to help employees and their dependents achieve the goal of "dying young as late in life as possi-

Exhibit I **The corporate medical department: a functional framework**

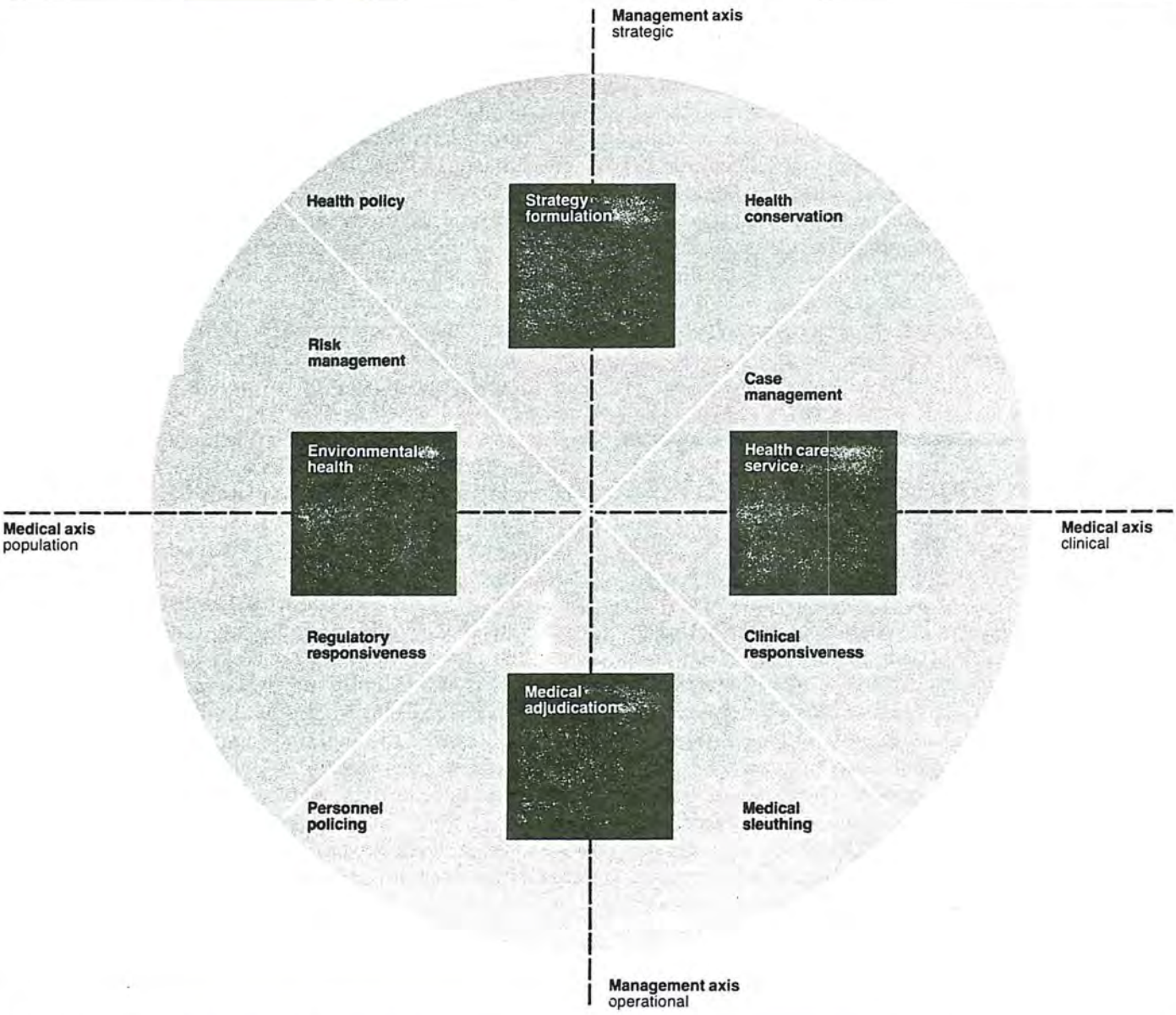

Exhibit II **Three major role sectors for corporate medicine**

	Health care services	Medical adjudication	Environmental health
Historical roots	Emergency treatment in remote locations	Verification of eligibility and claims processing (workers' compensation and benefits associations)	Accident prevention and public health reforms
Functions	Early detection of illness, health conservation, case management	Medical interpretations for industrial relations applications	Risk assessment and management organizational intelligence
Technique/ expertise	Clinical medicine	Medical administration	Epidemiology, biostatistics, toxicology
Conflicts	Organized medicine, regulators, employees, and public health sector vs. occupational medicine	Costs vs. health mission, line vs. staff	Worker vs. supervisor, in-house vs. outside physicians

ble.'" The company is assessing its own record in this regard, compared with similar companies. It has formal procedures for continuously exploring whether it is overlooking potential threats to health and missing health-enhancement opportunities.

As they install these procedures and move toward a strategic approach, some corporate medical departments become more active in deciding and communicating how the company will handle sensitive health issues, what the rules will be, what tasks the department will and will not undertake, and why. Instead of processing individual cases one at a time, they are establishing systems and structures, with an eye toward the ramifications for the organization and toward interactions between individual and organizational needs.

Environmental health

In the environmental health sector of the medical department's role, organizational considerations are paramount. They draw the department, like it or not, into an interdisciplinary collaboration it will seldom dominate. Monsanto's John W. Hanley described the tough decisions—the "judgment calls"—routinely demanded of a company in the environmental health sector: Does a company forgo announcing Product A after ten years of research and development and substantial sunk costs because of an environmental risk? Does it recall Product B, with all that means in direct and indirect costs? Or shut down the manufacturing line because of a "devil's chemical" found in trace amounts in the production of Product C?[8]

Medicine has an indisputable role to play in this assessment process, but conflicts arise over how far medical authority should extend. For example, does the medical department issue permissible exposure standards for others to obey, or does it merely recommend standards to be ratified elsewhere? These conflicts generally reflect uncertainty as to whether corporate health personnel can factor into their technical scientific judgments an adequate understanding of the organization's wider perspective.

Professional sovereignty

Yet these are issues that relate to health concerns in which physicians feel entitled to exercise the same kind of professional sovereignty that they do in noncorporate medical practice. But professional sovereignty inside a corporation is of a different order. As one IBM manager noted, "It's the product manager who is king around here."

Ensnared in these tensions, corporate health professionals occasionally look on OSHA and the social commitment it signifies as a mixed blessing. On the one hand, OSHA has heightened companies' consciousness of health concerns and made them willing to commit resources to enhance the well-being of their employees; on the other hand, it has created a climate in which health is becoming too important an issue to be left to the doctors. Environmental health sector demands make it increasingly difficult for an old-style medical department to wall itself off from the organization and to guard its strictly clinical role. Ineluctably, they push it up toward the strategic sector.

Moreover, old-style medical departments often lack an interest in health as a statistical phenomenon. To perform adequately in this sector, physicians need a public health orientation as well as managerial skills that go beyond orthodox medical training.

Special studies and investment in computerized health information systems are becoming increasingly common in large companies that deal with chemicals. Studies may be conducted in-house by companies large enough to sustain their own epidemiological team or through trade associations, labor-management consortiums, or in collaboration with government scientists and university investigators. Invariably they require oversight and interpretation by in-house medical departments whose scientists serve as advocates for more and better health research.

Value of better data

The case has been made that it amounts to hara-kiri for a corporation to produce self-incriminating information about the health risks of work.[9] The Kepone and asbestos tragedies might have been averted, however, with better organizational intelligence. Incentives do exist for producing information, even if they are indirect or remote, and they in fact constitute the rational core for a more strategic approach to health:

- ☐ First, if some government-promulgated standards are excessive, as some industry spokespeople believe, then better data will help companies make a convincing case. John Hanley argues that Monsanto's early warning system benefits the company in just this way.

☐ Second, evidentiary rules are such that issues arise case-by-case. A company has a better defense against a litigant it can show to have been the only employee who developed the disease in question. Data, again, may help.

☐ Third, current exposures may result in disease 20 years from now, and companies will be judged according to the (probably less forgiving) norms and laws in effect at that time. As the future will judge the present, it's prudent to be prepared.

☐ Fourth, some companies are developing integrated systems to use data processing technology in the systematic monitoring and cumulative registering of all exposures in the workplace and evidence of biological effects. These companies may create a standard of practice; companies lacking such systems could be judged negligent in future tort actions.[10]

☐ Fifth, customers of companies exporting products that involve risks look for information on how safely such products can be handled. Turning this need into an advantage, the sales forces of some chemical companies use environmental data developed for employee health protection as part of their sales pitch.

It seems reasonable to predict that companies producing or using hazardous materials will assume, or have thrust on them, increasing responsibility for conducting continuous and systematic monitoring of exposures in the workplace, indexed to the health of exposed workers. More and more, management will need interpretations of ambiguous data. Increased knowledge will enable companies to be more strategic in dealing with health issues.

Closing the loop

As they tackle complex health-related problems, companies begin to integrate the health concerns of their various organizational and geographical divisions. They begin, as one Alcoa executive said, to "close the management loop between the medical and operating staff." This means conducting an inventory and an audit of existing in-house health programs that have grown up, location by location, from the grass roots, comparing one with another and all with outside standards and practices. And it means developing a policy framework and defining objectives and operating principles for company health activities in health care services, medical adjudication, and environmental health (see *Exhibit II*), and adding a role in strategy formulation.

It also means developing performance indicators against which line managers can gauge their progress in meeting corporate standards with respect to health conservation, and creating incentives for them to do so, for example, by charging disability and accident cases to their budgets, as Bank of America has recently begun to do. Implicitly, it also means making the medical department an integral part of the company's management matrix, a resource in deliberations ranging from benefit design and utilization management to environmental monitoring, risk assessment, even the design of jobs. To bring this about, companies need to understand the pressures that have compelled some corporate health professionals to shy away from managerial roles and the ways in which those pressures can be mitigated.

In the past, too many companies have denied or minimized the conflicts in corporate physicians' roles. One conflict-escaping device is the credo that waves away the potential incongruity between individual and organizational purpose by holding that in serving the individual the medical department is, by definition, serving the organization. As we have seen, this position is at times untenable. Another device, "medical Taylorism," parallels Frederick Winslow Taylor's scientific management theories and trivializes conflict between management and labor. Medical Taylorism holds that medicine can be a neutral mediator, capable of producing objective tools without becoming embroiled in the debate over how they are to be used. This is related to the debate, as expressed in C.P. Snow's criticism of the role of nuclear physicists, over whether science can ever be neutral.

The medical profession's problems with functioning in an organizational setting have often been cast in terms of credibility, competence, and other personal qualities. Specialty associations have tackled these problems through socialization techniques – education, training, certification, the promulgation of an ethical code – familiar undertakings of an aspiring professional group that have their place but that deflect attention from the need for more enduring structural changes.[11] In the long run, health professionals have no choice but to become embroiled in the debate over how their scientific inputs will be used, and it is the joining of this issue that frees them to become more strategic.

Thinking about a health strategy

My study suggests that corporate managers need greater clarity on the underlying mission of their company's health programs. They must understand that various goals come into play, not all of

which are mutually compatible. It may be true in one company that medical adjudication erodes the trust essential to success in health care services, or that these services, in turn, deflect attention from environmental health issues. Those are questions that managers need to ask with a good deal of intellectual honesty.

Companies need to define more specifically the roles and obligations of their health professionals. The efforts of a dozen or more leading-edge companies are giving shape to an inchoate role and making health concerns more strategic. The object of their efforts is to generate, synthesize, interpret, and communicate information that will support a corporate health policy to restrain problem-causing activities and initiate problem-solving measures. Investments in technical and scientific expertise and in computer capabilities are therefore important, but even more important is the rethinking of key relationships: with middle managers (corporate and line), with employees (as employees and as patients), and with personal physicians in the wider community.

When managers view information as central to health care, the voluntary cooperation of employees with company medical programs follows as an essential objective. This is the channel through which baseline data are collected on the health effects of work and through which the company can communicate reciprocally with employees about their health problems and needs, options available to them for health care services, and actions they, their families, and the company can take to conserve their health. The protection afforded by the policies already outlined will go a long way toward eliciting the trust that is necessary to move in this direction.

Supported by adequate information, line managers play an important role in health conservation. The first step in any company's evaluation of its health programs—a cataloging of the health programs in offices and plants across the country and abroad—is a major undertaking in a large, decentralized company. Plant physicians typically report to plant managers and have a dotted-line relationship to the corporate medical department. Asking operating managers to provide the corporate level with a standardized accounting of the work experiences and exposures of employees on which to base a prospectively oriented, companywide health conservation program is, in the words of a former corporate medical director, "about as popular as the plague."[12] Operating managers have to concern themselves with short-term profit and loss; health is necessarily a longer term issue. And yet the longer term corporatewide purview is fundamental to the mission of a corporate medical program with a preventive outlook.

Furthermore, the longer term view is the ultimate conflict-resolving device, promising a more lasting solution than the various rationalizations already discussed. In the longer term lies the opportunity to ensure that company health policies are more than slogans masking the subordination of individual needs to organizational aims. The longer perspective seeks to redefine and reshape the organization's larger purpose, as necessary, to make it comport with basic individual needs.

In some companies whose senior managers place a high premium on employee relations, companies that have become sensitive to health problems, and whose corporate medical staff has a vision of an enlarged role as well as the persistence and skill to bring it about, the role of the corporate physician is becoming more strategic and more attuned to the total work force over longer time horizons. That the company's culture and the physicians' capabilities should converge in this way is often the result of historical accident. Only when health finds a place on the planning agenda will such a combination yield sensible survival strategies.

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Management of an Occupational Health Program Within an Industrial Setting

Perspectives of a Corporate Medical Director

Thomas J. McDonagh, M.D.

Occupational health practice as a discipline is facing transitional times as society undergoes a shift toward adaptation, toward blending social and economic goals. Despite an almost explosive growth in its scope and complexity in the last 10 to 15 years, many would argue that its basic mission of protecting and promoting the health of the worker has not changed appreciably. Although the American Occupational Medical Association's (AOMA) 1979 statement on the "Scope of Occupational Health Programs and Occupational Health Practice"[1] aptly defines its parameters and remains pertinent today, it is apparent that new opportunities, challenges, and priorities face us. Occupational health practice continues to demonstrate that it is influenced by social, economic, and practical forces as they impact on the work force, on industry, and on society as a whole.[2] Occupational health program managers now are faced with a period of introspection and self-analysis as they reevaluate and reformulate roles and responsibilities. The programs they direct must meet current needs while anticipating future requirements; they must be flexible and able to adapt to the changing and evolving external and internal environments within which they function.

Clearly, occupational health programs within industry vary widely. The size and geographical scope of the organizations being served may differ, e.g., a small local company v a multiplant or multinational corporation. Programs at a headquarters site often differ from those at an operating unit or plant. A location might be staffed by a physician-nurse team or an occupational health nurse may serve in virtual isolation. One company's occupational health program may be clinically focused, while another is broader in scope and even multidisciplinary in nature. Some companies integrate additional responsibilities, such as safety and environmental health and pollution control, with their occupational health program. Organizational reporting relationships also can differ greatly. While this diversity may make it difficult to talk specifically about occupational health program management, the requirements to direct varied and complex programs and to adapt to challenging and changing environments are common to all. Effective management and leadership are essential if programs are to meet their objectives.

Program Management

I have stated my biases before[3] regarding the role of the manager in occupational health programs and who that manager should be. I believe that all occupational health physicians must consider basic managerial practice as an essential component of their roles in the corporate environment. Indeed, the same can be said for all occupational health professionals as they direct the specific programs for which they have responsibility. Effective leadership and management skills are critical requirements in selecting an occupational health program manager. In addition, whereever possible and appropriate, occupational health programs should be directed by occupational health professionals.

My personal view is that occupational health practice is a multidisciplinary effort – a team approach is desirable, both professionally and organizationally – and, if he/she possesses the appropriate skills, the occupational physician ideally should be the overall program manager. More recently, in the literature, greater emphasis has been given to the role of the occupational physician as a manager[3,4] and to the responsibilities of the health program manager.[5,6] The physician-manager or occupational health program manager must understand the company's business strategies and objectives as well as society's concerns and expectations. With that as background, the manager can identify the organization's health-related needs; plan, implement, and evaluate appropriate programs; provide management

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with the health-related information it needs and periodically report to it on program progress and effectiveness. It is the manager's responsibility to ensure that effective programs are in place so as to protect workers' health and to provide management in a timely manner with the health-related information and advice needed for sound business decisions.

Occupational health programs are involved increasingly with concerns that have not only health, but organizational, business and even societal implications as well. There are a host of factors that offer opportunities and challenges to their managers and that shape current program directions and formats. It is not possible in this discussion to exhaustively address the full array of such issues. Those that seem to me to be the more important and topical, particularly those that have had a significant impact on my activities, will be considered.

Economic Constraints and Cost-effectiveness

It is disappointing that, as occupational health programs are receiving belated but deserved recognition as key resources vital to a company's business interests and activities, the current business downturn is making it difficult for such programs to achieve their ultimate development and potential. As economic conditions force companies to reexamine all programs and plans, the occupational health activity is receiving similar scrutiny. This has resulted in the reorganization or downsizing of some programs and staffs. Some reexamination and rejustification of objectives, priorities, and programs may be beneficial, provided managements continue to recognize and meet their ethical, legal, and regulatory-driven responsibility to ensure that the company's operations and products do not produce unacceptable risks to the health of employees, customers, and the public or to the environment. Overreaction is to be feared and, hopefully, will be avoided. In any case, manpower reductions, cost control and efficiencies, and redued operating budgets are not strangers to many occupational health program managers. However, the concern of companies for the safety of operations and products persists, and the provision of employee health maintenance services at some appropriate level is desirable. Striking the right balance will be the challenge. Sustaining continued management support for high-priority, effective programs and obtaining endorsement for newly defined, promising efforts will test the mettle and skills of the occupational health program manager.

In this economically sensitive environment, cost-effectiveness has become a buzzword. Benefits are now measured more against costs and less against abstract ideals or goals. For occupational health programs, data are needed to document reductions in absenteeism, health care costs, and premature death and disability, as well as associated increases in productivity. However, proving the cost-effectiveness of occupational health programs is difficult. As in most of these exercises, the cost side of the equation is the easy part. Defining and costing out the benefits is where the data are often nonexistent or extremely soft. AOMA's Committee on Occupational Medical Practice has noted[7] that it "knows of no well-documented studies that definitively show that an occupational health program is cost-effective." To some degree, we in occupational health practice are the basic cause for this observation. Over the years, programs were established and elements added with limited interest given to the evaluation of their effectiveness, either generally or from a more quantitative standpoint. This should be an integral component of all future programs.

In addressing the cost-effectiveness issue, one useful approach is to identify the subsegments of the total program and to analyze them individually. What factors need to be considered will vary among companies, depending, for example, on the type of business conducted and the size of the organization. Program elements that are clearly occupational in nature are more defensible, since often there are associated legal, liability, regulatory, labor relations, and other similar issues that enter into the equation. However, as Kotin and Gaul[8] noted in a presentation at the Chemical Industry Institute of Toxicology, one can determine costs associated with adverse effects such as occupational disease or injury, but there is no accurate way of quantifying the benefits of prevention. Management must recognize that costs associated with health, safety, and environmental problems are often hidden, and that preventive programs can be economical by their reduction or elimination of indirect costs and future liability.

Those program aspects that relate to nonoccupational preventive medicine appear to be more discretionary from a management point of view. Data do exist in the literature[7,9-11] on cost-effectiveness in some specific nonoccupational subsegments of occupational health programs, but admittedly they are fragmentary and weak. Other positive outcomes that should be considered, although difficult to set down in monetary terms, are employee self-image, job satisfaction, morale, company loyalty, productivity, and the enhancement of the company's image, both internally and externally.

Although it should not deter occupational health managers from evaluating program cost-effectiveness, it is important to recall that other well-accepted company programs have not been cost justified. For example, rarely in the past have the more traditional medical, dental, and life insurance; disability income; savings; and retirement programs received this scrutiny.[12] Rather, many are justified on the bases of improved employee morale, increased productivity, the attraction of high-quality new employees, and better employee retention and motivation, but without hard data to document these assumptions. Occupational health program managers also have utilized similar justifications. Some are valid, but we need to be realistic and recognize that we are in competition for a limited amount of company resources and that the need to marshall cost-effectiveness data in a more concrete fashion is becoming more important.

Additionally, management should understand that occupational health services are a key resource in helping companies minimze the potential adverse physical and psychological impacts on employees of cost and manpower reduction programs. These services can significantly affect employee health, morale, loyalty, and productivity, as well as the image and credibility of the company in their eyes. Thus, in the face of overall company cost-reduction efforts, it would be unwise to weaken the ability of the occupational health program to contribute effectively in this manner. Occupational health program managers must

repeatedly emphasize to their managements the potential value of this contribution.

Clincal Occupational Health Practice, Preventive Medicine, and Health Education/Promotion

There are a number of older issues and newer developments of current interest relating to the clinical side of occupational health practice that are deserving of mention. The periodic health examination continues to be an issue of debate. In reaction to earlier publications on the subject[13-16] and in response to cost-effectiveness pressures, companies have been reexamining their approaches with regard to philosophy, frequency, and content. Many have changed procedures and practices, and some are even contemplating eliminating these programs.[12] Our own approach will be to continue them, while lengthening the intervals between evaluations and tailoring the examination content to the employee to a greater degree. A final consensus is not in, nor will it probably ever be; companies undoubtedly will take different overall approaches, as they do in so many other areas. It should be understood, however, that we are speaking here about routine health examinations, and not those evaluations related to workplace exposure to potentially hazardous materials or conditions — a responsibility companies must always have.

Similarly, the issue of confidentiality and the right to access medical records remains a continuing topic of interest. I believe that very few question the right of the worker to be informed concerning the contents of his personal medical record. However, governmental and court-mandated rights of access of labor representatives and other third parties to personally identifiable medical data remains a concern to many health professionals and is an issue still not satisfactorily resolved.

A rapidly growing segment of clinical occupational health programs is aimed at preventing illness and disability. A recent Gallup poll indicated that 81% of all Americans believe that being in good health is very important — second only to the importance of a good family life. Naisbitt[17] in his best-selling book *Megatrends* notes, as one of the major trends in American society, the shift from institutional help to self-help, and that a part of this is the acceptance of personal responsibility for one's own health. Americans are demonstrating their concerns about health; they want to foster personal good health. A wellness revolution is sweeping the nation. Many employers also see merit in preventive medicine, partly for altruistic and humanitarian reasons, but also because of the rising costs of health care services.

Of course, prevention has always been one of the main principles of occupational medicine. Thus, it is not surprising that wellness promotion activities, such as health education, smoking cessation, hypertension detection, physical fitness, stress management, nutrition, and health risk assessment have become significant parts of occupational health programs.[18] To these should be added employee assistance programs, which, although somewhat different in scope and approach, share similar objectives in prevention and cost containment.

The objective in all these efforts should be to modify life-style behavior and reduce risk factors. The end outcome should be to motivate employees to make voluntary, informed behavioral changes that will positively impact their health. Assessing need and designing, implementing, and evaluating health promotion programs are important responsibilities of the occupational health program manager. Several articles addressing program establishment suggest an implementation process to follow.[18,19] The National Council on Health Education, now located in New York City, can be of help. It is the impression of some that such programs will have more effective outcomes if they can be targeted to higher-risk subpopulations.[20] A health risk appraisal program may be useful in this regard.

Environmental Health Concerns and Technological Change

It has been noted that the primary concern and interest of management in the health area must be its obligations with respect to occupational and environmental health. Despite the passage of a number of significant laws in the early to mid-1970s, and the other advances made since then, these still remain areas of marked public interest, polarized views, and heated emotions. The control of potential hazards associated with the use of raw materials; manufacturing processes, finished products, and wastes; and the preservation of environmental quality have remained intense societal concerns over the last 10 to 15 years. Industry has come under marked scrutiny from the public, the media, and the government; its scope of responsibility for the potential associated health impacts of processes and products is now considered in some jurisdictions to be nearly total — in effect from the "cradle to the grave," or through their whole life cycle.

The demands on management and its resources to address these issues have not abated significantly, although the economic recession has led to an erosion of the relative financial strength of many companies. It is now more important than ever that finite occupational health resources be used in a way that provides maximal overall health protection.

Technological uncertainties, change, and innovation have added to the vexing issues facing managers and their programs. Among them are the ability to measure occupational and environmental exposures to almost infinitesimal levels; a growing but yet incomplete toxicologic data base; the difficulties in extrapolating such data from lower species to man; a relative lack of information on human health effects as they relate to documented work exposures; and the uncertainties and varying methodologies associated with risk assessment as currently practiced.

However, technological advances do continue. An expanding array of "screening tests" should allow the effective prioritization of effort and the concentration of resources where most appropriate. An accelerating search for short-term testing methodologies and alternatives to animal research is being fueled both by the desire for quick, effective, and cost-efficient procedures, and by a growing sentiment against animal research in the United States and overseas. Advances in our understanding of biochemical and pharmacokinetic mechanisms are narrowing the gap between animal experimentation and its human application and the evolving sciences of molecular biology, genetics, and bioengineering are opening new vistas in the understanding of disease mechanisms, testing procedures, and treatment.

In an era of significant technological advances, much remains to be done. The evolving areas of reproductive, neurological, behavioral, and immunological toxicology require significant new methodology development. New computerized information systems allow for the prospective collection and analysis of large volumes of work-exposure and health data, whose use hold real, but relatively unfulfilled, promise for meaningful work-site surveillance and more definitive epidemiology. Ergonomics, a burgeoning discipline here in the United States, as compared to Europe, where it has been well established for some years, needs greater emphasis. Video-display terminal issues have been a significant factor leading to this increasing recognition.

A word of caution, however – new and exciting technology has its allure, but care must be exercised lest it be applied indiscriminately and before its implications are fully understood.

Regulatory Issues and Initiatives

Discussion of occupational health program management would not be complete without mention of the regulatory scene. One could become embroiled in debate over the differing regulatory philosophies of one administration v another; however, it should suffice to note that, to the degree such philosophies differ and shift from one election year and one administration to the next, the challenges presented to occupational health program managers are magnified. Karrh,[21] in the 1982 Sappington Lecture, outlined quite clearly the regulatory issues and needs of the 1980s, and reminded us all that good regulations are the responsibility of everyone: occupational health professionals, scientists, management, and labor, as well as the government.

I will not attempt to summarize the status of various current regulatory efforts but only note a few areas of interest and significance. In *Megatrends,* Naisbitt[17] points to a shift toward decentralization that can be recognized at multiple levels of society. This trend is apparent in the regulatory area as well; specifically, there appears to be a noticeable realignment of regulatory initiatives from the federal to the local level. The state and even city "Worker Right to Know Laws" are good examples. Any further acceleration of this decentralization trend will compound the compliance challenge already facing industry. If the federal government fails to identify and respond to problems needing attention, a profusion of costly, duplicative state and other local regulations may be the outcome.

I did not mention "Worker Right to Know Laws" as an example of the decentralization of occupational health regulations to express a negative or judgmental view concerning their underlying philosophy. The elimination or control of potential workplace hazards is an objective of both management and labor. If management is to meet its responsibility to maintain a work site free of hazard, it needs the commitment and cooperation of an informed and trained work force. The challenge is to so inform the worker in an effective manner, while minimizing the costs of doing so with limited resources, and without the compromising of confidential business information. The communication of health hazard information effectively to employees is an important challenge and we, as health professionals and occupational health managers, must see this as a responsibility, with or without a mandating law or regulation.

If industry is to avoid excessive regulation, it must show that it can and will meet acceptable health and safety standards of its own volition and that it can cooperate constructively with regulatory and concerned public interest groups. Currently, the negotiated voluntary testing programs being developed under Section 4 of TSCA through joint company and trade association sponsorship; the regulatory negotiation project of the Environmental Protection Agency; and the collaborative efforts of a trade association, an environmentalist organization, and several companies to come to a consensus on a low-level PCB control plan for consideration by the Environmental Protection Agency are encouraging developments no matter what their outcome.

It bears repeating that the surest way to guarantee fewer and less onerous regulations is for industry to exercise appropriate self-regulation. Management must accept that, in the final analysis, it has the responsibility for the safety of the company's operations and products, and for the healthful condition of the workplace. We, as occupational health program managers, welcome the opportunity to help them achieve that objective.

Health Care Cost Containment

In an earlier part of this presentation, the economic constraints currently facing industry were mentioned. In the context of that reality, companies have become much more sensitive to the rapid increase in health care costs, which had been rising at rates approximating 15% per year – faster than the 8.8% growth of the overall economy. In 1982, according to the Bureau of Labor Statistics, the cost of medical care in the United States rose by 10% – more than twice as fast as all other prices. *The Business Roundtable,*[22] citing the corporate contribution to payments for health benefit plans of some $60 billion in 1980, has called on business leadership to address local issues in the health care delivery systems. Three general areas in which the private sector could be effective were noted:

- *Community involvement* with other concerned parties on demonstration projects designed to stimulate competition in health care delivery, and with community coalitions established to address specific local health cost management problems.
- *Company programs* designed to improve employee health, to test innovative health benefit packages, and to educate company officials who serve as hospital trustees.
- *System checks,* provided through participation in local health planning units and support of health utilization review committees, to help manage future resource allocations and ensure the efficient delivery of care.

The need for corporate action was recently emphasized by health care experts interviewed by Yankelovich, Skelly and White, Inc. In this survey, "The American Health Care System,"[23] the experts identified as one of five factors contributing to the high costs of health care, the institutional indifference shown by insurance companies, major

corporations, and labor unions about taking charge of such costs and playing an active role in their containment. Also noted and of equal importance and significance in addressing health care cost-containment goals are the health care consumer's expectations of the system. Health care is looked upon as a public entitlement whereby someone else is expected to pay the costs associated with the best care that money can buy.

In the last year or two, numerous articles have appeared in lay and professional literature on the subject of health care cost containment.[2,24,25] Health care costs and their control, more often than not, have not been of special interest or concern to the occupational health program manager. Employee relations departments, benefits managers, financial officers, and risk managers have often been the company resources addressing this area. Much of what is now being considered by internal company committees looking at this problem involves the restructuring of benefit programs and a greater sharing of costs with the employee. Uncommonly has the process called upon the resources of occupational health departments. Occupational health professionals must become more involved. They particularly should be concerned with the employee's access to and the quality of health care services being offered in these newly designed programs.

The occupational medical department can play an important role in bridging the gap between medical-ethical issues and the financial considerations involved in the search for health care cost-containment strategies.[24] However, it would appear that health professional involvement is not occurring optimally. A survey[26] of AOMA members revealed that, in those full-time occupational physicians responding, 56% had been consulted on medical care cost-containment issues, and only 31% were involved in associated community activities.

This is obviously a priority area for occupational health program managers. Their participation should ensure a balanced approach and help preclude cost-saving measures that promise short-term bottom line results but risk long-term health liabilities.

In discussing company programs that might address the health care cost-containment issue, *The Business Roundtable*[22] recommended company efforts to improve employee health. Health or wellness promotion and employee assistance programs are such an approach to cost containment. A majority of corporate executives feel that such efforts would help contain costs, and, in one survey, seven in 10 forecast growth of these efforts in the future.[23] Simple logic leads to the conclusion that preventing illness or accident, to the degree it is possible, is less expensive than diagnosis, treatment, and rehabilitation. In addition, many believe that a positive life-style offers employees better health and longer lives; and these, in turn, translate into less absenteeism, greater productivity, and better morale.[18]

Although much enthusiasm exists for these various health maintenance and wellness promotion programs[9,18,22,27] by both their proponents and those who participate in them in the belief that they are useful in providing a sense of well-being and freedom from illness, there is little objective evidence at this time to indicate their place as a cost-effective tool in preventive medicine.[27] This statement by the AOMA Committee on Occupational Medical Practice reflects again the dearth, but not complete lack, of good evaluation data related to these programs. Fielding[9] has recommended six program elements for companies to consider in establishing wellness promotion programs: hypertension screening and follow-up, smoking cessation programs, exercise programs, diet modification/nutrition, employee assistance or alcoholism programs, and automobile safety programs. Collings[20] has taken the concepts of preventive medicine and wellness promotion one step further, to what he has called "managing the health of the employee." This is a more proactive approach that provides for a greater interaction with the private physician in a cost-effective organized system of health maintenance and disease prevention.

In talking to a number of corporate medical directors, it is apparent that companies are actively committed to cost-containment programs that often include wellness promotion elements. The occupational health manager must be actively involved in the cost-containment process, for it has the potential to significantly impact the health of employees as well as the character of the occupational health department and program itself.

Legal Issues, Product Liability, and Victim's Compensation Legislation

Although legal issues have been reviewed to some extent in my comments on regulatory matters, a more specific, focused look might be helpful, particularly with regard to the issues of workmen's compensation and alleged work-related illnesses, product liability, and victim's compensation laws.

Concomitant with the public's increased interest in health and the recognition of individual self-responsibility regarding personal health, there appears to be a somewhat contradictory tendency for individuals to hold their work conditions or exposures responsible for many and varied illnesses. Perhaps even more significant is a growing concern about the potential adverse effects of work-site effluents and emissions, not only on the environment, but also on the health of those who live in the surrounding community, particularly through environmental exposures such as those related to the products or by-products of industry or to waste transportation and disposal. These concerns, an outgrowth of uncertainty and a lack of adequate data about the long-term chronic health effects of low-dose exposure to chemical substances, have contributed to the exponential growth of legal suits related to so-called "toxic substances exposures." Workers are suing their employers, and occasionally the occupational physician, outside of workmen's compensation, charging negligence or the provision of poor-quality health services. The "fellow servant" defense for occupational physicians may no longer be a valid one in all states and under certain circumstances.

Additionally, individuals who have illnesses they believe to be due to "toxic exposures" are turning to third-party suits brought under product liability tort law against the manufacturer of the substance(s) to which they were exposed, alleging inadequate warning about the potential hazards of such materials. There are those, as well, who feel they have been injured by exposures to materials released or buried in the environment, often without the specific "offender" being known, e.g., those living near

waste disposal sites. Here, the liability may be shared by all those who utilized the disposal site.

This mounting tendency to sue, and the increasing litigious nature of our society, are of concern to industry, the government, and the public. Various bills are or will be before the Congress that address suggested reforms to the tort legal system and methods by which those individuals injured via exposure to toxic substances can be compensated (victim compensation legislation).

Although superficially these seem to be legal, and public and governmental relations issues, they should be of interest and a priority for occupational health program managers. Clinical occupational health services, toxicologic research, industrial hygiene monitoring and control, epidemiologic investigations, and hazard warning and training programs are essential elements in the prevention of problems, the alleviation of concern, and finally, if necessary, in the defense against unfounded allegations. Active in-house programs can help industry to allay its fears of the "threat" of future liability litigation. By putting good health programs in place with thorough record keeping, corporations can show in future litigation that they were meeting their responsibilities even without the threat of government action or regulations.

Occupational health program managers must become actively involved in the legislative/regulatory aspects of these issues. Unless there is appropriate scientific input and sufficient consideration given to the principles of causality in drafting these proposed new compensation laws, industry, and society as well, may face potentially staggering liabilities.

Summary

In this review, I have tried to identify and call to the attention of occupational health program managers what I consider to be some of the major occupational health issues and concerns facing industry. It is obvious that we have a sizable task ahead as we stand back and contemplate the scope and complexity of these matters. One of my colleagues coined an apt phrase: "We need to master the probable and manage the unpredictable." In the midst of all these opportunities, and faced with the constraints of the economy, the occupational health program manager must carefully evaluate his/her company needs vis-à-vis society's desires and requirements, and then prioritize and plan accordingly. In this plethora of challenges, I would encourage you to be innovative and to welcome the new, but not discard those features of past occupational health programs that have stood the test of time.

Let us remember, too, that a good physician and nurse should always be available to counsel employees and help them address their needs. Our concern for our employee-patients should be more than a preoccupation about potential exposures to chemicals, radiation, and other toxic substances. However, even in the case of occupational exposures and illness, through that physician or nurse-patient relationship we may be the only individuals in a position to learn of subtle, adverse health effects. Personal interaction between the employee and the physician or nurse must be maintained and, in the long term, technological advances may in fact allow them more time to counsel and heal.

In view of all that I have said, I will close with what I feel is an appropriate expression of the role of the occupational physician (or nurse) as contained in the words of Harvey Cushing: "A physician is obligated to consider more than a diseased organ, more than the whole man — he must view the man in his world."[28]

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Managing the Health of the Employee

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From the perspective of business management, the lack of good health among employees and their families produces a number of undesirable effects which may be viewed collectively as costs. These costs may be divided into those requiring visible dollar outlays (e.g., medical and hospital expense, sickness benefits, workmen's compensation) and those affecting productivity or effectiveness on the job (e.g., absenteeism, limitation of performance, poor efficiency, disruptive behavior). The former are generally easier to equate to dollars, but eventually both are felt adversely on the bottom line. Although it is difficult to prove, most experienced managers will agree that the indirect costs are at least equal to, if not two or three times greater than, the direct costs. Therefore, corporate efforts to deal with the health-cost problem must include appropriate elements to control the indirect costs and to improve productivity besides attempts to contain the more obvious and easier-to-measure direct costs.

Again, taking a broad view, the entire cost-containment matter can be divided into those costs which may be termed *excesses* (e.g., unnecessary surgery, overutilization of available services, excessive hospitalization) and those which merely reflect the *high* and escalating *price for health services.* This distinction is important because the opportunities for control follow two different avenues. In the former (the excesses), control is dependent on better individual case management, while in the latter, efforts must be directed through health-care structures and aimed at reducing the going rates charged for services. Any corporate program seeking to achieve maximum health cost containment should direct its efforts toward improving individual case management as well as toward checking inflationary prices in the community.

One should not lose sight of the fact that management efforts to improve employee health need to be coordinated with the other aspects of corporate health cost containment, and that the management of employee health has dual objectives which are interdependent and mutually complementary: (a) to improve the health of the employee; and, (b) to reduce the expense of health care. Neither of these occurs automatically, therefore some influence must be applied to make them occur. This influence is the *management* of each individual's health. To the degree this management is successful, the objectives are attained. When it is ineffective, natural forces tend to diminish health over a period of time and to increase the cost of dealing with it.

Who is the manager of this important matter? One would be tempted to say that the doctors are, but doctors do not generally manage health, they manage disease (and that, only *after* it occurs). The truth is that each individual person is managing his or her own health, and usually he or she doesn't know much about managing health, never had basic education in how to manage health, and is subjected to a constant barrage of advice and "information" through the media, friends, and other sources which often recommend contradictory or confusing paths.

Health Care Management

This offers an opportunity for the occupational medical practitioner to step into this confusion and supply the needed knowledge and managerial talents. The physician's role is not to displace the individual's responsibility for his/her own health, but to work with that individual supplying useful knowledge, guidance, and specific action programs. This process is one we have been exploring intensively for the past 8 to 10 years. We call it "Health Care Management" (HCM). It rests on the basic logic that if an employee is cooperative and his health is managed properly, that employee can expect a longer and healthier life (within the limits of the state of the art of the health sciences, and within the limits of that employee's heredity). It also envisions that, as long as the employee is cooperative, his health-care costs over time can be held to the minimum consistent with his actual needs.

HCM has *three conceptual levels:*

Level I management is the management of a specific illness or injury (e.g., a case of pneumonia, a broken leg, ureteral colic, congestive heart failure). Level I management requires a disease orientation on the part of the profession-

From the New York Telephone Company, 1095 Avenue of the Americas, New York, NY 10036 (Dr. Collings, Corporate Medical Director).

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als delivering the care, and operates within a logic which seeks first a diagnosis and then therapy designed to eliminate the illness. This is what physicians do best. It is also what most of the medical resources and the health professionals in this country have been prepared to provide. It should not be surprising, therefore, that Level I functions are commonly mistaken for the whole of health care.

Level II management deals with the whole individual. It is the management of health by working with the employee to set future goals and to work out strategies to reach those objectives. This process if referred to as the *lifetime health strategy*. It is a continuing process often modified to suit new circumstances or to incorporate newly-acquired information. The important distinction is that it is individualized for each employee/patient. Level II management includes guiding health education, monitoring health periodically, providing preventive measures, and improving wellness interventions for the individual.

Level III management concerns the employee population and the system. It applies the principles of biostatistics, epidemiology, and operations research to the characterization of a specific working population. Level III management by study of this population, identifies areas of greatest concern, and opportunities for the most significant achievement and then, through an integrated management system, proceeds to take action that will produce the desired results. Finally it evaluates those results.

Through the use of a computerized health information system, it is possible to integrate management at Levels I, II and III even though management at these levels is conceptually different. This system provides the framework for flexibility which is virtually unlimited as new and better ways are developed to accomplish desired ends.

HCM is an Art

The most important thing we have learned so far is that the practice of HCM is an *art* with similarities to but also great differences from, the practice of clinical medicine. As with any art, there are no simple procedures which can be prescribed that will get results in the absence of judgment. There are, however, basic principles which can be learned. If these principles are judiciously applied, the HCM practitioner will be able to achieve desired objectives in proportion to his skill.

We have also learned that employees respond enthusiastically to HCM overtures. Most persons intuitively recognize the need for organized health maintenance and disease prevention in their total life structure (although they may not use these terms), and they see the present medical-care system as not offering much that is practical in this regard. Our experience has been that 70-80% of our employees respond positively to offers of HCM assistance.

Contrary to predictions, we also have found that community medical practitioners respond positively to HCM if they are approached properly. The proferred relationship here is one of mutual support and cooperation as distinguished from the traditional role of the occupational physician who "refers" employee patients to the community doctor or, even worse, offers the employee the names of three or four doctors with the expectation that the employee will have enough insight to select the one most qualified to handle his problem.

Our experience has shown that for the well-trained and highly-motivated occupational physician or nurse, management at Level I is relatively straightforward, requiring only one modification (albeit an important one) of the usual clinical mandate to get the patient well. The difference from usual clinical practice is that the HCM Level I manager does not necessarily attempt to get the patient well by his own treatment. More often he works through other practitioners who provide the actual medical care. The objective is to get the patient well, and at a minimum cost consistent with that objective. Initially this presents some problems to the practitioner who tends to rely more on his own resourcefulness in treating his patient than on the development of equal resourcefulness in getting someone else to do it. Experience in Level I management for large numbers of employees soon makes it apparent that the Level I manager cannot personally treat all those people, and he learns that he must multiply his capacities by working through others. High quality care and minimum cost can be assured for more people by this approach than if the Level I manager provides all the care himself.

In addition, we have learned that in today's world a significant number of patients either have been improperly diagnosed, have had no diagnosis at all, or have experienced a slow and inefficient diagnostic process. Moreover, the average patient today is faced with a complex, frustrating, time-consuming experience in trying to find his way through the existing medical care-maze. Level I managers have learned that they can help significantly in reducing the complexities, frustrations and time commitment required. Every time they do they produce a grateful employee, one who not only returns to work sooner, but is less contentious and more productive when he does return. Furthermore, we have improved bottom line.

With respect to Level II, nearly two decades of experience in operating a wide variety of programs within the general rubric of prevention and health maintenance has led to several conclusions of a fundamental nature.

First, we have found that *single intervention programs*, such as hypertension control, exercise programs, or weight reduction are often only marginally cost-effective – or at least they are ineffective at first, but can sometimes be made effective by diligent management and adaption. At best, however, such stand-alone programs are inefficient since they address such wide target populations and, by their very nature, generate high overhead. Consequently, as experience with such stand-alone programs accumulates, the natural tendency is to attempt to combine several of these elements into a single coordinated format, in the hope that it will be more efficient. This led to the emergence of so-called "multiphasic" approaches where individual elements share in common overhead and can be directed by common medical management. In spite of their improved efficienty, however, these multi-element programs have not provided the ultimate answer. Nevertheless, they did bring into clearer focus the nature of the real problems facing preventive professionals.

An Illustration

It is illustrative to reflect on the following: if a physician had the responsibility to treat all the pneumonia or all the diabetes in a population would he give an antibiotic or

insulin to each member of the population ? It could be argued that, if he did, it would, in fact, take care of most of the pneumonia and the diabetes in that population. Such an approach however, is wasteful, almost certainly not cost-effective, and, moreover, would be attended by substantial undesirable side effects on persons who had no pneumonia or diabetes. This is not to mention the problems of administering in such a way that the proper therapeutic dosage is achieved in each case of disease.

While recognizing the absurdity of the foregoing approach to the *treatment* of disease we seem to assume that when it comes to prevention, different ground rules pertain. The truth of the matter is that this approach is no more viable in preventive interventions than it is in therapeutic interventions. Everyone who is fat probably does not need to have his weight reduced to normal. The fat man who is going to survive in relatively good health to a ripe old age doesn't need his weight reduced. Likewise, it is questionable whether every smoker should stop smoking. Most smokers are not going to die of smoke-related illnesses.

Why then do we take such different approaches to the therapeutic and preventive intervention? The answer is simple and obvious: the state of the art in prevention is primitive. We do not know how to pick out the fat man who will have significant adverse effects from his obesity, and we do not know how to differentiate the smoker who is going to develop lung cancer from those who will not. So we apply our preventive measures to everyone and hope that we do no appreciable harm to those who do not need it.

This state of affairs might be acceptable if our interventions were salutary and attractive to the individual concerned. Unfortunately that is not often the case. Almost always we are trying to get the individual to do something he does not want to do. As a matter of fact, most of our current energies in prevention are devoted to finding ways to get people to do things they do not want to do.

We are thus faced with a common dilemma – the disparity between the large diffuse target population and the small number of effective hits. Obviously ways must be found to reduce this disparity and some attempts to do so are already evident (so-called health-hazard appraisal and other forms of risk assessment have come to the fore in an attempt to reduce the targeted population to those with a statistically higher risk), but this is only a beginning. Not only do we need to increase the precision of risk identification, we need to prognosticate yield from that intervention as well, since all high-risk individuals do not respond to the same degree from any given intervention. We can, therefore, seek high-risk, high-yield equations for more effective preventive intervention. In the HCM program, much of what we call Level III management is devoted to this end.

Summary

In summary, we now visualize the ideal preventive-health program as one which identifies target subpopulations with precision; intervenes in those populations with selectivity based on anticipated yield; modifies and tailors each intervention to maximize its individual effectiveness; and delivers the whole program through health-care delivery machinery that can itself be managed for maximum efficiency. This cannot be done without sophisticated information processing capability which permits the individualization of intervention. Consequently, most prevention and health maintenance efforts in the work setting are, for a time at least, going to have to be satisifed with less than ideal characteristics and less than optimum cost-effective ratios. That does *not* mean that there is nothing that can be done, or that all current programs are obsolete, or that no results can be achieved. It does mean that professionals and managers who are planning and directing such programs will increase their success to the extent that their programs can be made consistent with the principles involved, to the extent ahat all programs can be tailored to fit individual employee circumstances, and to the extent that the whole health-care management effort can be integrated into one smoothly functioning, efficient system.

A COMPANY'S DUTY TO REPORT HEALTH HAZARDS*

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INDUSTRY—especially the chemical industry—today finds itself on the horns of a dilemma. This is not a particularly unusual place for industry to be. American enterprise has grown strong by solving problems and fulfilling the expectations of great numbers of people. But in this case we are not sure how many horns there are to this dilemma. Nor are we all that certain in every case about how to meet the problems that we know exist.

I refer, of course, to the burgeoning occupational health issue and its impact in the workplace. In the last decade we have become intensely aware that long-term, low-level exposure to some chemicals and substances in amounts once considered safe can be harmful to humans. We are painfully aware, too, that we need more knowledge about these materials—at what exposure levels they can be dangerous and how they can be handled safely. At the same time—as a sort of paradoxical corollary to the need for knowledge—companies realize that they, as well as all society, will always operate with less than complete knowledge. We in industry must confront this reality, and strive to deal with it to the best of our abilities by blending a combination of broad and effective health and safety programs aimed at protecting our employees, our customers, and the general public.

Perhaps as nettlesome as any of these dilemmas is the topic on which I shall comment today: a company's duty to report health hazards.

In this day and age, this proposition should be simple to answer. Yes, a company should disclose health-hazard information. It should be candid, and lay all the facts on the table. This is the only responsible and ethical way to go. This approach is the correct one, of course, and it is the way

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we try to proceed at Du Pont. Yet, when simply stated, it does not cover some very real and complex questions which cannot always be answered on a straight and narrow basis.

For instance, how much firm, unimpeachable laboratory evidence should a company have before it reveals a possible health hazard to its employees and the public? Who should get this information? In what form should it be presented? How should the information be reported so that the message is understandable yet not unnecessarily alarming? How much effort should be expended to locate former employees who may have worked with hazardous substances at one time? And when you find them how do you inform the members of this group?

I do not pretend to have all the solutions to these questions. All companies must grapple with these complex and ever-emerging challenges at their own levels and with the best resources available to them. I can only speak of the Du Pont experience in reporting hazards. Like all companies, we have learned some hard lessons through trial and error. We still are testing, refining, and adjusting our responses to the new occupational health demands. But we have developed some guidelines, policies, and procedures in this area, and we think they have served us well in our efforts to expand and communicate our knowledge on occupational and environmental health problems.

Du Pont, as the nation's largest chemical producer, is in the eye of the occupational health storm. As have several other chemical companies, we have had our own difficulties. The high incidence of bladder tumors among employees at our large Chambers Works plant in southern New Jersey beginning back in the 1930s left an indelible mark on our approach to reporting health hazards. These tumors were caused by betanaphthylamine or benzidine dye intermediates which Du Pont no longer makes. Significantly, this case was considered a rarity in its time by industry and by the scientific and medical communities as well. That there might be a number of industrial chemicals causing cancer and other health problems was not given a great deal of credence 20 or 30 years ago.

But this incident, combined with our traditional concern for employee and public health and safety, has compelled us to formulate a number of basic principles. They are applied broadly, and they function as constants which are invoked whenever we consider the need to report hazards. Five principles are involved: knowledge, commitment, responsibility, compliance, and communications.

The first principle is *knowledge*. Du Pont makes judgments based on the best available knowledge of health hazards and their consequences acquired both internally and from outside the company.

Second comes *commitment*. From our chairman of the board and the executive committee on down, Du Pont management is committed to make and to use products and chemicals safely, and to inform employees and others of possible health risks when they come to light.

The third tenet is *responsibility*. In our decentralized system of management, it is the duty of each of our industrial departments, which make and market roughly 1,700 different product lines, to acquire adequate operating knowledge through testing and to disseminate this knowledge to all groups with a need to know.

A fourth principle is *compliance*. Where specific legal statutes exist—such as the Toxic Substances Control Act, the Consumer Products Safety Act, the Occupational Safety and Health Act—Du Pont policy is to meet or go beyond the requirements contained in these laws and implementing regulations.

Finally, there is the matter of *communications*. Employees are told of health risks in the workplace and of how to deal with these hazards safely in their everyday work practices. Appropriate groups outside Du Pont, from customers to government agencies, are notified of potential hazards and actions taken by Du Pont to minimize their impact.

Over the years we have used these principles as foundation stones in building what we feel is a strong health-management program. Many key elements are involved—the Haskell Laboratory for Toxicology and Industrial Medicine as well as our medical, epidemiological, engineering, and safety programs. But it is the direct pledge that Du Pont will make, use, handle, and dispose safely of all products which has provided the cement. These principles are not just applied in cases of chronic toxicity, which has become the new, subtle, more insidious, and complex occupational health issue. They have long been observed in our handling of chemicals and substances which are acutely toxic and hazardous.

This approach evolved naturally over our 175-year history. Du Pont started out making gunpowder, a product which demanded extreme caution and safety by both managers and employees. Since those 19th century days the company has accumulated a tremendous amount of experience in dealing safely with hazardous substances. Just to take two examples which come readily to mind, for decades we have been producing tetraethyl lead

and chlorine in large quantities, and have learned to control the risk and to make and handle these valuable products without experiencing any chronic health problems.

In reporting a health hazard or new information about a known risk, Du Pont, of course, feels that its first obligation is to inform its employees. This is consistent with our normal practice of communicating all important matters to employees when the knowledge might affect their well-being or safety. The importance of day-to-day communications cannot be overlooked. A company's first and foremost opportunity to report is during the daily communications flow which passes between management and employees.

Relevant health-hazard information should be communicated to new employees before initial assignment and to employees transferred to new assignments. Other employees working with high-risk substances should be initially informed and then periodically reminded of work and emergency procedures, control measures, exposure limits, use of protective equipment, and the constant need to observe safety practices. Supervisory follow-up is another key ingredient to make sure employees are adhering to stipulated safe work procedures.

This continual exchange of communications is needed to form a base of credibility and management concern. Otherwise, management ends up speaking in "blasts" when a health-hazard bulletin needs to be announced. This is akin to dropping sticks of dynamite with little knowledge of the target, the impact, or the anticipated results. Departments and plants have latitude as to how they choose to announce health-hazard information to their workers. What we find to be most useful is to give employees basic facts that are technically accurate, complete, and understandable, and to provide information about further safeguards which will be implemented.

Taking a closer look at our large Chambers Works in New Jersey as a case in point, the plant has a written set of standard guidelines which it sets into motion after the department's general management classifies a chemical as a suspected or experimental carcinogen. These guidelines specify everything from sign-in and sign-out procedures and exposure monitoring to emergency precautions and record-keeping tasks. A plant industrial-hygiene committee, chaired by an assistant plant manager, ensures that all guideline specifications are reviewed and implemented by area supervisory personnel.

A key element in these guidelines is employee communications. All

employees who work in the area where the potentially carcinogenic substance is produced or handled are informed during group meetings by supervisory personnel. These meetings are conducted during a span of two days to catch all shift changes and to blunt the spread of rumors as much as possible. The problem is explained verbally in a straightforward and candid manner. A checkoff system is used to make sure all employees have been contacted.

So far, our health-hazard communications with employees—not only at the Chambers Works but at all our sites—have been successful. Our feedback indicates that employees in general think that Du Pont management is pursuing a frank and responsible course. In effect, employees are telling us that they appreciate and expect this kind of candor. Of course, there is always the possibility that such candor can cause doubts. An employee at one plant, after being informed of a health risk in his work area, was heard to say: "Well, I'm glad they told me. But it just makes me wonder what else is out there." To me, this response is only natural, and it is one we cannot answer authoritatively. We can only counter such doubts by doing everything within our power to guard employees against such unknown health risks.

Obviously, employees working with a substance are our first concern. But there are other groups we also think it essential to contact. All employees previously exposed to a newly identified health hazard should be informed. This, of course, is important if we are to do the best that can be done to protect our people who may have worked with newly identified chronic health hazards.

There is also considerable discussion at present on how to inform former employees who may have worked with newly identified chronic health hazards. This concern has been generated in large part by discovery by the National Institute of Occupational Safety and Health (NIOSH) that it may have some responsibility in this area. Unfortunately, we cannot offer any easy solutions ourselves. This problem, quite frankly, reveals gaps in our reporting system, gaps which we feel must be closed. We are still trying to find a good method to locate employees who left the company perhaps as long ago as 20 and 30 years, but who may have worked with a material now suspected of being carcinogenic.

Some of this information is available to us through the epidemiologic studies we have been doing for more than 20 years. We are also working to establish employee work and exposure histories, but we have a long way to go in these areas. The goal of informing all these different groups of

people is still largely elusive, although in some of our retrospective epidemiologic surveys we have managed to reach 98 to 99% of the identified cohorts.

We also report health hazards to a number of other groups, depending on the circumstances. The main criteria for these communications efforts are: Will this information be useful to these groups? Will it serve to cause these organizations to take remedial action to protect people who might otherwise not be reached? Can these groups disseminate this health-hazard information on a wider scale to provide additional health and safety benefits? When it comes to our customers, other producers of the same material, and appropriate government agencies, the answer is almost invariably "yes."

Let me briefly cite two recent health-hazard cases which may serve to illustrate the scope of our reporting efforts.

In May of 1977 Du Pont reported preliminary results of an epidemiologic study. It covered workers assigned to a polymerization operation with potential for exposure to acrylonitrile, a chemical intermediate, at one of our textile fibers plants. The results indicated an excess cancer incidence and cancer mortality in the affected employees. This was not the first time Du Pont had reported suspicions about acrylonitrile to its employees. Tests with laboratory animals done under the auspices of the Manufacturing Chemists Association had led to a decision early this year to reduce worker exposure to below a time-weighted average of two parts per million, one-tenth of the specified federal time-weighted average exposure. However, based on our epidemiologic study, which seemed to confirm that acrylonitrile was indeed a health hazard, Du Pont management released this new information on a broad scale.

At domestic and overseas plants and laboratories employees who might come in contact with the chemical were informed no matter how small the dosage. They were also told of the various courses of action the company was taking to reduce employee exposure and to conduct further studies and tests. In addition, we conveyed our acrylonitrile findings to the other chemical companies which participated in the Manufacturing Chemists Association study along with Du Pont, to customers, trade associations, European producers and users, state agencies, and to federal agencies such as the Environmental Protection Agency, the Occupational Safety and Health Agency, NIOSH, and the National Cancer Institute. Finally, we issued a four-page press release to the general news media.

In another case—that of Fluorocarbon 22, or "Freon 22" as it is

known—we did not have firm epidemiological data at our fingertips. But we did have the results of a 72-hour Ames test which showed Fluorocarbon 22 to be weakly mutagenic. Fluorocarbon 22 is used as a refrigerant in unit and room air-conditioning systems. These systems are sealed and there is little danger to the general public from leaks.

But, because of the fluorocarbon-ozone controversy, Fluorocarbon 22 was being considered as a possible replacement for Fluorocarbons 11 and 12 as an aerosol propellant by both Du Pont and companies in the aerosol industry. Considering these long-range health and economic implications, the company felt compelled to disclose the Ames-test findings to its own employees, to federal agencies, to both "Freon" refrigerant and aerosol customers, cosuppliers, competitors, and appropriate trade publications.

In our letters to customers and others who work with Fluorocarbon 22 we recommended that direct exposure to the gas be reduced to the extent feasible, that it not be sprayed at or on people during any new product-development studies, and that personnel who service air-conditioning units attempt to minimize venting of the refrigerant and maximize ventilation of the area in which they are working. In subsequent tests conducted by Haskell Laboratory, Fluorocarbon 22 was also found to be weakly teratogenic in inhalation tests with rats. Du Pont informed employees, appropriate government agencies, customers, and the trade press of these findings several months after the Ames-test developments were revealed.

These examples show how seriously Du Pont considers its duty to report health hazards. Our system of disclosure is far from perfect. It is constantly being evaluated, refined, and updated. But, to maintain credibility and good relations with our employees, customers, and the public, Du Pont management feels that it is not only a matter of duty or of corporate ethics to report pertinent health information about products, but that it is also good, sound business practice. To do less would be both morally irresponsible and, in many instances, economically damaging.

The facts of life in the occupational health and safety fields have changed drastically in recent years. When it comes to such intensely emotional subjects as occupationally related cancer and chronic illness caused by workplace conditions, a company cannot risk the possibility of being placed in the compromising position of withholding information or making a false judgment about who should know what. It is the duty of every company's management to discover and reveal the unvarnished facts about health hazards. We owe it to the people who work for us and those who depend on us for products and materials.

Worksite health promotion can be cost-effective

A corporate health advocate shares his fiscal findings

Andrew J. J. Brennan

Efforts to contain medical expenditures through worksite health promotion programs have generated considerable publicity. Because the news media have made "wellness" the latest business buzzword, most managers understand its meaning.

And most agree that comprehensive health-promotion programs, which strive for a complete makeover of one's health life style, are worthwhile. But for some managers, such programs seem too costly when results may not be seen for many years. Also, the cost-saving data, which demonstrates their cost-effectiveness, in many cases simply doesn't exist or would be too expensive to obtain.

These programs have existed only a short time, and it takes years to document the positive impact of health-risk reduction on the rates of illness, hospitalization and mortality.

Nevertheless, managers shouldn't shy away from health promotion altogether. There are risk-intervention programs that are highly cost-effective over the short term—ideal for those employee benefits managers who wish to test the health promotion waters without immersing their company too deeply. Specific cost-savings data is beginning to accumulate for these programs, and should persuade those who remain unconvinced by logic alone. The recommended programs are:

- Smoking cessation;
- high blood pressure detection and control;
- control of lipid levels, such as cholesterol and tryglyceride,
- weight control and fitness; and
- stress management.

The traditional assistance programs that focus on employees' alcohol and drug dependency problems, as well as on their financial difficulties, are not included in this listing, mainly because they are rehabilitation efforts. Health promotion programs emphasize a positive approach to health, and focus on the prevention of illness and the maintenance of well-being, thereby avoiding the horrendous costs of rehabilitation.

Risk reduction programs do work. For example, the nationwide health promotion activities undertaken since 1968 by the National Heart, Lung and Blood Institute can be credited with preventing hundreds of thousands of premature deaths occurring from cardiovascular diseases.

Successful programs

Unfortunately, habits and practices that make up a healthful lifestyle do not come automatically or easily to most people. Even when they are aware of bad habits, many people are not always able to change them or—just as important—do not think it is possible to change them.

So the first step to modifying health habits is to create the teachable moment through health awareness. Health awareness means knowing the present and future consequences of behaviors and lifestyles and the risks they may present. You can generate such awareness through health articles in company publications, payroll stuffers, flyers, posters and

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special announcements. The whole health promotion process begins with awareness. Without this key step, no program can be effective.

The commitment of upper management is vital. Without it, nothing will be accomplished. Even if a program is being initiated on a pilot basis, it must last long enough and be sufficiently funded to give the desired results.

An individual's health status and behavior are very personal matters. The members of your staff responsible for health promotion must respect the confidentiality of health records. And they must strive to be non-judgmental but caring, or else they will lose their credibility and will alienate potential participants. Express genuine concern through verbal and non-verbal communication, as well as in company policy.

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Effective publicity

When publicizing your programs, be conspicuous but conservative. Highlight the uniqueness of the program, publicize past participants' successes, but be cautious not to oversell the cost-containment aspects. Emphasize, instead, the health benefits. Unless employees perceive the central purpose of the program as beneficial, the entire project will be unsuccessful.

The scheduling and content of programs must be carefully decided. Before initiating any health promotion program, no matter how cost-effective it seems, identify the health risks and concerns of employees. You may also wish to identify employees at high risk and, initially, if financially necessary, restrict the offer of certain intervention programs to them.

In implementing health programs, many of options exist. They may be run on-site with your own staff, or they might be community-based and run on- or off-site by an outside staff. Or they might be on-site, consultant-run programs coordinated by the existing staff. It is our experience that an internally run program offers several advantages, such as control over the content and philosophy of the program, the establishment of continuity and a sense of trust, and the development of a sense of commitment to the corporation itself. After all, nobody shows commitment to a program and ensures its success as do those whose economic livelihood depends on it.

Consider the options

For example, suppose the topic is smoking cessation. Under the first option—internal staff and site—you might run a four-week clinic consisting of two one-hour group meetings per week, plus monthly maintenance meetings for the rest of the year. This would require a full-time health educator, would take approximately 30 hours to prepare and conduct, and would yield a typical success rate of between 20 percent and 30 percent. The cost per success (off smoking for a full year) would be approximately $200. The program is offered free to employees, but is conducted on personal time.

Under the second option—external staff, internal or external site—you might offer the American Cancer Society's "Helping Smokers Quit" clinic, which would require the presence of an American Cancer Society staff member, would take about 16 hours of meeting time, and would cost between $10 and $25 a person.

Under the third option—external staff, internal site—you might adopt the commercial Smokenders program, which consists of weekly hour-long sessions for eight weeks, plus reinforcement meetings. This would require a private consultant, would take about eight hours—plus time for the reinforcement meetings—and would cost around $200 a person.

Now let's look at the results that can be realistically expected from these risk intervention programs.

Based on internal evaluations and comparisons with such organizations as the American

Trends in total medical care expenditures *

	Per capita	Nationwide total billions	Percent of GNP
1960	$ 146.30	26.9	5.3
1965	212.30	42	6.1
1970	359.40	75	7.6
1975	607.60	132.1	8.6
1980	1,071.80	247.2	9.4
1985 (est.)	1,946.50	462.2	9.9
1990 (est.)	3,309.20	821	10.8

* Source: Health Care Financing Administration.

Cancer Society, the American Lung Association, and the American Association of Fitness Directors with national health data bases, we have determined that the health promotion programs conducted at Metropolitan have achieved success rates that are quite acceptable. Our studies of other companies indicate that these cost-effective intervention programs are, indeed, result-effective too.

Smoking cessation

In our smoking cessation programs, we have experienced a one-year success rate of approximately 35 percent. The programs are provided free to employees before and after working hours, and offer a choice of several quitting options.

Our "do-it-yourself" program is a self-quit program that begins with a moderator-led group meeting, during which a self-learning packet is distributed and a one-month follow-up meeting is set. A moderator is available during working hours for support or assistance.

We also conduct group sessions for both sudden—or "cold turkey"—and gradual smoking cessation. These moderator-led sessions are generally held in groups of 15-20 that meet periodically over several months.

All groups then participate in a three-month maintenance phase of 15- to 20-minute biweekly meetings, telephone calls and mailed messages.

These programs cost Metropolitan less than $200 for each successful quitter. According to health economist Dr. Marvin Kristein, a pack-a-day smoker may cost the employer about $626 a year. He adds that smokers have a 33-45 percent higher absentee rate than nonsmokers. If we accept these figures, we can conclude the smoking-cessation programs are indeed cost-effective.

Blood pressure control

The health care costs directly associated with high blood pressure total approximately $4 billion to $5 billion annually. A similar figure pays the cost of its consequences, or complications—heart disease, stroke and arterial disease.

Yet much of the cost and suffering connected with high blood pressure can be alleviated. Recent research by the National Heart, Lung and Blood Institute showed aggressive treatment of high blood pressure, even borderline hypertension, decreased complications among a test group aged 50-59—an age group that includes some of our most experienced and knowledgeable employees.

Results of a high blood pressure control program sponsored by TRW Inc. at its company headquarters in Cleveland, supports this statement. The program, which began in 1977, was offered initially to 200 professional employees. Nurses and physicians from an occupational health services firm measured employees' blood pressures, consulted with their private physicians in diagnosing and managing high blood pressures, and provided follow-up care and medication. The company's conference room was used for on-site monthly follow-up activities, and a local hospital performed the necessary lab tests.

The company considers the high blood pressure program a success. Of the 62 percent of employees who participated, 9.2 percent were diagnosed as hypertensive. Each of these employees followed treatment and 100 percent achieved control. Employee benefits manager Joseph Kozlowski, estimated the program cost TRW $150 per hypertensive employee. He compared this to about $10,000 in medical costs the company spends when an employee has a heart attack.

...nobody shows commitment to a program and ensures its success as do those whose economic livelihood depends on it.

This comparison prompted TRW to continue the high blood pressure program, and to consider sponsoring it at another company location.

Cholesterol reduction

Metropolitan's cholesterol reduction program emphasizes practical, behavioral changes that can reduce cholesterol levels. However, participants are also encouraged to further examine their overall health status and identify specific behaviors—diet, smoking and exercise—that can affect their risk of cardiovascular disease.

The program is offered to employees who have been identified as being "at risk" through blood tests taken during their regular company physical. Approximately 15 employees are referred by the medical and nursing staff for each program.

Significant results can be achieved in about 12 weeks. Initially, program participants meet in a one-hour group session led by a health education moderator. A packet of materials is

provided to reinforce the recommendations discussed and a weekly food record is kept for analysis at the next session a week later.

During the next three months, the participants have personal meetings with the moderators, who carefully monitor their diet plans and provide encouragement and reinforcement where necessary.

Participants have achieved an average 10 percent reduction in cholesterol levels—as documented by blood tests at the start of the program three and six months after completion of the course, and every 18 months thereafter.

The cost of staff time in running the program is approximately $50 per participant. This is very inexpensive, particularly in view of recent reports. Both government and independent studies indicate that fat and cholesterol levels have a connection to heart ailments and colon and breast cancer.

Metropolitan's fitness program in the Canadian head office...resulted in an average reduction in absenteeism of one day per participant.

Weight control

"Lighten Up", our weight control program, is run in a similar fashion. Last year it resulted in a collective weight loss of 990 pounds by 131 persons—an average of 7.6 pounds lost per participant. This program leads into an ongoing maintenance program—called "Lightened Up"—which helps participants maintain their new, lower body weight. Through "Lightened Up", the group has sustained an additional average per-person weight loss of 3.6 pounds. The program teaches participants how to maintain a nutritious, calorie-conscious pattern of food selection, preparation and consumption.

Through these programs, participants are improving not only their self-image, but also their health. Providing these psychological and physical benefits to employees costs approximately $80 in staff time per participant.

There was an immediate benefit for the company as well: Metropolitan's fitness program in the Canadian Head Office—which included weight control, exercise and instruction on good nutrition—resulted in an average reduction in absenteeism of one day per participant.

Stress management

One worksite program whose benefits are harder to itemize is stress management. Yet those benefits are undeniable.

Chronic stress is a significant risk factor associated with many chronic diseases. It may eventually lead to permanently elevated blood pressure and then to arteriosclerosis and heat disease. The result can be markedly increased absenteeism, decreased job performance, disability or the employee's premature death. According to the National Heart, Lung and Blood Institute, arteriosclerosis is the underlying cause of approximately 85 percent of deaths from heart and vascular diseases.

The basic thrust of a worksite stress management program is to help employees reduce the negative effects of excess stress by using a variety of techniques. Participants in these programs first learn to identify major sources of distress at work. Then they learn to differentiate between those that can be changed and those that are beyond their control, but which require a modification in perception.

To help reduce stress, behavior modification and interpersonal communication skills are developed. Specifically, participants increase their ability to: set priorities and manage their time, deal with aggressive individuals, give and receive constructive criticism, conduct performance evaluations and make appropriate requests. By recognizing indicators of excessive stress, learning how to reduce the stress level, and improving interpersonal communication skills, the individual can better control stress in both work and social situations, and undoubtedly become more relaxed and more productive.

Perhaps the most convincing argument for "wellness" comes from Dr. Charles Berry, former chief medical director of the U.S. space program, and an advocate of worksite health education.

"We learned many lessons from manned spaceflight which we can apply to health promotion today," he said, " and one of the most important is that we cannot wait for all the data before we move ahead. We didn't have all the facts about the effects of spaceflight on humans...but had we waited to get these facts...we never would have reached the moon."□

A New Model for Employer-Provided Health Education Programs

O. B. Dickerson, M.D., M.P.H., and C. Mandelblit, M.A.

The most frequently recommended model for employer-provided health education programs includes (1) assessment of needs; (2) survey of interest; (3) development and implementation of a program based on the results of the needs assessment and the interest survey; and (4) evaluation of the results. This model requires a greater investment of time and resources than most organizations are willing to commit. As a result, many employers defer implementation until cost-effectiveness has been proved. For this reason, evaluation of the current model for health education programs and consideration of new approaches that appear to be more cost-effective are necessary.

An increasing number of employers are evaluating the potential benefits of preventive health programs. They are examining studies of the relationships of life-styles to chronic and life-shortening illnesses and of the potential benefits (Table 1) that can be achieved by intervening with health education programs.[1,2(pp 6-11)-5]

In view of this, it seems appropriate to ask why more employer-provided health education programs have not been implemented. One answer often given is that available data are insufficient to permit accurate predictions of the relationship between life-style and illnesses or longevity for specific individuals. Another possible deterrent is that data are not generally available on long-term adherence to changes made during work-site educational programs. The third and primary reason appears to be that it is difficult to predict the cost-effectiveness of health promotion programs and, as a result, management is reluctant to commit resources.[6,7]

In any organization, competition exists for available resources. Because of this competition, management establishes priorities focusing not only on employee morale and government regulations but also on potential cost-effectiveness.

From the International Business Machines Corporation (Dr. Dickerson, Corporate Director, Health and Safety; Mr. Mandelblit, Senior Advisor, Health Care Planning), Old Orchard Road, Armonk, NY 10504.

We believe that more employers would implement health education/promotion programs if they were relatively low in cost. However, the typical health promotion model is complex and requires long-term commitment of substantial resources. Since interest in preventive health programs is accelerating, we believe that it is important to evaluate the merits of the traditional model. We see a clear need to consider alternative models.

Health Education Models

Needs/Interest Assessment – A number of techniques can be used for determining employee needs and obtaining baseline data for future research. Surveys or health hazard appraisals can provide information on the demographic, life-style and disease characteristics of employees. Health information can be obtained from existing medical records or from measurements (e.g., of blood pressure, blood chemistries, and weight).

If resources are adequate or the population is small, gathering such information may be desirable, particularly if the employer wants to emphasize intervention efforts for high-risk employees. However, the health characteristics and needs of different employee populations are essentially the same. For instance, life-style characteristics such as smoking, overweight, excessive stress, and lack of exercise

Table 1 – Employer Preventive Health Programs Areas of Potential Improvements

Medical insurance
Life insurance
Long-term disability
Absenteeism
Productivity
Retraining
Business disruption
Workers compensation
Morale
Employee recruitment and retention
Community image

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can be found in all employee populations. Therefore, it appears reasonable for organizations to use available data on the U.S. population rather than to devote time and resources to an assessment of needs in their own employee population.[2(pp 53-56), 8]

Interest surveys can be used to predict participation in the program, to prioritize offerings or to determine the most desirable schedule times or locations. However, an interest survey may not provide an entirely reliable prediction of participation. Individual factors relating to personal commitments and motivation may not be measured adequately and might significantly impact participation.

To eliminate the effort required for interest surveys, consideration should be given to simply offering the program to employees and using actual enrollment as an indication of interest. Obviously, this practice cannot be employed if a considerable investment (i.e., facilities and staff) is required before offering the program, but it would be feasible for low-cost programs (e.g., a smoking cessation course).

Program Implemention – In implementing programs, management frequently is asked to provide indoor exercise facilities and to employ a full-time staff or hire consultants. We believe that providing exercise facilities and a dedicated staff for delivery of health education programs as well as personal counseling probably results in maximum participation and behavior change.

However, the required investment is more than many organizations are willing or able to make. Inhouse facilities and instructional capability are particularly costly for organizations with multiple and geographically dispersed facilities with small numbers of employees.

We have observed that community facilities and instructional capability often are not investigated as alternatives to inhouse facilities and staff. In our search we found many voluntary, educational, medical and commercial organizations with high-interest, experienced staffs and, in some instances, facilities that could be readily utilized. A number of these organizations are currently seeking opportunities to assist employers with health education/promotion programs. Use of such community capability reduces the need for employer resources and provides flexibility in reducing programs as needs decrease.

Evaluation of Results Achieved – Evaluation of results achieved by health enhancement efforts should be considered by organizations willing to devote substantial resources to their programs. Criteria that could be used are behavior modification; physiological changes; lowered absenteeism; reduced medical benefits usage; and increased productivity. Measurements of results are essential for the accurate determination of the cost benefits of specific programs. Also, they enable organizations to improve their programs as well as to justify their continuation or expansion.

Unfortunately, properly designed studies are costly and must be conducted over an extended period of time. In addition, many of the relevant data are difficult to obtain. Medical benefits data are difficult to obtain in the format required. Productivity measurements are complex and, for many jobs, unattainable. Absenteeism changes may relate to many factors. Other possible measures require a longitudinal study that may be beyond the needs of most organizations or the capability of their staffs. We believe that organizations with limited resources would benefit more by implementing programs than by conducting lengthy and difficult evaluation studies.

The IBM Health Education Program — "A Plan for Life"

Development of the Program – In 1978, IBM began an evaluation of its employee health programs. Among the programs established prior to that time were a voluntary multiphasic screening program for all employees, begun in 1968, and an alcohol and drug abuse program. In addition, special health screening (e.g., hypertension) or health education efforts (e.g., breast cancer) had been conducted periodically at a number of major facilities and outdoor recreational/fitness facilities had been constructed at major locations. Comprehensive medical, psychiatric and dental benefits were provided, without cost to employees, and the company's comprehensive occupational safety and health program had been continuously improved. The components of IBM's health program are shown in Table 2.

The evaluation of IBM's health programs in 1978 was stimulated by management's growing concern about rapidly rising medical costs; by increasing evidence that life-style factors influence health; and by greater employee interest in healthy life-styles. A review of available data on health education/promotion programs resulted in our conclusion that there was no "compelling" proof that such efforts were cost-effective. On the other hand, data developed or reported by the Surgeon General, the Framingham study, the American Health Foundation and other institutions provided substantial evidence that certain life-style factors could result in illness, and therefore cause increased absenteeism and medical benefits costs, as well as losses in productivity.[2-4] On the basis of these data, we concluded that there was good business justification for assisting employees and their families in developing healthier life-styles and IBM decided to offer a comprehensive health education/promotion program. The subjects covered are listed in Table 3.

Needs Assessment – Since IBM employs a large number of people, it was assumed that they are representative of the general adult population in regard to life-style factors and chronic illnesses. Available data indicated that a substantial portion of the U.S. population has one or more health risk factors.[9] In addition, data accumulated from IBM's voluntary multiphasic screening program during a

Table 2 – Components of IBM's Health Programs

Health education
Voluntary multiphasic screening
Substance abuse assistance
Recreational/fitness facilities at major locations
Nutrition guideline for cafeteria managers
Smoking guidelines for managers
Comprehensive medical, psychiatric and dental benefits
Comprehensive occupational health monitoring and safety programs

Table 3 – IBM Health Education Program Course Subjects

Exercise
Smoking
Weight
Stress
Healthy back
First aid
CPR
Nutrition
Risk factors
Driver safety

period of 10 years supported the conclusion that needs existed.

Interest Assessment – A pilot program was conducted at five locations during the spring of 1980 to test both interest and administrative feasibility. Table 4 provides summary data on the pilot program.

Participation levels were higher than anticipated and the program was found to be administratively feasible. We decided, therefore, to implement it nationwide.

Program Implementation – Specific operational goals were established for the IBM Health Education Program called "A Plan for Life." The primary goal was to offer the program to employees at all IBM locations simultaneously. Employees' spouses and dependent children, 15 years of age and over, and retirees and their spouses were invited to participate. Because IBM employs more than 200,000 individuals in the United States at more than 300 locations, this goal had a significant impact on program planning and implementation. The operational principles used in designing the program are listed in Table 5.

The key to offering a program nationwide was to identify facilities and instructional resources in communities in which IBM has offices. Use of YMCAs was explored and it was found that their branches were located near IBM offices. Of greater importance, YMCAs provided expertise for conducting numerous health-related courses and in many locations, were willing to coordinate a total education program, making the necessary contacts with other organizations and with individuals to arrange for instructors. Therefore, YMCAs became the focal point for implementing the health education program. However, many other organizations provided assistance. These included YWCAs, YM-YWHAs, the American Lung Association, the American Red Cross and local hospitals and educational institutions.

Table 4 – Pilot Program: Enrollment Data – by Location

Location	No. of Eligible Employees	No. of Individuals Enrolled*		Employees Enrolled as % of Eligible Employees
		Employees Enrolled	Family Members Enrolled	
A	650	137	59	21
B	460	144	80	31
C	190	47	25	25
D	6,500	581	326	9
E	1,500	213	62	14
Total	**9,300**	**1,122**	**552**	**12**

* Individuals who participated requested enrollment in an average of 2.6 courses

Table 5 – IBM Health Education Program Operational Principles

Provide comprehensive educational programs
Offer courses at all locations
Employees and families, retirees and spouses are eligible
Schedule before and after working hours
Obtain assistance of community agencies – YMCAs, Cancer Society, Heart Association, Lung Association, Red Cross, hospitals, colleges and commercial organizations
Use IBM and community facilities
Offer option of taking IBM scheduled courses, free of charge, or taking equivalent courses on tuition assistance basis
Offer courses as long as participation justifies continuing

Courses were scheduled before or after normal working hours and were conducted in IBM facilities, in the facilities of community organizations, or in rented space. Any course scheduled by IBM specifically for its employees and their families was paid for by the company. However, individuals also were permitted to enroll in courses provided by community or commercial organizations on a tuition-assistance basis. Maximum tuition-assistance amounts and eligibility criteria were established for each course.

Results Achieved – The IBM Health Education Program was launched at all U.S. locations in February, 1981. Participation data for 1981 are shown in Table 6.

In addition to smoking cessation courses, we offered employees copies of the American Lung Association's *Freedom From Smoking* manuals. About 27,000 employees requested copies of these manuals.

Table 6 – IBM Health Education Program: Results for 1981

No. of courses conducted	
Mini-courses	787
Comprehensive courses	1,343
Total enrollments	
Mini	16,471
Comprehensive	25,845
Tuition-assistance	2,000+
Distribution (%) of enrollment requests	
Employees	67
Spouses	29
Dependent children	3
Retirees and their spouses	1
Most popular courses	
Exercise	
Stress management	
CPR	
Weight reduction	

Early in 1982 a driver improvement course was added. As anticipated, enrollment was high in those states where insurance premium reductions or driver record point reductions are available to those who complete the National Safety Council's Defensive Driver Course or other approved courses. In addition, 45,000 employees requested a copy of the *Driver and Home Safety Manual* which was developed by the National Safety Council for IBM.

There are no current plans to study the permanence of behavior changes or the physiological changes resulting from the courses. It is assumed that the results will be comparable to those reported in published studies.[10,11] Even though these published studies indicate there has been only modest success in achieving permanent change, we believe that the cost-benefit relationship is satisfactory for a low-cost program. Of even greater importance is that employees, retirees and their families have had an opportunity to increase their knowledge and skills in areas that should help them lead healthier and more satisfying lives.

Conclusions

In an environment of competition for resources, employers must make difficult choices in allocating dollars for people-related programs. Although the traditional model for employer-provided preventive health programs may be justified, it appears that many organizations will defer such programs until more compelling data on cost-effectiveness become available. Under these circumstances, a low-cost model for preventive health programs deserves consideration. The model described utilizes existing data on needs, as well as on the results that can be achieved from such programs. It focuses limited company resources on the delivery of programs and utilizes existing community resources. This low-cost model does not result in maximum intervention. However, it should be considered by employers and health professionals interested in developing health education programs.

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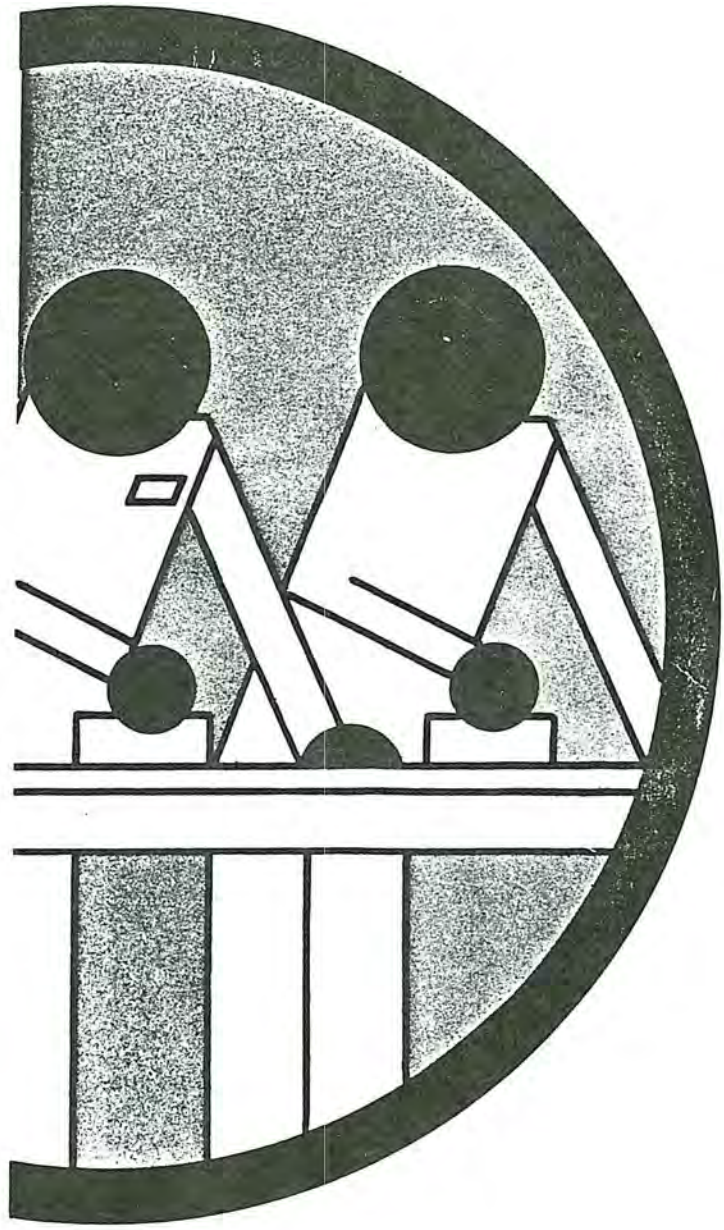
Training:

OSHA's New Frontier



'Training Is A Sound Investment, Especially for Small Employers'

by Francis X. Burkhardt

The Painters have one of the largest OSHA grants under the New Directions program, about $11 million divided among 82 successful proposals. It is not a story of grandiose munificence on the part of an over-endowed federal agency. Rather it is a story of seed money invested in the expanding compentency of a democratic organization. Given today's investment market, the many-fold return on this small investment would make any economist's mouth water. And it will continue to grow in the near future—and in the distant future, when the real investment payoff shows up in reduced cancer rates, fewer workers' compensation claims and increased worker productivity.

It's important to take the economic issues out of the short-range perspective and show why the New Directions Grants Program is one of the wisest investments in our nation's economy to be made with the taxpayer's dollar.

A conservative estimate by the National Institute for Occupational Safety and Health puts the cost of occupational diseases at $20 billion a year in workers' compensation, health care costs, lost wages and law suits. The cash cost of workplace accidents in 1977, according to the National Safety Council, was $20.9 billion in property damage, lost wages, insurance costs and workers' compensation payments. Painters and workers in allied trades are one-half of 1 percent of the workforce. So the industry's share of that $40.9 billion cost is at least $200 million a year. But, because ours is such a high-risk industry, the true cost of occupational diseases and accidents in our segment of the labor force is many times higher.

Workers' compensation insurance for some employers in our industry is running as much as 15 percent of labor costs. The insurance companies know why: because painters rank among the top five trades in workers' compensation payments; because painters and their allied trades are 3 to 5 times more likely to develop lung cancer; because a painter's life expectancy is 11 years below the national average.

Why? Because our industry, which is essentially a chemical industry, combines exposures to thousands of exotic, highly toxic and inebriating substances with work at heights on scaffolds, ladders, tanks, platforms, bridges, spiders, bosun's chairs and man-lifts.

Faced with this combination of hazards in both health and safety, Painters' President S. Frank Raftery in the late 1960s won agreement among management, scientific and government representatives to form a health-safety committee in the painting industry, with the committee meeting twice a year ever since.

Through this committee, the Painters came to Dr. Irving J. Selikoff of the Mount Sinai School of Medicine, the scientist most responsible for uncovering and calling attention to the epidemic of cancer and asbestosis caused by inhalation of asbestos.

Our work with Dr. Selikoff resulted in one of our most consequential experiences with the rewards of worker education. Dr. Selikoff taught 2,000 drywall tapers in New York City about the effects of inhaling their drywall compounds, which then contained asbestos. Once informed of the hazard, the tapers were able to make demands for the removal of the asbestos. Manufacturers first insisted that the asbestos could not come out. But as word spread that union tapers across the United States would refuse to work with asbestos-containing spackle, the manufacturers soon found ways. Fiberglass and other non-carcinogens were substituted, or the spackle was pre-mixed to eliminate the mixing process where most exposure occurred. Incidentally, pre-mixed spackle was also found to increase productivity.

Without these efforts, the health picture of drywall tapers now, some 10 years later, would be starting to look much grimmer—and much, much more expensive. Consider the death of a single drywall taper, a member of the IBPAT, who had worked for eight years with asbestos-containing drywall spackle. Six months and $36,000 worth of medical bills later, he dies. Total compensation received was less than $10,000. Who pays the other $26,000? Multiply this times the estimated 3.5 million asbestos-exposed workers who may die in the next 10 to 15 years. The cost is in the billions.

In our drywall taping example, an estimated 300,000 to 400,000 workers, including carpenters, floorcoverers, painters, glaziers and many others, are

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now protected from asbestos exposure—not to mention millions of homeowners and office workers. There is definitely an epidemic of harms caused by asbestos exposure, but it is not quite as great as it would have been without worker education.

This is a success story, but our National Joint Health and Safety Committee knew then, as it knows now, that drywall taping is only one trade and asbestos is only one substance. Hundreds of thousands of other workers and thousands of other paint trade substances needed similar attention: cancer-causing chromates, acrylonitrile, benzene, carbon tetrachloride; sensitizing coal tars, epoxies and isocyanates—the list is long. And this is in an industry with a worker population with 30 percent chronic bronchitis; 84 percent neurotoxic symptoms; cancers of the skin, lungs, kidneys, liver, colon, stomach; strippers which melt the membranes of the brain and central nervous system; silicosis from silica exposures; and heart problems from carbon monoxide and methylene chloride. You can add falls off scaffolds by solvent-intoxicated painters, the back injuries among floorcoverers and paint makers and the tank painters who entered confined spaces wearing dust mask respirators because neither they nor their employers knew any better.

All clamored for attention.

In 1975 Dr. Selikoff's NIOSH-funded clinical investigation of 2,000 IBPAT members confirmed what many of us had long suspected. But back in 1975, there was no OSHA New Directions Grants Program and the newly emerging health and safety information was often too technical and massive for wholesale adoption into our apprenticeship program. The contractors of the painting industry were in no better position.

So the IBPAT submitted an unsolicited proposal to the Occupational Safety and Health Administration asking for $200,000 to train 25,000 workers in the recognition and avoidance of health and safety hazards. Many in OSHA recognized the importance of the proposal, but OSHA had no infrastructure in place for evaluating and responding to it. As a result, it was passed around through channels for more than a year while our health and safety committee proceeded in frustration, knowing the modesty of its accomplishments.

Finally, in January 1977, OSHA awarded IBPAT a training contract for $143,000. The dam burst, the logjam exploded, the Painters' OSHA Project was born—and its work was cut out for it.

The role of the Painters' OSHA Project is essentially one of education and training. But the spinoffs and payoffs are much larger than that. Re-funded every year in varying amounts, the OSHA Project has grown from its ongoing development and delivery of training materials to include technical assistance to members, affiliates, medical students, attorneys, contractors, manufacturers and many, many others. Its role now includes coordination of special medical screening and hazard controls which are not funded by the project but which would not be feasible, even though the funding is available, without the guidance of the OSHA Project and the technical and financial resources of the New Directions Grant Program.

Spinoffs of the OSHA Project are numerous. The project stretches its modest budget wherever possible through arrangements with private companies. For example, the 3-M Company of St. Paul, Minn., spent $25,000 for production of 10 respirator selection videotape modules from scripts prepared by the project staff.

The Johns Hopkins University School of Hygiene and Public Health, currently conducting an epidemiological study of the paint trades, was able to obtain jobsite locations through the Painters' OSHA Project. The study in turn will feed the informational resources of the project.

In cooperation with Dr. Richard Moriarty of the National Poison Center, the project printed and distributed thousands of "Airless Spray, Water or Abrasive Blast Wound Medical Alert" cards for painters and sandblasters to present to physicians in the event of an injury in order to prevent possible amputations. The cost of this service was about $300.

Today, many political leaders express the wish that workers and employers assume more solo responsibility for achievement of safe and healthful workplaces. This may not be feasible even in capital-intensive manufacturing industries with permanent workplaces. And it is absolutely impossible in the labor-intensive, highly competitive and transient construction industry where employers themselves are as ignorant of health and safety hazards as the workers for whose lives they are responsible.

It makes no sense economically to force small employers to have to research, design and develop their own independent training programs—all of which together will cost many times what our project costs—with inevitably lower quality. Employers support the Painters' OSHA Project training because they know it was developed with management cooperation, and they know it's first-rate—beyond anything they could each do on his own.

The other OSHA projects fill a similar role in other industries. And there should be many more such projects because the economic efficiency of this approach is beyond dispute.

Health Hazard Surveillance by Industrial Workers

DAVID H. WEGMAN, MD
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CHARLES LEVENSTEIN, BA

A project to train industrial workers in the detection, reporting, and correction of hazards in their working environment is described.

> "It is the tragedy of today that man is so indifferent to the life of man. Yes, we surround the babe unborn with premonitory protection, deal wisely and gently with infancy and childhood, and then hurl the product of a reasonably healthy youth into a maelstrom of blind chances, of dust, fumes, and fatigue, which wear down the stoutest body and cripple the most willing worker."[1]

In March, 1970, Urban Planning Aid, Inc. (UPA), a nonprofit advocacy planning organization, decided it was important to extend its work to problems in the industrial environment and initiated the Occupational Health and Safety Project. UPA had been providing technical assistance to low income and working people in eastern Massachusetts who were confronting problems in housing and transportation. The target population of the new health and safety effort was ultimately the half million industrial workers in the area.

The project began with four goals in mind:

- Improving the working environment of people in Massachusetts,
- Promoting understanding and control of the working environment by rank-and-file workers,
- Providing them with access to professional expertise and technical information,
- Training interested workers, labor organizers, and members of local unions to enable them to undertake, for themselves, investigations of the problems of their working environment.

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Background

The problem of providing safe working conditions was originally addressed as purely one of preventive medicine. UPA quickly learned, however, that occupational health is as much an economic and political problem as it is a medical and technical one.

The principles of preventive medicine suggest that the best way to provide a healthy workplace is to eliminate worker exposure to hazardous conditions. This is best done by building appropriate—and usually expensive—general and local engineering controls. UPA, however, has commonly observed that much the more common practice is the introduction of stopgap measures subsequent to injury or illness, because they are less expensive as a direct cost to the company, therefore in economic terms more attractive to management.

Two examples of situations in which UPA was involved illustrate this economic dilemma.

A major producer of detergents has a plant near Boston where a number of workers developed serious lung and skin ailments. The workers believed, and subsequently independent investigators confirmed, that these complaints resulted from contact with enzyme additives in the detergents they were processing. The company had introduced enzymes into their product to capture a larger portion of the potential market and thus increase its profits. Elsewhere this innovation was an outstanding success by economic standards. For example, within 6 months of introducing an enzyme detergent in Britain, a producer was able to capture 25 per cent of the washing powder market and displace the brand which had been on top for about 20 years.[2] According to *Consumer Reports*, however, enzymes have only a marginal impact, if any, on removing stains.[3] Workers' health was thus potentially seriously affected as a

result of the economic drive of the company to increase revenues without proper concern for the increased health hazards to their employees—and without benefit to consumers.

In another plant near Boston, mercury is used in the manufacture of fluorescent lamps. The company had never given adequate attention to controlling exposure to mercury but concentrated on worker education. Nevertheless, on numerous occasions urine mercury levels exceeded acceptable limits meaning that workers had been subjected to conditions which could cause irreparable damage to their health. It has been demonstrated time and again that depending on worker education alone is not adequate, particularly when the recommended measures involve personal discomfort. Although some protective measures had been introduced, the installation of a planned comprehensive ventilation and control system could have reduced the danger to workers—but it would also have required a significant investment by the company.

Management's drive for increasing profits and minimizing costs in both situations shows how economic pressure works to shortchange workers' health. But the drive for profit is central to the dynamics of this country's economic system. It follows that constant vigilance, in addition to professional guidance, is required to safeguard the health of American workers.

Generally it has been thought that the necessary vigilance is provided by state and federal regulatory agencies. However, the UPA project staff discovered serious shortcomings in these agencies. While it is not our intent in this article to review government activities, we should like to cite two studies which indicate the inadequacies of present public policy, in one state and in the nation.

UPA's critique[4] of the control program in Massachusetts as it appeared in early 1972 reveals the failures of a relatively progressive state. The state program does not provide for posting of the appropriate law or information concerning violations. The state generally does not provide for workers to accompany inspectors and the workers are generally not informed of excessive exposures. They obtain final reports of inspections only with great difficulty. The state program relies on voluntary compliance rather than strong enforcement measures. Rarely are violations prosecuted, fines are small ($50 to $100), and although orders are issued, follow-up is generally inadequate. As a result, companies have little incentive to correct violations and workers have come to feel that nothing can be done to improve their conditions.

Nationally the picture is a little different. Given the widely recognized inadequacies of state programs, Congress enacted the Occupational Safety and Health Act of 1970. After 18 months, a Nader Task Force on Job Health and Safety reviewed OSHA operations in a recent report.[5] In addition to citing hopeless undermanning of OSHA's inspection staff and failure of the agency to cultivate trade union involvement in policing the work environment, the task force stated that:

> "... the Department has consistently stretched its interpretation of [The Act] to the furthest limits of its language and legislative history in order to avoid imposing strict immediate requirements upon employers and the states .... In addition, the Department has followed the practice of retaining, in regulations promoted by OSHA, as much discretion as possible in the Secretary of Labor .... A subsection of the penalty section of the Act specifically sets a mandatory fine of up to $10,000 for an employer's failure to post whatever information is required to be posted by the Act and regulations issued thereunder. But in all its regulations on posting, the Department has steadfastly refused to cite this specific subsection, thus intimating that it considers fines for posting violations discretionary."

These examples suggest that the components of an effective occupational health and safety program must include not only application of the practice of preventive medicine, but also consideration of the serious economic pressures within industry and the need to develop controls which do not rely solely on governmental regulation.

The Project Program

Recognizing these inadequacies, UPA looked at occupational health from the worker's point of view. It promptly became apparent that while many workers are deeply concerned about their health and are aware of workplace hazards, they believe that they can do little to change things. By and large workers have not seen the way to use traditional means of grievances, collective bargaining, publicity, organizing, and ultimately strikes to improve their work environment. UPA, therefore, started a training program focused on giving workers new skills which could be applied to solve problems by methods familiar to them.

The project's initial effort was with a large local electrical workers union of about 10,000 members. Several approaches were followed simultaneously: (1) meetings were held with the union officials and a special union committee for occupational health and safety was established; (2) materials describing health hazards, surveillance, and applicable state and federal law were included in the union shop steward training program; (3) special hearings were held for all three shifts to allow individual workers to testify as to the problems they believed they faced; and (4) a reporting system for occupational health problems was instituted on a limited experimental basis.

These programs led to the development of a multifaceted approach for this union and provided UPA with experience for designing programs to fit the needs of a variety of different sized unions working in a variety of industrial settings. At the end of 2 years the UPA staff was assisting over 20 local unions, including workers in steel, clothing manufacture, auto assembly and parts production, electrical equipment manufacture, machinery production, lamp production, asbestos products fabrication, tunnel construction, industrial painting, and meat packing.

The programs for each local needed to be individually tailored and in many instances were quite different. Yet one basic theme was included in all: training industrial

workers as their own on-the-job inspectors. In each instance the program was designed to inform and educate rank-and-file and lower level union leadership. The components included:

- Training workers to identify specific occupational hazards and to use legal resources in having them corrected;
- Developing contact between workers and occupational health specialists;
- Stimulating understanding of and interest in job health by helping workers write leaflets and hazard information sheets;
- Setting up accident and health hazard reporting systems;
- Facilitating links among union or worker groups facing similar problems.

The Project Experience

Worker Training

Workers have often been led to believe that they are not competent to discuss their job health conditions, that only experts such as the company doctor, hygienist, or safety director are qualified to deal with health problems. This belief alone has stopped many of them from taking positive action to correct long-standing hazards.

The UPA experience has shown that a minimal amount of outside support can dramatically change this situation. Classes for rank-and-file unionists have successfully introduced them to their legal rights, some general medical principles and engineering practices, and tactical considerations for producing change. Even though courses were rarely more than 8 hr long, course members initiated significant improvements in working conditions while still enrolled. Between weekly sessions in one training course, two ice cream plant employees walked around the plant making notes on what they thought could be dangerous. The management was confronted with this list and an agreement was reached to correct many of the cited hazards, including a long-standing noise problem. These workers had only had a 2-hr introduction to occupational health and safety before undertaking the survey.

Changes like this come about partly through education and partly through the increased confidence and sense of legitimacy course graduates have. This confidence is often most useful when improvement of health conditions is translated into economic terms. In a clock manufacturing plant workers were told that it was impossible to reduce the noise level of some screw machines. In their training, however, they had learned about threshold limit values for noise and control priorities. Subsequently, the workers learned that the company had experimented with plastic-coated gears but, although less noisy they had to be replaced more frequently than the old ones. When the workers pressed the matter of the health hazard, the issue was converted from one of feasibility to one of cost. Workers felt competent to raise it as a bargainable demand.

Another example of the value of short, concise courses occurred during a different training program. In this instance noise measurement and control was the subject of a 2-hr session. Following the session, two workers asked to borrow the noise meter available from UPA. They performed a quick, walk-through survey of a screw machine room the next day. The results of the survey were presented to the management and demands were made for immediate improvements. By the end of the week the three noisiest machines were repaired and arrangements had been made to provide for a preventive maintenance program.

Contact between Workers and Specialists

Another aim of UPA training has been to open up avenues of discussion between workers and occupational health specialists. Previously the only advice often available to workers has been from company sources.

In a gear manufacturing plant a number of workers tending automatic screw machines developed dermatitis which they had been led to believe was attributable to individual allergy. With the help of the UPA staff, the workers reviewed the situation and remembered that the cutting oil they were using had recently been changed. They submitted a grievance, the new cutting oil was replaced, and the dermatitis disappeared.

The contact between workers and experts has not only enabled workers to understand their environment more clearly but has also enabled experts to gain new knowledge. In one asbestos products plant, a physician representing the workers was refused access to chest X-rays which the company had taken over a series of years. The union and physician decided to attempt measuring the severity of the health problem on the basis of lung function studies alone without a control population. They discovered that new methods of statistical analysis of this kind of data could demonstrate the severity of the problem.[6] Thus, the feasibility of studying occupational lung disease with the cooperation of workers alone was shown. In addition, this evidence supported the union in its continuing effort for control of asbestos exposure.

Helping Workers Educate Each Other

Often a plant survey will uncover a condition which was not previously known to be dangerous. UPA has encouraged workers to inform their fellows about the nature of these problems. This heightens people's awareness of their working conditions and increases the support of those actively campaigning to control the hazard. In one case, workers who were relining brake drums were handed a flyer by their local union. The flyer, prepared with the assistance of UPA, told them of the potential dangers of the asbestos they were working with. The union members' strong reaction led to serious labor-management discussions resulting in institution of appropriate controls.

Sometimes worker surveillance becomes more effective over time without the use of substantial outside resources. Those who have been involved in attempting to control one hazard are more likely to guard against similar hazards in the future. In some instances worker knowledge of

resources has made them better able to use outside guidance. The local union in the soap and detergent industry, when faced with the health hazard described earlier when enzyme detergents were introduced, learned to use local occupational health resources and to be on their guard against other potentially harmful substances. Thus, when plans were recently made to experiment with a new detergent additive, they immediately sought information concerning the potential human health hazard of the material.

Reporting Systems

One of UPA's first projects was the development of a dual reporting system. Union stewards were asked to report hazards and injuries to a union safety committee. At the same time a system was devised so that the stewards received prompt replies to requests for information on health hazards. In one instance, the workers learned that they were working with a highly combustible solvent and that its replacement was feasible; they promptly submitted a grievance on the matter and a change in solvents was instituted.

The health hazard report forms became especially valuable when there were a series of reports on the same hazard. In this way, for example, the union was able to identify an important overhead crane operation hazard on a plantwide basis and to insist that the problem be corrected in all places at once.

The accident reports provided the union with its own record of accidents, not subject to the usual limitation in industry where only accidents involving "lost time" are reported but based rather on medical severity. These reports assisted in locating many more problems than did traditional reporting and provided a basis for demanding change to prevent recurrence. The reports alerted the workers to their own carelessness by helping them analyze the causes of the accidents. Lastly, the records provided the union with an important cumulative record for use in subsequent negotiations with management.

Inter-union Links

A knowledgeable worker who is not an expert can communicate very effectively with other workers, so UPA has tried to help workers in Massachusetts share their experiences whenever possible. Workers with similar problems have participated together in training sessions, sometimes led by those with more experience. Participants gain confidence when they learn that people like themselves have actually achieved more healthful working conditions.

Role of the Health Professional

In order for workers to police their environment they need information, education, and training that is presently the province of health professionals. The kind of technical assistance operation maintained by the project described in this paper is one way in which that knowledge can be dispensed to workers who need it. The newly formed Alice Hamilton Institute in Boston proposes to extend that model by providing a 9-month nonresidential training instituted for workers, thus developing on-the-job health and safety specialists capable of aiding and mobilizing their fellow workers to deal with industrial hazards.

Health professionals should develop many more ways to assist working people in their efforts to maintain their health. They should seek out working groups in need of aid and provide their skills and knowledge in appropriate ways.

Professionals working for state and federal agencies should take advantage of the new law to talk to workers—and to report back to them the findings. Inspectors should be ruled by professional—and humane—standards, not by the economic concerns of corporations.

Health professionals involved in medical care delivery should search for ways to detect and prevent occupational disease. Where screening procedures can be shown to be sensitive and reliable it would be best to apply them in a sufficiently homogeneous sample as is found in industry to be able to identify specific exposures. In this way a danger may be predicted and workers protected.

Researchers should set a priority on studying the chronic effects of toxic agents. There is a critical need for epidemiological studies on human beings since approximately two-thirds of the current threshold limit values are based on animal studies alone.

Finally, there are all too few professionals being prepared in the field of occupational health and concerted study must be given as to how to improve recruiting to this important field.

Conclusion

Current activity to provide a work environment free from disease and injury is directly in line with the wide range of battles in which working people have engaged over the past 100 to 150 years for decent, healthful conditions of labor. Through trade unions they have applied economic pressure to gain specific health and safety clauses in collective bargaining contracts as well as shorter hours and grievance systems. And through political activity, factory and mine inspection and safety laws, child labor laws, and workmen's compensation laws have been won.

Despite these hard-won reforms, the problem endures. In recent times the number of workers injured each year is over 8,000,000, the number killed over 14,000. And these are conservative figures, not including an unknown number of victims of long term industrial disease. It is singularly revealing that no estimate of industrial disease deaths has been made.

It is clear that there is still need for political action to improve both the legislation designed to protect workers' health and its enforcement. But a more basic approach is also necessary, one that relies not on the vagaries of political compromise or the goodwill of the appropriate bureaucrats, but rather on the people most directly affected by industrial hazards. Workers themselves must have a far greater measure of control over the conditions under which

they work if hazards in the work environment are to be eliminated. The Occupational Health and Safety Project's experience has indicated that health professionals' assistance to workers can make a valuable contribution to the achievement of this goal.

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A Hospital-Based Occupational Health Service

Robert J. McCunney, M.D., M.P.H.

Responding to the local business community, Sturdy Memorial Hospital developed an occupational health service. Situated about 35 miles south of Boston, Attleboro has a population of 130,000, with jewelry, chemicals, and light manufacturing as its predominant industries. Featuring plant visits by a medical director with specialty training in occupational and internal medicine, the program provides clinical, ancillary, consultative, educational, and a variety of special services. Clinical services include preplacement examinations and treatment of work-related injuries. Ancillary services are audiometric testing, pulmonary function testing, and screening for heavy-metal exposures. Among the consultative services are evaluations as to whether a disease is work related; counseling on the reproductive hazards in the workplace; and disability evaluations. Work-site visits are conducted by an occupational health nurse who participates in medical surveillance and health promotion programs. Within two years the service has become affiliated with more than 60 firms on a noncontractual, fee-for-service basis. Economic self-sufficiency was established within 18 months of the institution of clinical services.

Sturdy Memorial Hospital is a 209-bed community hospital, situated in Attleboro, Mass., about 30 miles south of Boston. Serving a population in excess of 130,000 in an area that includes a wide variety of small industries, the hospital developed a community occupational health service in 1981. Within a two-year period, the new department established a relationship with more than 60 firms by providing a wide range of occupational health services. The purpose of this report is to trace its development and implementation and to describe the types of services.

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Background

The suggestion that a hospital develop an occupational health service originated with the medical director of a local manufacturing company. Claiming that small industries needed medical support to comply with the Occupational Safety and Health Administration's (OSHA) and other federal regulations, he contacted the hospital administrator, who presented the proposal to the chairman of the board of managers. The chairman, an owner of a local tool and die company, had long recognized the need for quality medical care for his employees.

Eventually, a meeting was held to which local business and community leaders were invited. Guest speakers included the medical director of a major workers' compensation carrier, the medical director of the above-mentioned firm, and a well-known consultant in occupational health and safety. At the meeting, some of the services that an occupational health service might provide were discussed; participants were later asked to complete a questionnaire indicating their level of interest in such a program. Of 53 firms represented, 45 supported the concept; with this level of encouragement, the hospital formed a committee to investigate a site for the future department and to select a medical director.

A few years previously, the hospital had closed a three-year training program for registered nurses. The first floor of the three-story dormitory had recently been renovated for an admitting section; the second floor was chosen as the site for the occupational health service. Decisions regarding equipment, staffing, and services were left to the discretion of the future medical director, for whom a search was being conducted.

Strong emphasis was placed on the selection of a physician with specialty training in occupational medicine. It was recognized that there was a need for an individual with this level of expertise, due to the wide diversity of industries, namely, jewelry, chemical, and light manufacturing.

In August, 1981, a physician who had completed residency training in internal medicine and a fellowship in occupational medicine assumed directorship of the program. An initial two-month period was necessary to reno-

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vate the facilities, prepare brochures, forms, and promotional literature, and plan for an opening seminar. Initial staffing included an administrative assistant, who had experience with the hospital's public information department. During this implementation phase, weekly meetings were held to chart progress and design policy as well as to meet with prospective clients.

Since the administrator foresaw the new program as a potential threat to the hospital medical staff, the medical director met with key department heads to discuss the role of the service. It was agreed that the physician and program would function in a *consultant* capacity and that medical conditions requiring long-term management would be referred to the attending staff. The medical director was granted consulting privileges in occupational medicine and was asked to discuss asbestos-related disease at a combined medical-surgical staff meeting. In addition, a letter that described the new program was sent to all active members of the medical staff; physicians were queried as to whether their practices were open to new patients.

Opening Seminar

The efforts of the first two months were directed toward an opening seminar to which more than 300 potential clients were invited. Representatives of about 35 firms attended to hear the medical director discuss the new role of occupational medicine and outline the services that would be provided. Nearly all of those in attendance requested a plant visit by the occupational physician.

For interested firms, an initial plant visit is suggested, during which the medical director meets with designated representatives of the organization to discuss particular health and safety needs. There is no charge for this visit. Following the discussion, the medical director conducts a walk through the plant to assess any health and safety concerns that have been brought up at the earlier meeting. Common concerns are citations by OSHA, recent outbreak of illness in a certain department, or rising workers' compensation costs.

Following the meeting, a letter is sent outlining the proposed services, which are provided on a fee-for-service, noncontractual basis. The types of services provided have evolved over the past two years. More than 90% of the firms in the service area of the hospital have 100 or fewer employees and the focus of the program was directed to these industries, since they lack the employee base to justify an in-house nurse or physician. The concept pursued was that a hospital could provide needed services if businesses used the occupational health service in a consortium-like fashion.

Services Provided

Consistent with a comprehensive occupational health service, clinical, ancillary, consultative, educational, and special services are provided.

Clinical – The main clinical services include preplacement examinations and treatment of minor work-related injuries (Table). Although the new department is on the second floor adjacent to the emergency room, it was decided to offer *priority treatment of work-related accidents* for employees of participating firms. Employees present to a central registration desk and when recognized as members of a client firm are directed to occupational health and by pass potentially long waits in the emergency room. After treatment, the patient is given a form, listing diagnosis, treatment, and expected time of return to work. The firm is provided the same information (Fig. 1). The preplacement examination is directed toward the suitability of the employee performing the job in question. Depending on the requirements of the work environment, as determined by the medical director during a plant visit, a number of ancillary studies are performed. Only medical information that pertains to performing the job is released, ensuring confidentiality between the patient and physician (Fig. 2).

Since it is estimated that about half the work force lacks

Occupational Health Service: Categories of Services

Clinical Services
- Preplacement examinations
- Treatment of work-related injuries
- Health assessments
- Respirator clearance
- Back-to-work examinations

Ancillary Services
- Audiometric testing
- Pulmonary function screening
- Screening for heavy-metal exposures
- Influenza immunizations
- Industrial hygiene

Consultative Services
- Work-relatedness of disease
- Occupational medical consultations
- Disability evaluations
- Clearance for employee assistance programs

Educational Services
- Cardiopulmonary resuscitation training
- Back school
- First-aid training
- Seminars
- Medical elective for house staff and students

Special Services
- Epidemiological studies
- Health hazard evaluations
- Professional

Health Promotion Activities
- Smoking cessation
- Screening
  - Hypertension
  - Cancer
  - Health risk appraisal
- Fitness
- Stress management
- Weight reduction

STURDY MEMORIAL HOSPITAL

Occupational Health Service

DATE: _____

TO: _____

RE: _____

_____ was seen at the Occupational Health Service on _____

DIAGNOSIS: _____

TREATMENT: _____

_____

_____

EMPLOYABILITY: _____ May return to work today

_____ Cannot return to work until _____

_____ Work Limitations: _____

_____

_____

FOLLOW-UP VISIT: _____ DATE: _____ TIME: _____

PHYSICIAN: _____

LOCATION: _____

_____
Attending Physician's Signature

AUTHORIZATION FOR MEDICAL TREATMENT

I hereby authorize the Physician or health care professional in charge of my case to administer any treatment and perform such delivery as may be deemed necessary and advisable in the diagnosis and treatment of my case.

_____ _____
Signature Date

Fig. 1

a primary physician, the occupational health service occasionally evaluates illnesses that are not work related. This involves initial diagnosis and treatment of minor health conditions such as influenza, upper respiratory tract infections, and minor rashes. Conditions requiring long-term care, such as admission for transient ischemic attack, hypertension, herniated disk, and hydrocele, are referred to the medical staff in a rotating fashion similar to that followed by the emergency department.

Other clinical services include "back-to-work" examinations following a major illness or injury, for example, of a material handler who suffered a brachial plexus injury.

In a metal refining firm, a safety director noted that a number of laboratory workers exposed to platinum had developed asthma-like symptoms. Eventually, it was learned that atopic individuals have markedly increased risks of developing type I allergic disorders from exposure to platinum salts. Consequently, allergy scratch testing was advised to screen for atopic status to properly advise employees of the health risks in assuming the particular position. The screening was conducted for proper job placement and was not used to discriminate prior to employment. Respirator examinations, in conjunction with the National Institute for Occupational Safety and Health's (NIOSH) guidelines, are also conducted.

Ancillary — To assist in compliance of federal regulations with respect to hazards such as noise, dust, and heavy-metal exposure, a variety of medical surveillance programs are conducted (Table).

Audiometric Testing — When it has been determined that a firm's noise level exceeds allowable levels, individuals who work in the particular departments are referred for an

TO: _____

_____ was examined at the

(Name)

Occupational Health Service of Sturdy Memorial Hospital on

_____.

(Date)

CLASSIFICATION: _____

OTHER TESTS PERFORMED: _____

_____ _____

(Examiner's Signature) (Date)

Classification

A The individual is in apparent good health and is physically able to perform the job requirements.

B The individual has a health condition which is amenable to treatment and will not affect ability to perform the job.

C The individual has permanent disability which will not affect ability to perform the job.

D The individual has a permanent disability which will necessitate modification of job requirements.

E The individual does not appear suitable for the particular job requirements because of potential danger to self or others.

Test Abbreviations

AUD Audiometric Testing

EKG Electrocardiogram

PFT Pulmonary Function Test

Fig. 2

audiogram. A health history is conducted by a registered nurse, who then examines the ears and conducts a pure-tone hearing test. Instruction in the proper use of hearing protectors follows. At times, a short film is shown to small groups of employees. A letter is then sent to both employee and employer, summarizing the results with recommendations for appropriate follow-up.

Although most firms have noise measurements conducted by insurance carriers, the hospital safety director is trained to conduct reliable measurements, having completed a three-day seminar on the new OSHA regulation. A noise level meter and personal dosimeter were purchased by the department.

Pulmonary Function Testing – Many participating industries, in particular the costume jewelry industry, use dusts such as silica and talc. Testing is done as part of preplacement examinations as well as on-site, administered by a nurse. Results are forwarded to employees and to supervisors, with recommendations for follow-up as needed. A Collins survey spirometer with a microprocessor is used.

Work-site biological monitoring has been conducted on company location for a semiconductor industry and a heavy-metal refinery. In addition, work-site influenza vaccinations have been administered to large groups of employees.

Consultative – Patients have been referred for consultations as to whether a disease is work related (Table). Examples include a welder with frequent lung infections, a laborer who developed transient hypertension secondary to exposure to dimethylformamide, and a woman contemplating pregnancy who was exposed to methylmethacrylate.

Occasionally, the emergency department treats acute occupational illnesses in patients from nonparticipating firms. As a result, some of these patients have been referred to the occupational health service. Examples include

cyanide exposure and occupational asthma resulting from exposure to toluene diisocyanate.

Insurance carriers have also referred patients for disability evaluations. Where necessary, employees have received "medical clearance" prior to referral to an employee assistance program directed by an independent organization.

Educational – A number of educational programs have been developed, generally in response to specific requests (Table). Two popular programs have been training in cardiopulmonary resuscitation and first aid. Both courses are offered on company location and at the hospital, and are directed by the occupational nurse.

Although the neighboring Red Cross Association had long conducted first-aid training courses, the program had not been directed toward particular problems of the industrial environment. In a number of firms, questions had been raised about the initial treatment of conditions such as burns, puncture wounds, and accidental exposure to cyanides, acids, and degreasing fluids. Consequently, the first-aid course was modified to include an additional two-hour session directed to the work site and a review by the occupational health nurse of the first-aid station and contents of the medical supply cabinet. Following completion of the course, individuals receive appropriate certification from the Red Cross.

In response to numerous requests for a preventive program designed to reduce the number of back injuries, a back school was developed by the medical director in conjunction with the hospital's chief physical therapist. The program is educational in scope and includes two 1½-hour sessions directed toward proper lifting techniques and back-strengthening exercises. The therapist also visits the work site to observe individuals during lifting operations and take photographic slides for a future presentation. Supervisors and employees usually participate, with emphasis directed to the role of supervisors in preventing back injuries. In addition, individuals who suffer chronic back strain are referred to a similar program that is held periodically at the hospital.

Special – A number of special services have been established, including educational seminars and a newsletter (Table). Seminars have focused on the OSHA hearing regulation, cancer screening in the workplace, and the new OSHA voluntary compliance program. Notice is given through the newsletter and all interested individuals are invited; there is no charge for seminars. Both regionally recognized experts and local specialists have been guest speakers.

A bimonthly newsletter edited and written by the medical director is sent to participating and nonparticipating firms, insurance carriers, and local business and employee groups. Topics include contemporary issues in occupational health and safety as well as a discussion of new services.

Due to the favorable exposure given to the department by the local newspaper, a number of requests for special services have been made. One situation involved a call to the department by an astute plant manager, who was concerned that employees in a particular department were suffering from headaches, light-headedness, and chest tightness. The medical director, nurse, and a medical student went to the plant to survey the work site and interview the affected employees; appropriate blood samples were drawn. Carboxyhemoglobin concentrations of the respective employees confirmed a diagnosis of carbon monoxide exposure. The search led to a faulty annealing oven with a defective ventilation system.

Another special service was generated when lead was found in the ventilation system of a local municipal building. After a work-site visit, it was learned that a practice firing range for policemen was present in the basement of the building. More than 50 employees filled out a health history questionnaire and about a dozen underwent physical examinations and other testing. A review of recent health hazard evaluations, conducted by NIOSH, supported the contention that inadequate ventilation can lead to systemic complaints such as fatigue, headache, and nasal congestion. The lead in the ventilation system proved to be a red herring since blood lead and air lead measurements were normal.

Another special service currently conducted by the department is an epidemiological investigation of testicular cancer. A staff urologist noted an increased number of testicular cancer cases in his practice over the preceding five years. Normally he treated one case per year, but over the preceding three or four years he had noted four or five cases per year. Medical records were reviewed by the medical director, who in turn submitted a proposal to the American Cancer Society for funding to study the problem. With the assistance of a graduate student at the Harvard School of Public Health, a case-control study is being conducted that has been expanded to include three neighboring hospitals.

Since most workers' compensation carriers conduct industrial hygiene surveys, it was decided that the department would not staff a hygienist. The hospital's safety director demonstrated a strong interest and facility for industrial hygiene and was encouraged to seek special training in the evaluation of noise levels. A portable instrument capable of analyzing for certain gases and vapors was also purchased.

Other services include presentations by the medical director on a variety of topics in occupational medicine to both medical and lay groups. Currently, an elective for senior medical students and medical residents is under development with Brown University School of Medicine.

Hospital Employee Health Service – Among the responsibilities of the new program was the administering of the hospital employee health service. Since Sturdy Memorial Hospital promotes the role of occupational health to its business community, it is appropriate that it should have a quality program of its own.

At the inception of the occupational health service, the hospital had been operating an employee health service for about 15 years under the direction of a physician from the medical staff (two to four hours weekly) and a registered nurse (25 hours weekly). Responsibilities included preplacement examinations, administering of tuberculin skin tests, immunization for influenza, processing of workers' compensation claims, and other administrative functions such as the membership on the safety committee and infection control committee.

The occupational health service assumed the responsibility for the employee health service. It was recognized, however, that the program needed review prior to implementation of new policies to take into consideration recent developments regarding the health hazards associated with hospital work. Some areas with potential risk to health, such as the operating rooms and maintenance areas, were investigated. Noise level measurements were conducted in areas with heavy machinery, operating rooms were assessed for ethylene oxide levels, and asbestos concentration was measured in areas with potential exposure to employees.

Clinical activities included treatment of work-related injuries, preplacement examinations and health assessments for minor episodic conditions, back-to-work examinations, and clearance for employee assistance programs.

A first-aid program, back school, and smoking cessation program were conducted by an occupational health service staff nurse, the chief physical therapist, and a member of the hospital auxillary, respectively.

Patient Activity

During the past year, 4,141 patients were treated by the staff of the occupational health service. Of these 1,217 were seen in the last quarter, representing an average of 96.5 patients per week, or 19.3 per day (compared with a similar quarter in the preceding year, the figure represents a 37% increase in patient activity).

Follow-up evaluations of injuries and illnesses accounted for the largest portion of activity (26.1%), followed by preplacement examinations (20.7%) and illnesses (17.9%). Work-related injuries comprised 15.4% of patient visits. Illnesses included both work-related and nonrelated conditions, with the majority of such patients lacking a primary physician.

Since the department's scope is consultative in nature, patients are often referred to the attending staff of Sturdy Memorial Hospital. Within the year, 115 referrals took place (an average of 2.2 per week). Physical therapy received 67 referrals for the evaluation and institution of treatment.

Only eight patients were admitted directly to the hospital from the occupational health service; reasons included chest pain, transient ischemic attacks, and severe wound infections.

Economics

At the insitution of the program, it was hoped that within two years the department would be self-sufficient, defined as able to meet monthly expenses by generating enough revenue to cover costs. Generally, *direct* revenue was raised through physician services, administration of ancillary tests, and consultative activities. The indirect revenue was raised through the utilization of hospital x-ray and laboratory facilities. From the 17th month onward, the department was able to meet direct costs through direct revenue. Revenue raised through ancillary services generally accounted for an additional 40% of direct revenue.

Marketing

Since a hospital-based occupational health service is a relatively new concept, marketing is essential for growth and development. The initial marketing effort was directed toward the opening seminar. Other *referral sources* for new clients have been physicians who have treated patients with occupational injuries and illness. Follow-up of these patients has often led to access to individuals at firms that deal with occupational safety issues. Workers' compensation carriers have also supported the program by encouraging their clients to seek the services available. Seminars, newsletters, and presentations have helped draw attention to the program. In addition, the local newspaper, through the public information department of the hospital, has written supportive articles about the new department.

Staff

The current staff includes the medical director, a full-time nurse practitioner, an administrative assistant, a medical assistant, and an occupational health nurse.

Equipment includes an audiometric booth, a spirometer, an electrocardiograph, and a computer terminal and printer for access to information on more than 1,000 chemicals.

Physical facilities include a reception area, office space for the nurse, administrative assistant, and nurse practitioner, two examining rooms, one treatment room for minor work-related injuries, and a testing room for audiometric evaluations and pulmonary function screening.

Problems

A hospital-based occupational health service is a relatively new and innovative form of health care delivery; consequently, services must be "sold." Only recently have various industrial firms sought out the services, after having been referred by satisified clients. A strong marketing program is a *sine qua non* of survival.

Resistance by the private practitioner of the medical staff can present impediments to the full development of the program. This potential problem was averted by having the new department provide *consultative* services and refer patients in need of hospitalization or long-term care to the attending staff, on a rotating basis. In addition, the medical director is an active member of the medical staff, but does not admit patients.

The equipment, personnel, renovations, and development time present an investment of some risk. It seems prudent to be realistic about the future self-sustaining nature of any hospital-based program. Sound feasibility studies that assess the level and type of industry, as well as the nature of neighboring competition, are essential.

SECTION III

OCCUPATIONAL SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

III. OCCUPATIONAL SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

Although occupational safety and industrial hygiene share the same basic goal of providing a safe and healthful workplace, they are distinctly different functions. The safety function focuses on the prevention or control of events leading to the loss of personnel, equipment and system function. Its goal is to minimize losses in the occupational setting subject to the limitations of resources which are available for the task. Since its goals are consistent with the operational goals of most companies, safety can be managed like other business functions in the organization. Line management performs the safety functions of hazard recognition, evaluation and control and is held accountable for safety within their areas of operation. The safety specialist provides consultative services to the line managers and is involved in the specification of new types of controls and personal protective equipment to reduce recognized hazards. To effectively coordinate safety activities through interactions with all levels of line management, the safety manager must possess extensive managerial skills in addition to a thorough knowledge of the technical aspects of safety.

The industrial hygiene function focuses on the recognition, evaluation and control of health hazards in the workplace. It is a highly technical function which requires a great deal of specialized knowledge and extensive training in the techniques required for measuring environmental conditions and monitoring worker performance. Because of its technical nature, it is difficult to measure performance in the area of health protection and thus difficult to hold line managers accountable for the effective execution of the industrial hygiene function in their areas of operation. It is also difficult to align the industrial hygiene goals with operational goals since savings from health protection are difficult to measure and may not be realized for many years. Therefore, industrial hygiene is generally viewed as a technical function instead of a managerial function.

The development and implementation of a comprehensive safety or industrial hygiene program is a complex activity for which there does not exist a generally accepted set of guidelines. Although the ultimate objective of the programs is to control losses and provide for the welfare of the employee through a reduction in the number of accidents and occupationally related illnesses, there is great variation among industrial safety and industrial hygiene programs and substantial disagreement among managers as to the most effective way to achieve this objective. Some of the variations in programs and the associated disagreements among managers are caused by differences in the type of industry and the size of companies. However, many of the observed differences result from differences in management philosophy concerning the role of safety and industrial hygiene specialists and the way in which the resources required to implement these programs should be organized.

In spite of the disagreements concerning the 'best' approach for organizing and implementing a safety program, it is generally agreed that an effective safety program will not only reduce accidents but will also be cost effective. Since job related deaths and injuries cost business more than $30 billion annually, an above-average safety record can save millions of dollars on insurance premiums, health-care costs and property losses. Although it is more difficult to measure the savings from an industrial hygiene program, it is generally agreed that the function is important for most manufacturing firms and is essential if the firm uses toxic materials in the manufacturing process.

Since there are many ways in which effective safety and industrial hygiene programs can be organized, the readings were selected to cover a broad spectrum of the approaches which are currently being used to manage these functions. Hopefully, an exposure to a variety of ideas will clarify the nature of the problems which may be encountered during the implementation of these programs and will provide an introduction to some of the approaches which are being used to make the safety and industrial hygiene functions more effective.

The first article in this section provides some basic statistics on the cost of job-related accidents and clearly indicates the substantial savings which can be achieved by implementing a program which produces a better-than-average safety record. It is estimated that the DuPont safety program saved the company more than $26 million in 1980. DuPont's annual sales would have had to increase by nearly $500 million to have the same impact on the company's profit. Similar savings are reported in the article by Reinhart (1975) which discusses the safety and health program at Questor.

The next three articles provide an overview of the problems associated with the development, implementation, control and evaluation of occupational safety and industrial hygiene programs. The first of these articles focuses primarily on the safety function. The author, Russell DeReamer, views safety as a staff function which is organized as a part of the total loss control unit which is responsible for advising line management on the recognition and control of any hazards which could result in a loss of personnel, equipment or system function. The article emphasizes the importance of providing adequate safety education and training programs at all organizational levels. Additional information on the loss control approach to safety management can be found in the articles by Baldwin (1975 and 1976).

In the next article, Dennis Bridge addresses the key elements which should be considered in the development and implementation of an industrial hygiene and safety program for business concerns which have more than $50,000,000 in sales and more than 5000 employees. Since smaller companies usually cannot absorb the overhead associated with a comprehensive industrial hygiene program, they must rely on part-time consultative services. The author estimates that 70 to 75 percent of the workforce in the United States does not have reasonable access to a comprehensive occupational health program.

In the fourth article, Clifton Crutchfield discusses the goals of occupational safety and health programs, examines the safety management model and proposes an approach for managing the industrial hygiene function which emphasizes the utilization of line management as a direct resource for identifying and controlling health hazards. Two other articles which look at the management aspects of the industrial hygiene function are the articles by Bridge (1983) and Lichtenstein (1983).

The next two articles discuss the organization and management of the safety and health programs at Dan River, Inc. and Olin Brass Fabricated Products. Lester Hudson, the President and CEO of Dan River Inc., discusses the basic philosophy which underlies the management of the safety program at Dan River. Safety is not viewed as an expense but as an opportunity to make investments which are considered just as important and just as potentially profitable as production oriented or new product development investments. The next article describes a safety program which has significantly reduced the number of injuries at the Olin Brass Fabricated Products plant which employs approximately 200 workers. This article clearly illustrates that it is both feasible and beneficial to develop an effective safety program for a small plant. The article by Soulliard (1973) discusses the safety program at the Budd Company and Martin (1977) describes the health and safety program at Western Electric.

The seventh article in this section describes the behavior based safety management program which has been implemented at the Procter & Gamble Company. Behavior based programs focus on activities that are directed at changing behaviors, as opposed to activities that are directed at changing attitudes. This approach has been instrumental in reducing Procter & Gamble's lost weekday frequency rate to less than one-twelfth of the all-industry average. Readers who are interested in behavior based safety management may be interested in reading some of the following papers which are included in the bibliography: Komaki (1978 and 1980), Sulzer-Azaroff (1978 and 1980), Larson (1980), Rhoton (1980), Zohar (1980), Haynes (1982), and Reber (1984). None of these papers have been reprinted because they are primarily concerned with the methodology of behavior analysis rather than management. However, all of the papers include a discussion of applications in which the behavior analysis approach was used to increase worker use of desired safety practices. These papers clearly demonstrate that behavior based safety programs really can increase the percent of tasks which are performed safely.

As indicated in several of the articles in this section, effective safety programs almost always require good training programs. Although it is often assumed that management must provide these training programs, the last two articles describe training programs which were developed through extensive union activity. The first of these articles describes a joint labor-management effort to develop a comprehensive safety training program for workers in the sheet metal and air conditioning industry. The second article describes a safety training program developed by the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada. Externally developed training programs may be the only way to train the 70 to 75 percent of the workers who work for small companies. Union-related programs appear to be an effective way to reach workers in the unionized crafts and trades.

Additional articles in the bibliography which are primarily concerned with safety programs include: Carroll (1982), Ezell (1979 and 1980), Glickman (1983), Petersen (1983) and Simins (1977). Chelius (1977) is an interesting study of the change in the manufacturing injury rates which occurred in the 1960's. The article by Corn and Lees (1983) discusses the industrial hygiene audit, a tool which they have developed for the evaluation of industrial hygiene programs.

III. OCCUPATIONAL SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

1. When Accidents Don't Happen
   Jeremy Main
   Fortune
   Sept. 6, 1982

2. How to Establish an Effective Safety Program
   Russell DeReamer
   Professional Safety
   May 1981

3. Developing and Implementing an Industrial Hygiene and Safety Program in Industry
   Dennis P. Bridge
   American Industrial Hygiene Association Journal
   April 1979

4. Managing Occupational Safety and Health Programs — An Overview
   Clifton D. Crutchfield
   American Industrial Hygiene Association Journal
   March 1981

5. Effective Safety and Health Programming — A Management Oriented Approach
   Lester A Hudson
   Unpublished remarks given at the 44th Annual Conference of the South Carolina Occupational Safety Council
   September 23, 1981

6. Small Plant's Safety Success Formula
   Frank W. Lancianese
   Occupational Hazards
   July 1981

7. Behavior Based Safety Management
   R. Eugene Earnest
   Professional Safety
   January 1985

8. Employer-Union Group Trains for Survival
   William S. Odlin
   Job Safety and Health
   November 1976

9. A Model Union Program
   Virginia Reinhart
   Job Safety and Health
   September 1976

WHEN ACCIDENTS DON'T HAPPEN

A better-than-average safety record can be worth millions in annual profit.

by *Jeremy Main*

Several floors up on a building under construction near Grand Central Terminal in Manhattan, workers balanced on bare steel girders without nets or safety lines. Some have discarded their hard hats. A welder hasn't bothered to screen off his work. Red-hot slag falls to the ground, starting a small fire in a pile of discarded wood that shouldn't have been there. Even a layman watching from the sidewalk can see accidents ready to happen. A construction engineer comments, "We figure we are lucky if we can get through a job like this without killing someone."

By contrast at Du Pont's nylon-fiber plant in Seaford, Delaware, all the production workers wear safety glasses and earplugs, and it is hard to find any dirt, much less debris, on the factory floor. But Dale Merriss, the plant manager, reports that a regular one-hour safety tour by his staff had just turned up three "safety defects": a worker without his hearing protectors, an unattended ladder leaning against a wall, and a desk drawer left open. The chances of anyone tripping over a desk drawer and getting hurt are admittedly slim, but Du Pont keeps track of these things because an uncorrected increase in defects might lead to an increase in accidents.

Accidents at Seaford are so rare they have little statistical meaning. The last time anyone got hurt there was when a woman tripped in the parking lot in May 1980 and fractured her wrist. Like any other accident serious enough to keep one of Du Pont's 140,000 employees off the job for a day or more, this one was reported to Du Pont's chairman within 24 hours.

Cost out of hand

Some industries, such as construction, are inherently risky, but what's more siginficant is that accident rates vary greatly from company to company within the same industry. Companies with poor safety records pay a stiff price. Du Pont, which probably has the lowest accident rate of any major manufacturer, counts savings in the tens of millions a year from its safety programs. The National Safety Council estimates that in 1980, the most recent year studied, deaths and injuries on the job cost business around $30 billion. Whatever the actual total may be, reducing those costs is a job that calls for better management—and better public policy as well.

Incentives to take safety seriously have increased sharply because costs are threatening to get out of hand. Not only are claims bigger but more ailments and injuries are coming under the coverage of workers' compensation. The states set the compensation that employees can receive and define what is covered. But employers essentially pay for their own safety records. They buy insurance to pay the claims, or are self-insured up to a minimum that ranges from $250,000 to $1 million per accident.

The Stanford University Department of Civil Engineering calculated last year how much difference a good safety record can make to a construction company's costs. Insurers set premiums according to what they call an experience modification rate (EMR), a multiplier applied to a basic premium. The Stanford study found that the EMR multiplier for national contractors ranged from .5 to 2.05. On a $100-million job, assuming direct labor to be 30% of the total cost, an EMR or .5 would result in workers' compensation premiums of $1.1 million. An EMR of 2.05 would require premiums of $4.3 million.

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Astonishingly, by the principal gauge used to judge job safety—the number of incidents resulting in lost workdays per 100 workers per year—accident rates have been getting worse since the federal Occupational Safety and Health Administration was established in 1971. The rate for all private industry moved up fairly steadily from 3.2 in 1972 to 4.2 in 1979. In 1980 the rate dropped to 3.9. The 1981 figure won't be known until late this fall.

There is no widely accepted explanation for the increase. It could be attributed to the millions of inexperienced or young workers who came into the labor market in the 1970s, because accident rates among them are much higher than among experienced workers. That explanation would also account for the drop in 1980, when fewer new workers were hired because of the recession.

Another possible explanation is that accidents did not increase, but more of them got reported after OSHA's establishment. A less charitable explanation of the increase is that the growing generosity of workers' compensation payments has encouraged workers to submit more claims. Most states set payments at two-thirds of the injured worker's wage up to a maximum, which ranges from $112 a week in Mississippi to $942 a week in Alaska. The income is tax free.

The bulk of workers' compensation claims until now have concerned accidents, but companies face large and growing liabilities because of the health effects of substances such as asbestos, that were used years before it was known that they might be damaging. To old enemies are being added some newly recognized ones, such as polyvinyl chloride.

Liberal interpretations

The generous payments and liberal interpretations of what a worker can blame on his employer are raising workers' compensation costs. A teacher can attribute his ulcer to the strain of dealing with unruly students. A salesman can blame his alcoholism on the employer who encourages him to entertain customers. "Employers are being held responsible for the health habits of their employees," says Robert Paris, a workers' compensation consultant to Aetna Life & Casualty.

California, Illinois, Michigan, Minnesota, Rhode Island, Wisconsin, and the District of Columbia are especially known for generosity. The cost of workers' compensation has become a deterrent to new business in Minnesota, says Brian Fahey, director of research of the Minnesota Association of Commerce and Industry. More than half the bus drivers in Washington, D.C., managed to sustain an injury in 1980, judging by the successful claims filed. But the District of Columbia city council recently signaled that it recognizes workers' compensation has been abused. The council enacted a new law that tightens the basis for claims and cuts the maximum weekly payment from a handsome $496 to $396—the average working wage in the capital.

The facts about job safety can be as confusing as they are controversial. Last year the Council on Economic Priorities, a liberal think tank supported by foundation grants, turned the generally accepted facts upside down by saying DuPont had the "worst record" among eight major chemical companies.

The council based its findings not on accident rates, which aren't usually available on a company-by-company basis, but on complaints and citations by OSHA, which are. Since until recently even anonymous letters could trigger OSHA inspections, the council picked a shaky basis for its findings. The Department of Labor found the study lacked "the minimal requirements of objective analysis" and misused raw data. DuPont points out that while the council reported the company had the greatest number of "willful" (most serious) violations, the study failed to say that OSHA backed down on the citations when challenged.

Companies that have their own sophisticated safety programs regard OSHA as irrelevant. Says Ned K. Walters, Du Pont's director of safety, "We told our people to obey OSHA regulations

but don't let that interfere with our safety program." B. Craig Farmer, a safety expert at the Travelers Insurance Co., observes that OSHA concentrates on checking for unsafe conditions, but most accidents are caused by unsafe acts. OSHA has little to say about the causes of the mundane accidents that Farmer says make up 70% or more of injuries: slips and falls, improper lifting, careless driving. Hotel maids strain their backs by reaching across a bed to make it instead of walking to and fro. Even serious accidents can have trivial causes. A steelworker disdains safety lines when venturing out on a beam 40 stories up, or a painter steps back to admire his work, forgetting he's on a scaffold.

Under earlier Administrations, OSHA sometimes seemed to think that its duty was to convict industry rather than encourage safety. But Thorne Auchter, President Reagan's OSHA director, speaks of being a "cooperative regulator" who will work to help industry improve its safety record by stressing human factors, such as training. Instead of casting a wide net and spending a lot of time visiting plants at which they found no violations, OSHA inspectors are now focusing on industries and companies with poor records. Almost half of OSHA's inspection force will concentrate on the accident-prone construction industry, which is where Auchter came from.

While businessmen are, of course, delighted with the turn in OSHA's policy, labor isn't. "Relations between labor and OSHA are at their lowest possible ebb," says George Taylor, the AFL-CIO director of occupational safety and health, who has just had a nasty exchange of letters with Auchter. Taylor charged Auchter with creating a "blackout" of safety data and invoked the Freedom of Information Act. Auchter replied he was tired of trying to satisfy Taylor's "seemingly endless requests for data," which Taylor seemed "unable to competently analyze." In the exchange of letters Auchter said Taylor didn't realize the days were gone when OSHA confronted industry in a spirit of "vicious adversity."

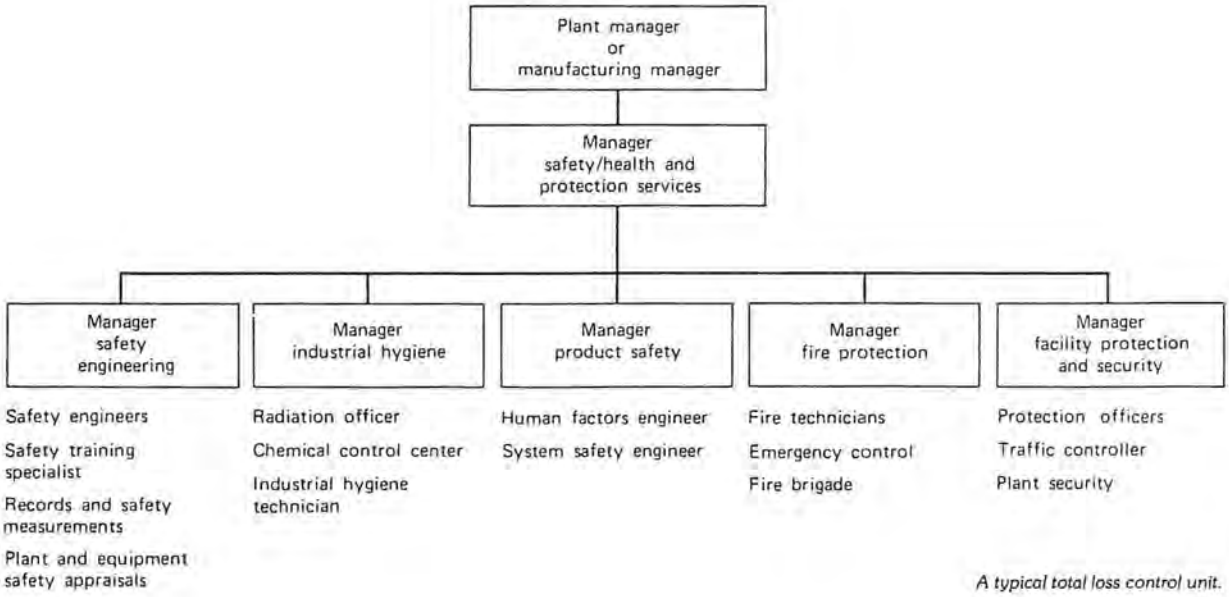
What it takes to stop the little accidents—as well as the big ones—is unremitting, almost infuriating fussiness about safety from the head of a company all the way down. Clay Smith, business manager of Du Pont's applied technology division, which provides safety and health consulting services to other companies, says that clients who establish serious safety programs average a cut in accidents of 38% the first year.

Du Pont's fussiness goes back to the 19th century, when its principal product was gunpowder and two du Ponts were killed by explosions. In the early days the company's mills blew up so regularly that they were built with three sturdy stone walls and one flimsy wooden wall, facing Brandywine Creek. When the inevitable explosion came, the wooden wall would blow out. The rest of the mill would remain standing and could be economically restored to service. "Going across the creek" became a company euphemism for being blown to bits.

Advancement through safety

Pierre Samuel du Pont, founder of the American branch of the family, set an example of top management involvement in safety in 1817 by leaping from his sickbed at the age of 77 to help put out a fire in a powder mill. Today, at the regular Friday meetings of Du Pont's top management in Wilmington, safety is always the first item on the agenda. The pattern holds throughout the company—safety comes first. Everyone understands that "a job will not be done unless it can be done safely," says James Kearns, a general manager of the textile fibers department. Supervisors and managers realize that without a good safety record, they just won't get promoted.

Du Pont's safety efforts reap enormous savings. In U.S. plants in 1980 the company had 129 accidents that caused workers to lose time from the job—an annual rate of .12 accident per 100 workers, or one-twenty-third the National Safety Council's average rate for all manufacturers. Had Du Pont's record been average, the company would have spent more than $26 million on additional compensation and other costs, using the Safety Council's estimate of $9,400 for the average cost of a disabling accident. That's 36% of Du Pont's profits. To make up the difference, in view of the company's 5.5% net return on sales, Du Pont would have had to increase sales by nearly $500 million. That seems reason enough to be fussy about safety.



A typical total loss control unit.

How to establish an effective safety program

by Russell DeReamer

I recently read an article in a safety magazine that contained this statement: "The safety professional goes from plant to plant changing safety posters." Unfortunately, there are some who still cling to this low level regard for the safety position. On the other hand, it is becoming apparent that management has recognized the need for highly qualified people to organize and administer their safety and health programs. They want men and women who are expert in their field, men and women who will apply the same management principles and practices to run the safety program as are applied to the operation of the production, quality control and cost control programs.

There is no question that the field of safety—including health and fire prevention—is one of growing importance and challenge. Safety engineers must be prepared to make much greater use of the physical, social and behavioral sciences. They must recognize safety to be multi-disciplinary and multi-functional, a unique, demanding type of work.

A total loss control unit

At one of its facilities in New York State, IBM has a 9,000 employee manufacturing and laboratory site. The work done there is highly sophisticated and complex. Hundreds of chemicals are used in its manufacturing processes. There are hundreds of ionizing and non-ionizing radiation sources at this facility, which has over 2.5 million square feet of floor space.

Out of necessity, site management has assembled a highly sophisticated, well-trained and competent safety, health and fire prevention staff which includes specialists and generalists. To give you an idea of the multi-disciplinary and multi-functional aspects and scope of safety/health/fire prevention work the specialists are: The chemical coordinator, the toxic (poison) gas coordinator, the ionizing radiation safety officer, the non-ionizing radiation officer, the OSHA standards and compliance coordinator, and the education, training and statistical coordinator.

The generalists are the safety engineers. Because their work encompasses three important areas, most of them have had out-company training in safety engineering, industrial hygiene, and fire prevention engineering. They operate as the safety program managers of the areas assigned to them. They conduct regularly scheduled safety and health audits, they make a thorough safety review and assessment of all new equipment and processes, they investigate accidents, they train and educate, they consult and advise.

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These three functions have a common denominator—risk assessment and loss control. It obviously makes sense to combine these three functions into a single operating or functional unit. As an example in the case in point, a second level manager heads up the loss control unit. He reports just two levels below the general manager. Three managers report to him:

Manager, Safety Engineering
Manager, Industrial Hygiene and Radiation Services
Manager, Emergency Control (Fire Prevention and Protection)

When and where these functions operate as separate units, the work often is fragmented, uncoordinated and redundant. But when all risk control functions are joined together, safety's broad technical function and importance become apparent and its economic impact becomes visible.

Among the staff of more than 40 persons at this site are mechanical engineers, three chemists, a physicist, fire technicians, industrial hygienists, two persons with majors in education and a statistician. To tackle today's safety/health problems, a well-rounded, highly qualified staff is required—a staff that commands the respect of the line organization, particularly managers and engineers. Safety advice and counsel must be sought by line management; it cannot be thrust upon them. Once the competence and expertise (in safety) of the safety staff is recognized, there will be a path beaten to their doors.

Staff to the line organization

Safety practitioners must have a crystal clear understanding of their role. They are staff to the line organization. An incident that occurred about three years ago brought the staff role of safety personnel into sharp focus for me. I was meeting with the general manager, the laboratory director and the plant manager to review an accident. There was no injury, but the potential for a serious injury was there. During our discussion, the plant manager made a comment that implied safety should be blamed for the accident. However, the general manager was quick to point out that line management hadn't done its job. He said, "Safety has three responsibilities: To advise and counsel, to educate and train and to monitor." His description is exactly what the safety job is all about.

Advice and counsel

In fulfilling the advice and counsel role, safety personnel must recognize that the relationship between line management and safety is a delicate and a critically important one. More than ever before, in this age of increasing complexity and an avalanche of technological change, line managers have become more and more dependent upon the skills and know-how of their safety/health staffs. This being the case, safety personnel must assume the role of catalytic agents who serve as counselors and advisors to managers, engineers and others. In this role, safety personnel will be responsible for helping line personnel solve their safety problems. This role, however, calls for a change on the part of line managers in their use of safety personnel. Managers must stop thinking that they can solve their safety problems by asking the safety department to provide them with a new safety gimmick, a safety slogan, a poster or a subject for the next employee/supervisor safety meeting. Staff formulated safety techniques cannot be substituted for direct management action. Far too often such techniques or gimmicks lull managers into thinking that all that needs to be done to prevent accidents has been done—not by them but by the safety department.

Safety advice and counsel must be sought by line management . . .

Here is an interesting but questionable proposal for solving a common safety problem:

> "There was a safety engineer who was having a hard time getting his firm's employees to pay attention to their eye protection program. So one day, he hired a pretty model to walk through the plant wearing a bathing suit. Needless to say, this perked up plenty of interest . . . but further attention was focused on the black eye patch she wore and the boldly lettered sign she carried which read, "I Didn't Think I Looked Good in Safety Glasses." There was an immediate and noticeable increase in the use of eye protection equipment throughout the firm." (As claimed by the safety engineer.)

In taking this prescribed approach, every concept of good management was denied. Here was a problem crying out for management action. Here was a problem that was without question a responsibility of the first-line supervisor, not the safety engineer.

Surely, no manager would attempt to solve a production problem or a cost problem using a bathing beauty and placard. Suppose that instead of refusing to wear safety glasses, employees had decided—contrary to instructions—to enamel refrigerators black instead of white. Would any manager try to change the situation by parading a bathing beauty through the plant with a sign reading "Don't Be Slack and Paint Them Black. Be Right and Paint Them White"? Of course not. Solutions to safety problems require application of the same management principles and practices used to solve production and cost problems.

Education and training

Another responsibility or duty of the safety engineer as previously mentioned is to educate and train. There is just not enough safety training taking place in industry today. This is true in spite of the fact that properly trained employees have a much better safety record than untrained or poorly trained employees.

Employees and supervisors must be trained in a number of areas (depending on their jobs); industrial hygiene, chemical safety, industrial truck operation, respirator use, fire protection, emergency procedures, and so on. These are specialized courses. General safety training, which should be applicable to all employees and all supervisors and managers, includes: New employee safety orientation, on-the-job safety training, and supervisor/manager

safety training. These three safety training courses should be mandatory for all.

New employee training

New employees tend to have a much higher accident rate than experienced employees. A solution to this problem is effective employee safety orientation or training during the first week of employment. Some companies cover safety and health in a 2 to 3 hour session. But other companies, convinced that safety orientation has a positive impact in the areas of accident prevention and good employee relations, have extended the training over a two to three day period.

On-the-job training

On-the-job personalized training is an indispensable element of the total safety training package. In fact, under OSHA, employees must receive on-the-job safety training based on an analysis of the tasks performed by the employee. This approach stresses work habits required for safe job performance. It permits the conversion of safety generalities into specific safe practices applying to a specific job or task and to the individual doing the job. In launching an on-the-job personalized safety training program, supervisors and foremen must make a job hazard analysis of each task to pinpoint the inherent hazards so they can tell employees what the hazards are and how to avoid them on an individualized basis.

A high percentage of industrial accidents are due to worker attitude and lack of knowledge or skill about the job. It is apparent that both of these causes can be influenced substantially by individualized safety training that is quite effective not only in reorienting the individual's thinking about his job but in inducing better work habits.

Safety training for managers

Manager/supervisor safety training is important and necessary for all managers. It is not enough to tell supervisors and managers that they are responsible and accountable for the safety and health of their employees. They must be taught what these responsibilities are and how to go about fulfilling them. And, of course, they must be taught the basic concepts and theories of accident prevention and loss control. They must be taught that accidents are caused—and they, individually and collectively, can prevent them.

Monitoring

Along with advising and counseling, educating and training, safety also monitors. Two monitoring or tracking tools that merit high priority are properly organized and conducted plant or facility safety audits and safety performance measurements.

The safety audit, however, is often regarded as a low-level activity that can be left to safety technicians or employee safety committee members. Not so. Safety audits should be made by the most qualified people in the safety department and the audit team should include line managers. Technical competence is needed to identify safety and health hazards, weaknesses in safety program components, and the adequacy of supervisor and manager safety knowhow and effort.

Audits must be highly sophisticated, formalized and regularly scheduled. A systems approach is imperative. It is not appropriate, for example, to look at a skid in the aisle and blame the "careless" material handler for creating the unsafe condition. The entire material handling system must be examined. Poorly laid out truck aisles, a lack of drop areas, uncoordinated materials movement or too few material handlers could quite likely be the root of the problem.

Safety measurements

Through the years, we have placed unjustifiable emphasis on disabling or lost work day injuries. This emphasis has been detrimental to accident control, since only the serious injury/accidents get attention. As an example of the case in point, an electrician, unable to find a circuit disconnect, proceeded to work on a hot line. He received a 220v shock, but there was no injury. When the general manager was asked if he knew about the accident, he replied, "Yes, but there was no lost time." Here was a serious accident, but the general manager was not really concerned because he had been preconditioned to think of "accidents" in terms of the severity of injury. This particular case never got into the records. It did not affect the injury rate—the company's record of over "three million man hours without a lost time injury" was still intact.

In the field of safety performance measurement, it is high time to depart from the conventional measurement techniques that served so well in the past but have outlived their usefulness. Since 1937 disabling-injury frequency rates and now away-from-work incidence rates are considered as valid, sensitive and comparative measures of safety performance. Such rates meet none of these criteria. To improve on the situation, the use of total OSHA cases (which include away from work, restricted work and medical case) is suggested. This method, although lacking in preciseness, will provide managers and safety personnel with a safety measurement that they will understand and use. But to make this sort of measurement a useful and meaningful tool, everyone with a need to know must be taught that:

1. The focus must be on the accident not the "injury."
2. The frequency rates of different plants or operations of a company cannot be compared with any assurance that the comparison will be valid.
3. It is the rate trend (going up or down or staying about the same) that must be watched, not the rate as such.

The safety performance measurement must answer one simple question—"How are we doing?" Following this basic concept will make safety statistics a powerful monitoring tool.

Qualifications needed

Safety engineers are engaged in a unique multidisciplinary and multifunctional type of work that has its own character. To be effective, they must have the skills and knowledge needed to identify risks, evaluate risks, and to recommend controls. They must be capable of analyzing the entire situation personal and environmental, emotional and physical, and they must understand the management system so they can advise and counsel; educate and train and monitor on their (the managers) terms.

Developing and implementing an industrial hygiene and safety program in industry

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introduction

All who become involved in the development and implementation of a comprehensive industrial hygiene and safety program have the same ultimate goal – employee welfare through the use of engineering control and other preventive measures. However, means of obtaining this goal are subject to great variation, depending on the type of industry, management philosophy and size of the business establishment. Each industry and every workplace is unique. Against this background then, how does one broach this very general and elusive topic?

First, a brief review of the author's work experience is in order to provide a better understanding of the rationale behind the discussion which will follow. This experience has included development of an integrated industrial hygiene, environmental control and product safety program in the coatings and resins industry; participation in the development of a corporate-wide safety program in the petroleum and petrochemical industry; and most recently, in the development of an integrated industrial hygiene and safety program in the health care/pharmaceutical industry. Table I depicts this activity in terms of industry, sales dollars, number of employees, work location and supervisor's title. There is a wide variation in each category.

In view of this experience, most of this discussion will be directed toward the larger business concerns having in excess of $50,000,000 in sales and more than 5,000 employees. Generally, operations smaller than this cannot readily absorb the overhead associated with a comprehensive industrial hygiene program and perhaps not even an adequate safety program. This is unfortunate in many respects. In the United States, it is estimated that 85 to 90 percent of employers have less than twenty-five employees.[1] Approximately 70 to 75 percent of the workforce, or about sixty-five million civilian employees do not have reasonable access to a comprehensive occupational health program.[2] It is difficult to estimate the percentage of employees in the United States that do not benefit from an ongoing safety program, but 60 to 65 percent seems reasonable. Suffice it to say that smaller businesses most often rely on consultative services, especially in the area of industrial hygiene. The NIOSH publication, no. 77-172 *Proceedings of: Clinic Based on Occupational Safety and Health Programs for Small Businesses,*[1,2] addresses many of the safety and health problems confronting the small business entity. This document is available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

The development of such a program poses many questions: what means can be used to justify an ongoing industrial hygiene and safety

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TABLE I
Corporate Industrial Hygiene and Safety Experience[A]

Company	Type of Industry	Sales $MM	No. of Employees	Work Location	Supervisor's Title
A	Coatings Resins	300[B]	4,500[B]	Division Headquarters	Vice President Manufacturing
B	Petroleum Petrochemical	14,000	46,000	Corporate Headquarters	Director[C] Environmental Health Services and Safety
C	Health Care Pharmaceutical	900	30,000	Corporate Headquarters	Vice President Personnel

[A]Dennis P. Bridge

[B]Represents divisional sales and number of employees

[C]Reported to Medical Director within Corporate Personnel

program and what will its governing philosophy be? To whom will the function report? How will it be staffed and with whom will it interact? And, finally, what measures of success can be used to determine performance?

justification

The development and implementation of an industrial hygiene and safety program is a management function rather than a classic technical function. Top management commitment in terms of visible support and dollars is absolutely imperative. With such support, the technical professional, especially one trained in the field of industrial hygiene, is ideally suited to provide for employee welfare as well as to serve the employer through preventive engineering control.

There are two general approaches which can be taken to arouse management concern and enlist active support: social responsibility and economics. Social responsibility includes issues such as considerations in providing for employee welfare, maintaining a presentable community image and complying with federal regulations. Most top managements are genuinely interested in the welfare of the employee. Unfortunately, the time available to exercise this concern directly generally diminishes with increased management rank. Management also has an abiding respect for the unfavorable publicity that can be associated with incidents such as those which have plagued the pesticide and insulation manufacturing industries. By circulating reports and press coverage of these types of incidents to management, these incidents can serve as very beneficial reminders of potential adversities.

Regulatory compliance is a definite management concern. Based on a survey of 700 companies in the United States conducted by The Conference Board as part of a Personnel Function Study,[3] the proportion of surveyed manufacturing companies having major corporate safety activities has more than doubled since 1965 with almost three-quarters of these companies indicating governmental and legislative influence as the prime motivators in spurring this increased activity. Industrial hygiene was a major activity in only 9 percent of the companies surveyed in 1965. This figure tripled to 27 percent by 1975, with eight out of ten companies surveyed having hygiene programs, indicating that OSHA was the prime motivational factor in the development of these programs. The Conference Board Survey also noted a 50 percent increase in corporations with medical programs.

The second, but equally effective approach to arouse management interest is economics. Management has to be concerned with the "bottom line." Expenditures and return on investment considerations associated with health and safety have to be balanced by potential and actual costs of occupational illness and injury, class action suits by relatives of deceased employees or customer employees, property loss, production stoppage, regulatory penalties and labor difficulties. Although it is often difficult to obtain actual costs or even to estimate costs associated in these areas, an attempt must be made to do so. One technique

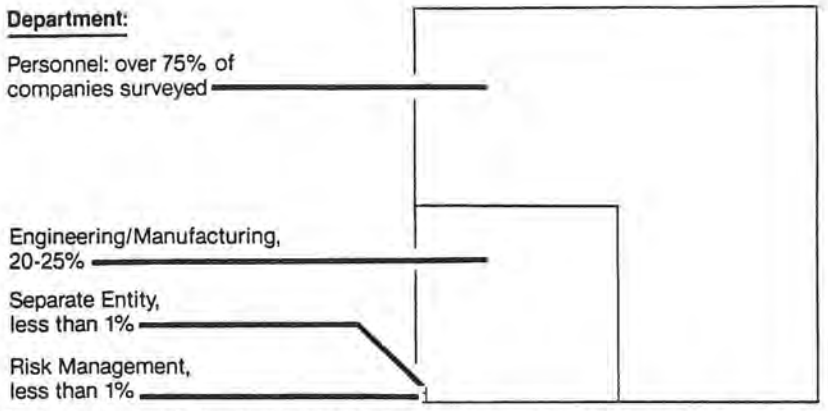

Figure 1 – Industrial hygiene and safety corporate reporting relationships as noted by a Conference Board Study on the personnel function.

frequently used in ascertaining a portion of this cost is to compute Workers' Compensation trends in terms of dollars per share of outstanding stock or percent of net earnings, keeping in mind that for every direct dollar of cost, usually at least three dollars of indirect cost is incurred.

philosophy

The ultimate goal of the industrial hygiene and safety program is to provide for employee welfare by preventing adverse stresses in the workplace. Specifically, tasks to be undertaken can include environmental monitoring, medical surveillance, review of new facility design, establishment of engineering controls and development of a chemical inventory.

In attaining these goals, the guiding philosophy of programs with which the author has been associated can be summarized as follows:

1. Line management has the direct responsibility to provide for employee health and safety and to prevent needless property loss.
2. The health and safety professional has a staff responsibility to assist line management in fulfilling its responsibility.
3. Provision for a healthful and safe workplace is a continuing function that can only be accomplished in most situations through onsite staff rather than sole reliance on a corporate or divisional staff.
4. Health and safety programs must be risk-based in concept.

The first three points speak for themselves. The last point merits additional comment. Employers have a responsibility to maintain a current and accurate risk analysis of the workplace. In addition, the employer has a distinct responsibility to inform those at risk of the inherent implications associated with that risk. All workplaces have risk – no workplace is inherently healthful and safe. Measuring risk is more of a scientific activity, judging the risk is more subjective and political in nature, especially when benefits are considered.[4] Those measuring risk should be professionals using current state-of-the-art technology and research information. These same individuals should participate in judging the risk within the framework of a benefit-risk analysis. Perhaps this can be summarized by noting that benefit-risk analysis is not a matter of weighing dollars versus life or health; rather, benefit-risk analysis is a mechanism by which available resources are directed by a rational, professional evaluation of priorities to determine how employee health and safety can best be protected.[5] Several recent publications which address various concepts associated with benefit-risk analysis are noted in the references.[4,6-8]

reporting relationships

Figure 1 depicts the four patterns of reporting

relationships most often followed as reported by the Conference Board.[3]

1. Health and safety activities are made part of an insurance or risk management unit – seldom done.
2. Health and safety activities are set up as a distinct staff unit reporting to a general executive – seldom done.
3. Health and safety activities are assigned to a corporate or divisional engineering, manufacturing or technical staff – approximately 20 to 25 percent of the companies do this.
4. Health and safety activities are part of a corporate or divisional personnel department – approximately 75 percent of the companies do this.

Companies following the first pattern are mainly financial institutions with very few safety hazards. Those following the second pattern can be categorized as having had a historical concern for safety long before OSHA. Companies in the third category emphasize a strong technical approach to accident reduction. A knowledge of machine maintenance and design, process considerations, facility layout, development of working and safety procedures, and the availability and cost of accident and health hazard prevention equipment are to be found in engineering and manufacturing staffs.

Companies place the function in the fourth category, corporate personnel, for four main reasons: 1) they are labor-intensive and very people-oriented, 2) the labor situation may be such that personnel is the best place to put the function, 3) to avoid possible conflicts of interest, some manufacturing-engineering staffs have high production with cost reduction as their main goals and sometimes this is not deemed compatible with good health and safety practice, 4) there may be no other place to put it which makes sense.

Although there is no one reporting relationship suitable for every corporation, the concept of a separate staff organization headed by a vice president reporting directly to the president of the corporation, as shown in Figure 2, would appear to be the most generally acceptable. This organization would consist of the various facets of environmental control, medical, occupational health, product safety and risk management. The vice president in charge would have a sound technical background, preferably in several of these areas. The individual would have a reasonable financial orientation and some operating experience. Such an organization would most likely permit a total environmental approach to environmentally related problems by an independent group, hopefully without any particular bias. Also, it would lend more credence to the medical aspects of this function

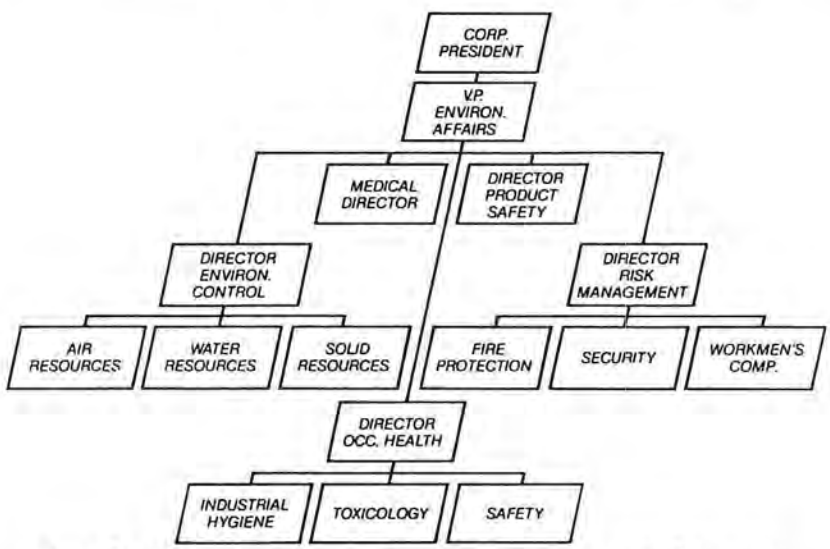

Figure 2 – Preferred reporting relationship for environmental affairs group.

TABLE II
Occupational Safety and Health Employment
Current and Projected National Needs[9]

	Available 1973	Projected Need 1980
Safety Engineers (CSP Only)	5,000	20,000
Industrial Hygienists	2,000	10,000
Occupational Nurses	20,000	30,000
Audiologists	2,000	5,000
Toxicologists	800[A]	2,500
Fire Protection Engineers	3,000	10,000
Safety and Health Technicians	1,000	10,000

[A]estimated

and tend to negate lingering impressions that medical personnel are well paid members of management and adversaries of the working man.

staff and analytical capability

The larger the company, the greater the need to develop an in-house industrial hygiene and safety capability. This is not to say that consultation does not have its place during the incipient stages of program development as well as for various phases of implementation or for special problems which may occur once the program is in place. However, consultative services should only augment rather than substitute for an ongoing in-house capability.

Acquisition of trained industrial hygienists and safety professionals is difficult. Table II depicts numbers of various kinds of occupational health and safety professionals available in 1973 versus projected needs for 1980.[9] At present, in the United States there are anywhere from 3,000 to 4,000 professional industrial hygienists, about one-fourth of whom are Board Certified. This amounts to one certified industrial hygienist for about every 100,000 workers. At present, there are approximately 5,000 Certified Safety Professionals actually employed in safety work and about 5,000 fire protection engineers. It is difficult to acquire the services of individuals trained and experienced in these fields. Perhaps existing staffs can be trained to some extent through short courses. Another means is to develop a corporate program for degree level studies on a half or full-time basis with a time payback commitment to the corporation.

Internal staffing brings with it certain unavoidable costs. Assume a staff which consists of a director, two masters level hygienists, two certified safety professionals and two secretaries. Table III depicts probable cost based upon the author's experience. In terms of annual expense, budget approximately $175,000 for salaries and $125,000 for overhead expense such as travel, supplies, sampling expendables, office space, telephone, dues, professional seminars, etc. This calculates as a rule of thumb to about $60,000 per professional staff member.

Capital expenditures are generally confined to industrial hygiene sampling equipment. About $15,000 per hygienist is needed to obtain most equipment for routine sampling as well as a few pieces of some more sophisticated equipment. Once again, this will vary significantly from industry to industry. For the example staff mentioned above, this equates to a total initial investment of about $30,000.

Another important consideration is sample analysis. Even if an existing laboratory is available within the organization for this, it is

TABLE III
Corporate Industrial Hygiene and Safety Staff

Annual Operating Cost	
Salaries	$175,000
Overhead	125,000
	$300,000[A]
Initial Capital Investment	
Survey Equipment	$ 30,000[B]

[A]Approximately $60,000 per professional staff member with a staff of one director, two industrial hygienists, two safety engineers, two secretaries.

[B]Approximately $15,000 per industrial hygienist with a staff of two industrial hygienists.

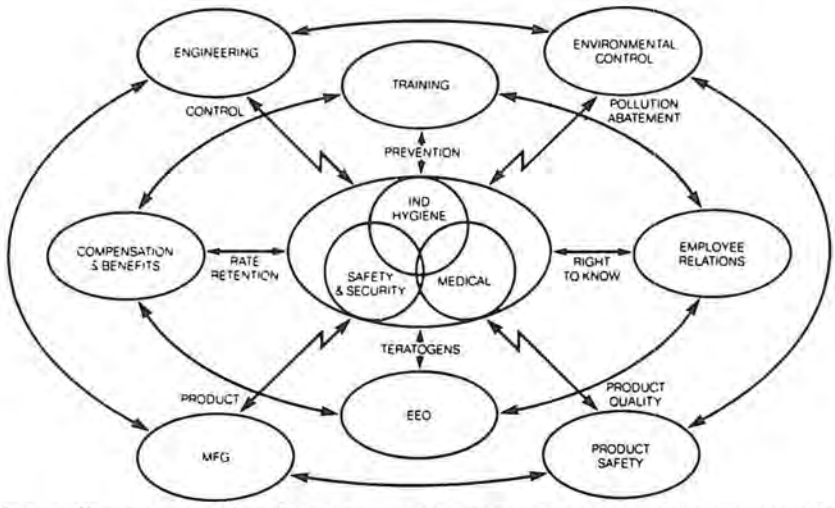

Figure 3 – Intra and interfunctional communications necessary for a successful industrial hygiene and safety program.

usually difficult to obtain laboratory space and reasonable priority for adequate sample turnaround time. It is quite likely that either a consultant laboratory will have to be retained or a sole service in-house laboratory be established. Unfortunately, it is difficult to indicate a break-even point in terms of sample load and analytical costs where an in-house laboratory becomes less expensive than consultative services. It can be noted, however, that normally, one analytical chemist and about $20,000 of analytical equipment are sufficient to begin most routine industrial hygiene sample analysis. It is recommended that, if an in-house laboratory is developed, it be accredited by the American Industrial Hygiene Association. This will lend credibility to analysis work because it provides a mechanism for insuring quality control. If the laboratory is not accredited, then it is well to send duplicate samples to a certified laboratory on a random basis as a self-check.

interfunctional communication

Interfunctional communication is essential if the program is to succeed. Often the program will have two strikes against it before it begins. First, it is new and untested. Second, many will consider it a detriment to production or a necessary evil which is sometimes not even necessary. If communication is not stressed to gain acceptance and cooperation, the program will most likely fail or be only partially successful. The real loser, of course, is the employee – whose welfare is at stake.

Figure 3 shows many of the interfunctional communications generally necessary to achieve success. In this particular example the center of the "universe" is the Environmental Health Services group to include industrial hygiene, medical, safety and security activities. Because the function is located in the Corporate Personnel Department, it is important to note the various areas and topics for intrafunctional interaction: training-prevention, employee relations – "right-to-know," Equal Employment Opportunity – handicapped and teratogenic considerations for pregnant females, compensation and benefits – rate retention. Areas and topics for interfunctional communication include: environmental control – pollution abatement, quality control – product safety, manufacturing – product considerations, engineering – control. There are, of course, many other important areas of interaction not depicted, such as with the law department and risk management.

Taking this a step further, Figure 4 depicts these intra and interfunctional interactions in terms of the classical industrial hygiene process – recognition, evaluation and control of occupational stress. As for recognition, one must depend a great deal upon individuals actually located at the manufacturing site. Of course, corporate staff audits also play an

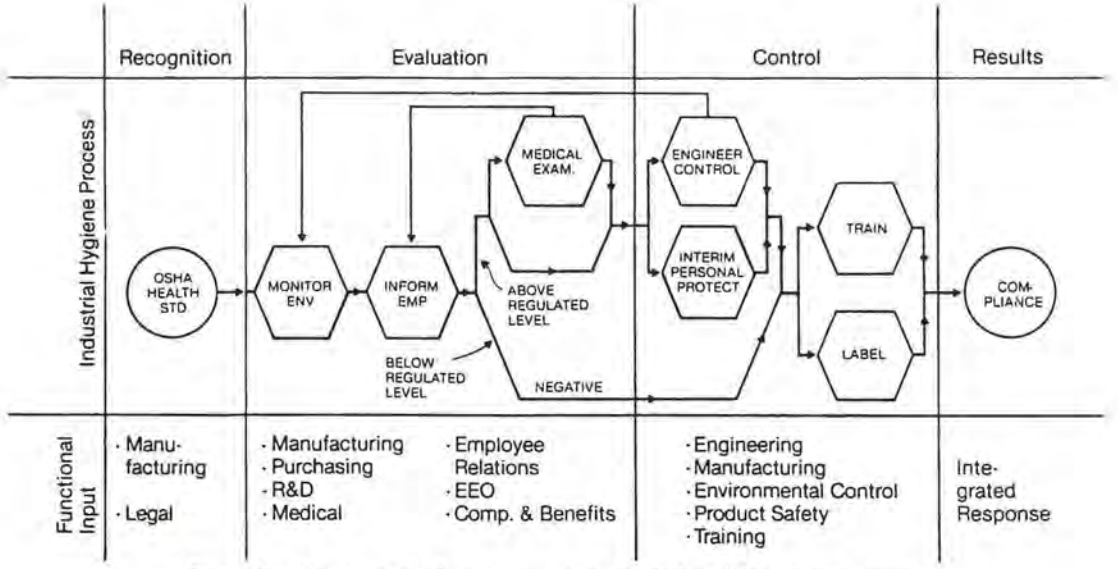

Figure 4 – Inputs most often necessary to the industrial hygiene process.

important part in the recognition of occupational stress. In addition, the law department should follow the regulatory arena and communicate developments to the Environmental Health Services group at the earliest possible opportunity. The need to develop a firm understanding and monitoring mechanism for regulatory affairs cannot be overemphasized.

The prime responsibility for evaluation naturally falls on the Corporate Environmental Health Services staff because of its industrial hygiene capability. However, many additional inputs are often required to completely evaluate a situation in terms of actual hazard to the employee. Arrangements must be made with manufacturing personnel to accommodate adequate and timely sampling. Additional information on the contaminant in question may be necessary. The Purchasing and Research and Development functions can be of assistance in obtaining this information in an expeditious manner. Often, the environmental evaluation must be accompanied by medical evaluation to completely ascertain the degree of adverse exposure. Finally, the evaluation is not complete until the labor relations aspects of the findings have been evaluated with various personnel functions such as Employee Relations, Equal Employment Opportunity and Compensation and Benefits, depending on the nature of the workplace in question. This is not to say that labor relations' input will negate good industrial hygiene practice or violate medical confidentiality, but it is certainly required to accommodate the employee's best interests in terms of right-to-know and possible consequences of any necessary administrative action.

The control function speaks for itself. The goal is to engineer problems out rather than relying on personal protective equipment. This is not always possible, but is certainly always desirable. Once the problem has been corrected, or at least personal protective measures have been established, it is manufacturing's responsibility, specifically line management, to insure that established control is not negated through human activity or technological change. In establishing control, it is extremely important to involve the environmental control function in order to correct the in-plant problem without creating an extra-plant problem, perhaps of a greater magnitude. Also, product safety should not be forgotten. Many findings in the workplace may be quite useful in terms of controlling potential product problems.

A very important aspect of the control function is training. Proper training in the potential hazards of a particular job can prevent adverse exposure. Of course, chemical identification and labeling play a large part in

this training. In fact, training and chemical identification are statutory requirements in many instances.

program performance indicators

Once the program is under way, the question is how continued existence can be justified to management. This is not an easy feat for either industrial hygiene or safety, but it is relatively a lot easier for safety than for industrial hygiene. In regard to safety, three indicators are commonly used to determine performance. The two most well known are the OSHA incidence rate and Workers' Compensation costs. Although both are of benefit, each is somewhat lacking. They are both after-the-fact, relative indicators of performance. The incidence rate must be scrutinized to insure all facilities are following the same guidelines and that only like facilities are being compared. Workers' Compensation costs have an inherent six-month lag time before adequate data is available for analysis. One advantage is that both of these can be used to determine performance goals for ensuing periods of time.

The third indicator is what is often referred to as safety self-evaluation. In short, the program requires that local personnel evaluate each facility with respect to elements of a prevention-oriented safety program most applicable to the operation in question. Examples of these elements include management control, training, hazard analysis and preventive maintenance. These elements are broken down into subtopics and criteria are provided to evaluate facility performance relative to that subtopic. The criteria are subjective in nature and are intended only to provide local personnel with a means of bracketing performance with respect to criteria generally accepted among safety professionals.

Participation in the program provides a mechanism by which each location can review its safety-related efforts in terms of its entire safety program rather than in fragmented fashion. Self-evaluation is generally conducted at least once a year under the supervision of the facility health and safety coordinator in conjunction with all appropriate facility personnel. Once completed, the self-evaluation serves a twofold purpose. First, it presents a uniform, comprehensive basis by which corporate staff can measure the safety performance of the facility. This information can then be conveyed to corporate management. Second, and of equal importance, it provides a means of communication between facility and corporate staff by which substandard performance can be identified and priorities can be set for corrective action.

The question of performance in the area of industrial hygiene is difficult. There is no widely accepted system in use. One that has been used which tends to be subjective and self-serving is a review of activities to determine the number of individuals who have been protected from potentially adverse exposures during the year. Other indicators that are used include capital expense for control, percentage of favorable biological monitoring results, percentage of favorable environmental monitoring results, number of facilities surveyed and degree of regulatory compliance. However, it is difficult to compare any of these accomplishments to any meaningful measure of performance. Development of criteria for measuring performance is one aspect of industrial hygiene which deserves a good deal of attention from the health professional.

summary

This paper has reviewed the aspects of developing and implementing an industrial hygiene and safety program based on the author's experience to be most important. No attempt has been made to establish a guideline for such an activity, but rather discussion has been limited to recital of experience within three corporate structures.

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A basic premise of safety management holds that safety should be managed like any other business function. The responsibility for providing a safe and healthful work environment is integral to the line organization formed to plan, direct, and control the activities of the man-machine-environment system that operates to realize organizational goals and objectives. An important determinant of success in providing safe working environments involves achieving recognition and acceptance of responsibility for safety by line management and focuses on the implementation of safety programs through line activities. An examination of industrial hygiene programs reveals that they are not generally focused through the line in a similar manner. A comparison between job activities between industrial hygienist and effective safety managers indicates that the technical expertise embodied by the industrial hygienists is focused much more directly on the machine-environment components of the system, and addresses the man component predominately as a passive receptor. The result is that too many industrial hygienists dilute their effectiveness in contributing to a safe and healthful work environment by resorting to a technically solitary role in recognizing and evaluating occupational hazards and incorrectly assuming responsibility for their control.

Managing occupational safety and health programs — an overview

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introduction

A recurrent theme that is invariably sounded whenever safety and health practitioners assemble on a formalized basis is that the two functions should have a much closer working relationship. Calls for mutuality of effort seem logical enough since both professions are founded on concern for the welfare of workers in the occupational environment. But are the goals and objectives of an industrial safety program that closely allied to those of an industrial hygiene program in the private sector? Specification of goals is of primary importance to the effective management of a program. A comparison of the general goals of industrial safety and health programs is of interest because any significant difference between them impacts the potential for allying the functions more closely in an organizational sense. Significant goal differences also have large implications for strategies used to manage each program.

goals of occupational safety and health programs

A commonly stated basic goal of occupational safety and health programs is to provide a safe and healthful place in which to work. Such a goal focuses on the machine and environmental components of the man-machine-environment system that is designed and implemented to accomplish organizational tasks. The mechanism of specification standards provides an obvious means of defining the parameters of a safe and healthful workplace. It also serves to focus safety and health efforts on physical equipment and environmental conditions found in the workplace.

The standards promulgated by the Occupational Safety and Health Administration represent the broadest current array of specification standards covering physical hazards associated with machines and equipment used in the workplace. In addition, performance standards in the form of permissible exposure limits are aimed at chemical and physical stressors present in the worker's environment. A basic assumption is that compliance with promulgated standards will in fact achieve the goal of providing a safe and healthful workplace.

A study involving detailed investigation of the conditions surrounding 61 occupational fatalities in Arizona[1] revealed that 54% of those fatalities arose from conditions that were not or would not have been cited for violation of OSHA standards. Of the remaining 28 fatalities, 33% involved citable violations of specific OSHA standards and 13% involved violations of OSHA's "general duty" clause. While the study examined only a limited number of cases, it does reflect a serious problem that has been observed elsewhere.[2,3] The OSHA approach of standard promulgation, enforced at least in theory by compliance inspection, would prevent less than half of the occupational injuries and fatalities that occur, even if perfect compliance were achieved.

Such a finding is consistent with observations reported in 1931,[4] when Heinrich reported that 88% of over 75,000 industrial accidents screened were primarily caused by unsafe acts of persons as opposed to unsafe conditions in the work environment. The implication is that provision of a safe and healthful place to work, as defined by current specification standards, does not necessarily guarantee safety and health.

Modern safety management theory epouses a basic goal that is more encompassing than the one just discussed. Briefly stated, it is a goal to control losses in the occupational

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setting to the greatest possible extent contingent upon available resources. Such a goal is focused on prevention or control of actual events leading to loss of personnel, equipment, and system function. It realistically incorporates the fact that finite resources are available for the task. The basis of the goal is more economic than moralistic, and is therefore more consistent with operational goals in the private sector.[5] It also directly involves the man component of the operational system, which necessitates a very different managerial approach to achieve the objectives underlying the goal of controlling loss.

safety management model

One of the principle features of the safety management approach is the incorporation of line management, that exists in every organization, as a resource for achieving loss control. The approach provides an avenue for safety and health access to system components that are subdivided into functional task units. Responsibility for safety and health follows these avenues and descends to bottom managerial levels within each unit. A great deal of the safety literature is devoted to discussion and analysis of methods for planning, implementing, directing, and controlling loss control programs from a perspective (the safety manager's) that is external to the operational line.

A basic premise of safety management theory holds that safety should be managed like other business functions in the organization.[6,7] Instead of treating health and safety matters as external entities which are often viewed as competing with or countering the operational goals of the organization, they must be integrated into the organization's operational procedures. Such integration demands a strong commitment to safety on the part of top management. Commitment is usually expressed in the form of safety policy. To be effective, safety policy must not only express top management's commitment to safety, but must also specify the delineation of responsibility and authority down through the management chain. If all levels of management are not vigorously charged with the responsibility for safety within their managerial span, and held directly accountable for execution of that responsibility, then line management should not be considered a viable loss control resource. Without accountability for designated responsibility the safety function, as would any other function, tends to consist of more platitudes than performance.

The key for holding line management accountable for safety within their individual operational spheres involves measurement of safety performance. Past inabilities to define and measure managerial performance precisely as it relates to achieving safety objectives accounts for a substantial portion of failures to manage safety functions effectively.[8,9] Measures that can be applied to the problem can be categorized as either results measures or activity measures.[10] Results measures such as OSHA's incidence rate and ANSI's frequency and severity rates reflect performance as a function of events that have occurred. They are difficult to apply as valid measures at fairly low organizational levels because industrial accidents involving injury are statistically rare events and yield limited data bases at that level. Activity measures involve monitoring managerial activites in the area of safety such as inspections, tool-box meetings, training, and accident investigations. Activity measures normally involve a large amount of self monitoring, which impacts their validity as safety performance measures.

Specific activities carried out by line management in support of safety involve the familiar functions of hazard recognition, evaluation, and control. The safety manager typically plays a consultative role to the line in hazard recognition and evaluation procedures such as routine inspections, job safety analyses, system safety analyses, and accident investigations. He is heavily involved in the specification of engineering controls and personal protective equipment to reduce recognized hazard levels. After hazards associated with physical conditions in the work environment have been removed or reduced to the lowest feasible level through the use of engineering controls, residual hazards in the system, many of which are associated with the man component, must be addressed. Hazard control at this point relies on the actions of people, and involves using well conceived and defined procedures to minimize the risk of loss. Beyond development by line management and the safety function, the procedures require training to ensure that the worker knows how to use them, motivational techniques to encourage use by workers, and supervision to monitor procedure adequacy and to complement worker motivation as a force for procedure use. Procedure development, training, motivation, and supervision are all vitally important to the success of the safety function. Orchestration of these activities through interactions with all levels of line management is a tremendous challenge for the safety manager. The managerial techniques involved are much more complex than are required to function as a technical specialist conducting inspections, gathering accident data, and attempting to comply with specification standards, which remains the job description for too many safety professionals.

industrial hygiene function

From a national perspective, the industrial hygiene function can be categorized currently as being well below projected manpower needs.[11] Of the expertise available, a substantial portion has been added since the implementation of the Occupational Safety and Health Act. During that period, industrial hygiene has been added as a formally staffed function to a large number of organizations. While education and experience levels of the added complement of industrial hygienists can best be described as diverse, a large portion of the complement has a common characteristic. Soon after beginning practice in the field, a great many industrial hygienists have found themselves as the sole source of industrial hygiene expertise within an organization, with responsibility for developing and implementing an industrial hygiene program for a multitude of plants, locations, and problems. Few of even the formally trained hygienists had any extensive management training included in their educational curriculum. As a consequence, techniques

for executing the vital functions of planning, organizing, directing and controlling a comprehensive industrial hygiene program must be gained through hard experience, often in the face of almost overwhelming time demands associated with the technical aspects of the position. The literature directly related to the field has not been a source of help in this area, nor has classic management literature directly addressed the sphere in which the industrial hygienist operates.

Industrial Hygienists with multi-plant, multi-location responsibilities often place heavy reliance, as does OSHA, on the walk-through survey technique. The point-in-time and expertise limitations associated with walk-through surveys need not be elaborated here. The question arises as to whether line managment could be more directly involved as a possible resource to the industrial hygiene function. If line management can be utilized effectively in such a manner, the safety management model where implemented has shown that managerial techniques and interactions will become extremely important to the industrial hygienist.

For line management to be a viable resource to the industrial hygiene function, it must be actively involved to varying degrees in the recognition and control of health hazards in the workplace. It must in fact have primary responsibility for these functions. In the area of hazard recognition, first line supervision represents a continuing presence and high degree of familiarity with the specific workplace or system component that is missing from the walk-through survey approach. While a great deal of specialized knowledge underlies recognition of health hazards, a line responsibility charged towards identifying all health hazards associated with a given work station should instigate more selective requests for consultative help to the industrial hygiene function. A high level of supervisory training and interaction would be indicated, but overall better use of limited resources of industrial hygiene expertise should result.

The responsibility for health hazard evaluation would still reside in the industrial hygiene function. Primary responsibilities of line management in the area of control of health hazards lies in the areas of funding controls; assuring operational integrity of installed engineering controls; knowing about, training for, monitoring, and supervising the use of personal protective equipment; monitoring activities of employees enrolled in programs such as hearing conservation and medical surveillance; and developing and implementing required work procedures to reduce hazard generation as much as possible.

As in the safety management model, effectively utilizing line management in an organization as an industrial hygiene resource would require interaction by that function with the entire line management. Gaining line acceptance of its responsibility for the health of employees, and more specifically for the recognition and control of hazards posing a threat to employee health, would be a crucial first step. As with safety management, the key to acceptance and execution of line responsibility for worker health is an accountability system, which in turn hinges on management's ability to measure line performance in the area of health protection. However, the performance measurement problem in health is even more acute than it is in safety. Some suggested performance indicators include number of workers protected from potentially adverse exposures, capital spending for control, degree of monitoring done, percentage of favorable monitoring results obtained, and degree of regulatory compliance.[12] Any measure utilized would have to be standardized to achieve uniformity of line measurement.

summary

Developing, selling, implementing, and controlling a program which utilizes line management as a direct resource for the industrial hygiene function by holding it responsible and accountable for health hazard recognition and control could add needed elements of coverage and continuity to many industrial hygiene programs. Such an approach could make optimal use of limited industrial hygiene expertise within many organizations. The managerial skills required to develop and implement such an approach are quite extensive, and may exceed the skills formally acquired by many practicing industrial hygienists.

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EFFECTIVE SAFETY AND HEALTH PROGRAMMING A MANAGEMENT ORIENTED APPROACH

Thank you for inviting me to participate in this conference. I am impressed to see so many qualified and concerned professionals dedicated to the safety and health effort.

I was honored when Charles Ezell asked me to speak to you today. I'm pleased to have the opportunity to tell you how I feel about safety and health problems. I would not presume to talk to this distinguished group about the technical aspects of this subject, such as safety engineering, industrial hygiene, or occupational medicine. You are more informed about those subjects than I am. But I wish to tell you about my experiences concerning the implementation of these technical aspects of safety and health and the management of effective safety programs.

Your technical know-how and well planned programs will be an asset to your organizations *only* if management creates an environment in which these resources can flourish. This is something that many of us do not really appreciate, and it is the reason that many safety programs die on the vine. But it is a fact of which I have become cognizant during the past several years, which has proven to be very valuable to me and to Dan River.

MANAGEMENT COMMITMENT

The first essential necessary for an environment which is conducive to a successful program is *commitment*. Management must be committed - absolutely and positively! It must come from the very top of the organization. The commitment must be sincere, genuine, and serious. The attitude of all concerned must reflect this commitment. It must be talked about often. It must be given equal billing with other manufacturing objectives, such as quality and efficiency, and labor turnover. There must be visual signs and actions which reinforce this commitment. Safety effectiveness must become part of the criteria by which we measure supervision.

There is no better way to outwardly demonstrate one's commitment to a cause than to spend your money to support it. Political campaigns are a good example. The same is true with safety. Management can demonstrate its commitment to safety and health programs by spending money to support them. This may mean hiring additional staff overhead, which frequently makes management flinch.

At Dan River we have always had safety programs. We gave them lip service - oh, we put up safety posters and had a safety banquet once a year. We printed a monthly report, but we didn't talk much about it, and we seldom used safety as the criteria in evaluating supervisory effectiveness.

Then several years ago we became serious - rather, we became committed. We decided that it was really in the long-term best interest of Dan River to have an effective safety and health program. We employed and trained men to be safety and health professionals. We established policies at the corporate level to set forth our intentions and objectives. Reports were established and published regularly. We began to devote a part of *each* corporate management meeting to safety and health reporting. Performances were compared among operating divisions. The good ones were praised, and the poor ones were questioned and criticized. Managers were evaluated as to their effectiveness of their safety program.

Soon - the word was out. Dan River was serious - was committed to safety. Managers began giving safety top priority. Soon our results began to show improvement. Everyone became enthusiastic and excited about the progress being made in safety - some of us were actually surprised! The improvements have indeed been significant.

Most of our accidents have been eliminated. Everyone has become more safety conscious. People have become involved and, as a result, have found more satisfaction, more enjoyment and more fun in their work. People have more pride in their company.

Unpublished Speech by Lester A. Hudson, September 23, 1981. Reprinted by permission.

MANAGEMENT RESPONSIBILITY

It is now fashionable and in vogue for managers to talk about quality circles. I must get 10 brochures each week promoting seminars on quality circles. Dr. Demming, who is credited as the one responsible for the success of Japanese industry as we know it today, established quality circle programs thoughout Japan. He found that 85% of all quality problems are management problems and that only 15% are employee problems.

Very few of us in America believe this. We may even find it astonishing to think that management makes 85% of the poor quality. But the laugh is on us — it is true! And the same concept applies to safety. Management is responsible for most of the accidents which occur. Poor safety is a management problem.

Most of our employees want to do a good job and want to observe good safety practices.

Management must implement programs to train employees in proper methods and good safety habits. We must follow up to ensure that these procedures are followed. Looking the other way when a dangerous short cut is taken only advocates the practice.

Management also must provide the right tools, machines, raw materials, equipment, etc., that permit good safety.

We have had safety glasses available in our company for many years. We didn't become serious about wearing them until about a year ago. Then we required the use of safety glasses for certain tasks as a condition of employment - no if's, and's, or but's.

About three or four weeks ago, an electrician in one of our Alabama plants was working on an electrical junction box when an electrical flash occured. Only minor injuries resulted, but we are sure that his safety glasses saved his eye sight. I know these things are important. I am convinced that I would have been responsible for that man having lost his capacity to see if I had not insisted, required, ***demanded***, that safety glasses become a condition of employment.

Management must recognize that most accidents are their responsibility.

MORAL OBLIGATION

Being responsible for the productivity and profitability of a company is a heavy burden. But, the ultimate responsibility for the safety and health of all the company's employees is simply awesome! The proper management of productivity, profits, quality control, and market strategies is the lifeline of a company. But, machines, materials, and market strategies don't have feelings and they don't have families.

After a change in business activity, I can arm myself with all the facts and present our stockholders with understandable explanations for a change in sales or a shift in market demands, or all the reasons our earnings per share were not as expected. I can report on our action plans to return our business to economic health. But there is simply no way to satisfactorily present the facts to a grief-stricken family concerning the loss of a human life, the loss of sight, or a permanent disability. There is no way to "fix" this loss. It is lost forever. And, unlike our presentation to stockholders, there can be no "action plan" to make the person whole again.

I cannot overemphasize; this is an awesome responsiblity that cannot be shifted. It is also a moral obligation. It's roots can be traced to Biblical origins.

Nonetheless, there is a great tendency - a human tendency - for management to rationalize after experiencing a human tragedy. It is always so much easier to find the "careless acts" on the part of an injured employee which precipitated the accident. But, an enlightened management will not hesitate to look beyond the "Unsafe Act" on the part of an employee and to consider it as a ***symptom*** of a loss of ***management control***.

There is also an understandable tendency in such circumstances for people to avoid personal blame. This is to be expected.

At Dan River, we try to avoid these obstacles by investigation procedures which do not find fault for human failures. Rather, we look for the management system breakdowns which really caused a lack of control. And, we then try to make system-oriented corrections, such as better procedures, training, motivation, or supervision. We realize that only this kind of "action plan" will result in better management and harmonious interaction within the production environment.

The reason we take this approach is best illustrated by a quote from Homer Sanger. He said:

> "Any baseball team could use a man who plays every position superbly, never strikes out and never makes an error; but there is no way to make him lay down his hot dog and come out of the grandstand."

Those of us who are involved with the management of an organization will make mistakes. But we must always seek to improve and attempt to manage our risks so that the mistakes we do can be corrected.

SAFETY MANAGEMENT

We have learned that we cannot afford to manage safety any differently than we manage any other aspect of our business. In other words, we cannot ***segregate*** the safety function and expect success. At Dan River, safety is seen as an opportunity to improve overall management.

Experiences at our Company recently have proven beyond a doubt that there are ***real***, tangible opportunities in the safety area. Taking advantage of these opportunities have paid dividends far beyond our ***primary goal*** of reducing the pain and suffering which accompanies accidental injury. It has even gone beyond the ***secondary goal*** of reducing the rapidly escalating cost of Worker's Compensation and hospitalization.

The most valuable fringe benefit of considering safety an operational strategy has been the general improvement in line management's ability to manage ***all*** aspects of their total jobs. Believe me, this is not just mere rhetoric. It is readily evidenced by correlating safety statistics with all the other indicators of success. It is a proven fact.

We have found that when safety becomes a part of the total management job, we begin to ask the pertinent questions such as: Are the monies now being spent for safety really a true cost of doing business? Are we missing out on real opportunities in accident prevention? Can we put our money to better use? How are we measuring our success? These are the common questions asked of any other function within a company. Should the safety function be immune?

ECONOMIC BENEFITS

Peter F. Drucker, in his book, ***MANAGING IN TURBULENT TIMES***, reminds us of the urgent need to constantly evaluate expenditures. He discusses the "Operational Budget" and the "Opportunities Budget" and suggests that we analyze costs accordingly. To quote Drucker:

> "For the operational budget, one asks: 'Is this effort and expenditure truly necessary? If not, how do we get out of it?' But, if the answer is 'Yes', one asks: 'What is the minimum to prevent serious malfunction?'
>
> "For the opportunities budget, the first question is: 'Is this the right opportunity for us?' And if the answer is 'Yes', one asks: 'What is the optimum of efforts and resources this opportunity can absorb and put to productive use?"

In most companies, the safety function has traditionally been considered as part of a company's operational budget. It has been considered ***exclusively*** as a cost of doing business. It has consisted of the monies required to maintain the traditional functions and to meet the requirements of the various safety laws. In my opinion, this has been done with much too little attention paid to the actual return on our investment, both in

terms of reduced pain and suffering as well as the more tangible benefits.

So, in answer to Drucker's question, "Is this effort and expenditure concerning safety truly necessary?", we have always responded with an unqualified "Yes". Any answer short of yes would be inhumane.

A portion of our operating budget has always gone for the "hardware" elements of a safety program, such as safe design of equipment, the guarding of machines, and the equipping of plants with fire extinguishers and other emergency related hardware.

Yet, in the past we did not explore the matter much further. That is, we did not always ask whether we were getting our full dollar's worth from all our investments.

Many times in the past we have not considered safety to be a part of our "Opportunities Budget". At Dan River, we are now looking at safety expenditures as opportunities — opportunities which are considered just as important and just as potentially profitable as production-oriented investments or the introduction of a new product line.

We feel that this is very important, particularly in times of economic uncertainty, high Worker's Compensation cost and a shrinking labor market. Every level of management must continually seek new areas of profitability, including the evolution of more effective safety programs aimed at the control of all losses.

Today there is more truth to slogans such as "Safety Pays" or "Safety and Production Go Together" than at any other time in our past. That is why, in Dan River, we are trending toward referring to the safety function as a "Loss Prevention" function, the function which can and must make a major contribution to profits by minimizing losses which are a drain on total corporate profitability.

Every level of management must recognize and accept the fact that good safety brings profits through good management. True, there may be high initial costs involved in operating safely or to sustain proper housekeeping and equipment maintenance, but in terms of accelerating insurance costs, Compensation costs, losses in efficiencies, or outright shutdown because of fire or explosion, these expenditures become opportunity investments. Failure to allocate funds is synonymous with assumption of unreasonable risks and the possibility of a disaster.

SUMMARY

We have discussed the following points:

1) Management Commitment - Absolutely essential!
2) Management Responsibility - 85% of the problem in management.
3) Moral Obligation - An awesome responsibility. We ***must*** provide a safe environment for all our associates.
4) Safety Management - Must be considered an important part of the total management function.
5) Economic Benefits - The economic rewards of an effective safety and health program are lucrative. It makes sense.

I can personally guarantee success with this approach to safety and health. I resisted the temptation to bring charts and slides which illus trate the tremendous improvements we've enjoyed at Dan River. However, if you have an interest, I am sure Charles Ezell, our Corporate Safety Director, will be happy to share this information with you.

I applaud your efforts to improve the safety and health for all those who work in our plants, our industries, and our businesses throughout South Carolina. Your success is essential to our continued progress.

Thank you.

SMALL PLANT'S SAFETY SUCCESS FORMULA

by *Frank W. Lancianese*

In 1980, Olin Brass Fabricated Products (East Alton, Ill.) registered an 0.48 OSHA recordable injury incidence rate, when it sustained only 18 minor injuries and one OSHA recordable injury in working 416,291 manhours. In addition, it's been over eight years and close to six million manhours since Olin sustained its last lost-time injury.

Olin Brass Fabricated Products employs some 200 workers. The plant manufactures a wide variety of fabricated brass products, including bathroom fixtures, automobile thermostats and condenser shells, and valves for washing machines, dryers, and dishwashers. The East Alton facility is one of the four divisions within Olin Brass, whose parent company is Olin Corp.

To find out what makes their successful safety program tick, we contacted A. P. Jackson, manager of safety and loss prevention for Olin Brass. Jackson, a mechanical engineer, has held this post at Olin for 11 years.

Personal touch

To what does Jackson attribute the impressive injury incidence rate? "A big reason was the 'personal involvement' theme we gave our safety program last year," said Jackson. "This theme, which is carried out in several ways, seeks to increase the employees' input into the program."

One way is the "Quality Circle Team" concept. "Small groups of volunteer employees are given time off their jobs each week to attend meetings with management personnel where workers raise any job-related problems they have, whether safety-related or not, and recommend solutions," Jackson explained.

Safety meetings for all employees are also held monthly within each department. They take place during working hours and away from the department's work area. The shift foreman presides. The agenda focuses on a different safety topic each month. Jackson and his associates in the safety department usually recommend the topics, but several months a year employees set their own agenda.

"The meetings use a variety of techniques to approach each month's subject," Jackson said. "Along with open discussion among the workers, safety training films are shown twice yearly, and slide shows are also presented frequently."

In addition to learning on-the-job safety procedures, the workers attending the safety meetings kick around ideas which might create a safer workplace. If they agree on a particular idea, they put it in writing and send it off to management for consideration. "Safety suggestions are never ignored by management," said Jackson. "They don't always reply affirmatively, but they always reply. This way at least workers know that their ideas aren't being filed away somewhere. They know they're getting a hearing."

Olin also has a joint union-management safety committee which meets four times a year. It consists of four union members and four management members, one of whom is a safety official. Four unions represent Olin employees; the largest is the International Association of Machinists (IAM). The committee's chairmanship rotates yearly from a union representative to a member of management. "The committee receives and investigates safety complaints and reports of potential workplace hazards," Jackson said. "At the meetings they discuss their findings and decide on the best corrective measures. They then submit these recommendations to management."

Jackson noted that Olin's management is most receptive to the committee's recommendations. He gave us a for-instance: "The committee determined that a new scaffold would greatly reduce the risk of falls in one of our work areas. Although the scaffold was quite expensive, management recognized the inherent safety benefits and promptly authorized its purchase."

The monthly formal housekeeping tour is another way of attaining personal involvement. Every month a different hourly employee joins the plant's superintendent and loss prevention engineer on the four-hour tour. They inspect equipment to ensure that it is clean and in safe working condition. They also watch Olin's workers in action to check for safety violations and potential hazards.

"Through the 'Quality Circle Teams,' employee and union-management safety meetings, housekeeping tours, and other means, we try to drive home the fact that our employees' part in the safety program is pivotal," Jackson stated. He added: "If a worker feels he is in some way responsible for his plant's safety program, he will try to perform his job more safely in order to help the program succeed."

Extensive training

Jackson cites the extensive safety training conducted at Olin as the second key element behind the plant's low injury incidence rate.

An Olin worker's safety education begins his first day on the job. New employees and those transferred from other departments immediately undergo the "SOS" (safety orientation by supervisors) program. First the supervisor, who is usually the shift foreman, goes over the plant's and the department's safety rules. A quiz follows. If the worker answers any of the questions incorrectly, he must retake the quiz until he scores 100 percent. Next, the foreman takes the new worker step-by-step through his assigned job, stressing the necessary safety precautions along the way. A week later, the foreman runs the worker through this program again to make certain he hasn't forgotten anything.

Along with the general training received at the monthly safety meetings, specific hands-on training programs are required for employees who operate certain equipment. One example is forklift tractor training. "Forklifts are used quite extensively in this plant," Jackson said. "However, before any employee is permitted to operate a forklift, he must have taken our in-plant forklift training course. The course is designed to insure that workers know how to operate forklifts properly and safely." The training course, given by the shift foreman, includes a film presentation dramatizing correct operational procedures, a written examination, and hands-on experience under the foreman's scrutiny. Certificates are issued to workers upon successful completion of the course.

All employees are drilled once a year in plant evacuation procedures. Evacuation plans are posted in all areas of the plant. When the fire alarm sounds, workers following the evacuation plan, exit the plant. Their performance is timed and later evaluated to see if any improvements are needed in the evacuation program.

Olin also trains its supervisors, approximately 35 in all, to be prepared for emergencies. The company sponsors courses in first aid and CPR for supervisors. Courses are held on company time. They're taught by one of Olin's safety engineers. Although the sessions are voluntary, attendance has been impressive. "All of our supervisors have taken the first aid course, and over half have gone through CPR. I think this response proves that they're more than willing to do their part in making for a safer working environment," Jackson said. He noted that both first aid and CPR are offered free of charge to employees as well, but they must attend the classes on their own time.

In addition, first-line supervisors are required to complete the safety home study program offered by the National Safety Council. It covers how to improve supervisory skills and instill safety awareness in workers and concludes with a test.

SAFETY PERFORMANCE

Olin Brass Fabricated Products/1972—1980

YEAR	Lost Time Injuries	Serious Injuries	Industrial Injuries	OSHA Recordable Injuries	OSHA Recordable Injury Rate
1972	2	6	169	4	1.07
1973	0	5	213	16	3.82
1974	0	2	150	2	0.53
1975	0	2	92	2	1.58
1976	0	5	88	5	1.36
1977	0	3	58	4	1.30
1978	0	7	56	8	2.80
1979	0	0	37	6	2.00
1980	0	1	18	1	0.48

Safety first

Over 300 presses, from simple punch presses to complex 200-ton transfer presses, are operational in the Olin plant. To safeguard press operations, machine guards of various kinds have been installed. They include barrier, pull-back, light, or other types, depending on the structure of the press. Microswitches and interlocks are also used.

Along with engineering controls, Olin provides its workers with a full line of personal protective equipment. Head-to-toe protective clothing, safety shoes, ear plugs, gloves, safety glasses, and respiratory equipment are available at no cost to workers. Jackson noted that "all employees are required to wear safety glasses and metatarsal shoes at all times; and in work areas where noise levels are 85 dBA or more, ear plugs are mandatory."

Jackson is especially enthusiastic about the value of what he has designated "job safety write-up sheets." These sheets are permanently posted on each piece of equipment and provide detailed instructions for its safe operation. The sheets are regularly reviewed and upgraded.

At the start of every workshift, all equipment operators go through a "safety check-off" procedure. Before they start up their equipment, they check for any frayed wires or broken or misaligned parts.

Jackson also cited the following aspects of Olin's safety program as exemplifying the plant's "Safety First" attitude:

- Every injury, regardless of how minor, is investigated by the injured worker's supervisor to determine the cause and to specify corrective action. Formal reports are issued to the department head.
- Injury reports are immediately circulated to all departments, so that workers can check their areas for similar hazards.
- Monthly safety reports are distributed to inform employees of the safety status of their departments.
- A mandatory safety "tag out—lock out" procedure prevents disabled equipment from being operated until repairs are completed.

- Daily informal housekeeping tours help maintain a clean, safe working environment.
- In areas where maintenance personnel lack expertise, outside firms are employed on a permanent schedule to check cables, hoists, chains, and other equipment.

Motivation

"Stringent enforcement of safety rules is a top priority at Olin," asserted Jackson. "Our enforcement policy lets workers know we mean business when it comes to safety."

The superintendent of each department is responsible for safety enforcement within the department. Jackson provided us with a brief description of the enforcement policy. "If a worker is seen breaking a safety rule, he receives a verbal reprimand. If the worker commits a second safety violation, he is warned in writing. A third violation carries with it a three-day suspension, and any further violations could result in the worker's termination," he said.

Jackson noted an addendum to this four-step enforcement process: "If we catch a worker operating his press without an appropriate machine guard, he will be automatically suspended for three days."

Strict enforcement, however, is not the only way employees are motivated toward working safely. Olin's safety incentive program also helps do the trick. Under the program, awards are given for major accomplishments in safety. When Olin attained one million manhours worked without a lost-time injury back in 1973, workers received jackets. When the two-million plateau was reached two years later, they were awarded gift books. The three-million level in 1976 brought a gift of either a calculator or a jacket. Watches were issued when four million manhours without a lost-time injury was achieved in 1978. Sweaters were awarded a year later when the string reached five million, and last year, when Olin had completed five-and-a-half million lost-time injury-free manhours, a refrigerator was installed in the plant for the workers' convenience.

While Jackson believes the safety incentive program has stimulated safety consciousness and promoted a team effort at Olin, he cautions against over-use of incentives. "If it gets to the point where workers feel as if they're being rewarded to perform their jobs safely, and this factor alone motivates them, it's time to redesign the incentive program," he stated. "Incentives should be but one element in a total program."

According to Jackson, this hasn't become a problem at Olin. One potential problem he does fear, however, is complacency. "We constantly remind workers that we didn't accomplish our safety record by sitting on our hands. It took a lot of hard work, and any letdown of our safety efforts could easily result in injuries," he said.

Evidently, complacency hasn't struck Olin yet. At presstime, the plant has sailed through 1981 without a lost-time injury, serious injury, or OSHA recordable injury, and has incurred only three minor injuries.

Behavior based safety management

by R. Eugene Earnest

For many years, Procter & Gamble has been recognized as one of the better managed companies in the United States. Various articles have been written in *Forbes* and other business-related publications touting the P&G manager and how he or she is sought after by other companies. The Peters & Waterman book entitled, "In Search of Excellence," identifies Procter & Gamble among the best managed companies in America. Incidentally, this book was on the best seller list for 66 weeks.

With all the compliments being paid to P&G managers, it may be a surprise when I tell you that several years ago insiders thought the company safety programs needed improved management. That is not to say our "track record" was bad. In fact, our performance was significantly better than most other companies. For example, in 1976, the P&G year-end lost workday case frequency rate based on 1,000,000 safe working hours was 0.9. The all-industry lost workday frequency rate for the same period was 10.9. At that time we also held world safety records in five divisions.

Early safety programs

Prior to 1977, our safety programs tended to be directed primarily toward physical hazards and changing employee attitudes toward safety. The approach relied heavily on hazard surveys, promotions and gimmicks, rather than focusing on behaviors and utilizing sound management principles. The interesting thing about these above average results was that few managers understood how to consistently get good results in safety. There was little correlation between effort expended and results obtained. I am convinced that the process of getting results can be as important as the results. I visited our plants that held world safety records in those days, and in management safety meetings asked how they accomplished this feat. The silence from the group was overwhelming. The fact is many managers didn't understand how they attained this performance. I believe it is safe to say there was a feeling that safety could not be managed to obtain consistently good results and that by a lot of prayer and keeping a high level of awareness, they would somehow maintain their safety record.

Most line managers were aware their hard number safety results were much better than national averages and were not motivated to make a significant change in the way they managed safety. On the other hand, the Corporate Safety Section did not think plant safety performance was where it should be, and audits they conducted indicated that improvement was in order.

As a means to initiate change we began to create dissatisfaction with the status quo by comparing our safety performance results with other companies that were top performers and publicizing this information. We were only average in this select group. In effect, we were asking them if they wanted to play in the major leagues or in the minor leagues. This

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appealed to their pride. At about the same time, we were developing a corporate safety seminar that would provide a clearer focus on how to effectively manage safety and was structured to initiate change.

The beginning of change

The actual turning point in the way safety was managed at P&G began in January 1977. This was the date on which the first plant was exposed to the seminar entitled "Management Safety Training." The MST Seminar was constructed around the concept that efforts in safety should primarily focus on activities that are directed at changing behaviors, as opposed to activities that are directed at changing attitudes.

The realization that safety efforts should be focused on behavior became apparent after reading an article published in the *Harvard Business Review*. The article entitled, "Behavioral Theory vs. Reality,"[1] was written by James A. Lee, Professor of Management, College of Business Administration at Ohio University. Mr. Lee provided an eight-step approach for managers to make maximum use of the then current knowledge of human behavior in organizations. In Step No. 8, he makes the following statement: "There is scant evidence that attitudes can be changed and then behavior, but there is a mountain of evidence that belief is shown in the willingness to act; therefore, strive for changes in behavior."

Mr. Lee's article had the effect of turning the light on as it were, to the realization that the major efforts in safety should be directed at activities focused on changing behaviors. It was obvious a great deal of activity had been devoted to getting the right safety attitudes and this effort had not yielded commensurate results.

Let's examine the difference between attitude and behavior. Attitude has been described as an internal state. Behavioral scientists tell us attitude is merely a label based on general conclusions drawn from a series of behaviors. We draw conclusions about a person's attitude based on how he or she behaves in response to a given subject. For example, we may conclude an employee has a bad attitude toward safety because she refuses to wear personal protective equipment or follow certain safe procedures. On the other hand, behavior is the external evidence of an internal state. In other words, behavior is observable, while attitude is not.

People generally resent the attitude approach in that it is directed at changing their thinking. There are certain values which we hold dear and do not want anyone tampering with them. On the other hand, most of us would agree there should be certain expectations regarding our behavior. For example, we should be expected to come to work on time, do a fair day's work, and behave in a safe manner. Few people will argue with that rationale, provided the rules are reasonable and clear.

Goal setting can be an effective means of motivating our people in safety.

You may be wondering how P&G or any other company becomes involved in the attitude approach to safety. The attitude approach should not be surprising; after all, in 1931 H. W. Heinrich identified attitude in the foundation and the five steps of accident prevention. Some of our behavioral scientist friends have also influenced our thinking. There is a school of thought among behavioral scientists directed toward changing people's thinking. This school of thought has created a certain amount of suspicion and has caused many managers to view the subject of human relations as fuzzy, not very useful, theoretical, and so forth.

As noted earlier, many P&G managers didn't understand how to get consistently good results in safety. We believe this was in part due to deficiencies in the way we measured safety performance. Prior to 1977, feedback was heavily oriented toward after-the-fact performance measures. It consisted primarily of the lost work day case rates and recordable incidence rates. Most of our plants have departments with fewer than 100 people and the total work hours per year don't provide a good statistical indicator for judging true safety performance based on the recordable incidence rate. Therefore, managers could not correlate effort expended on safety with hard number results.

Although most managers had not been taught that the outcome of an unplanned event is a matter of chance, their experience told them the measurement system left much to be desired as a statistically reliable feedback tool. It should be apparent the average manager's motivation to devote effort to safety wasn't all that great based on the feedback system. Obviously, there are managers who devote effort to safety who are motivated by humanistic concerns, but experience tells us this is not adequate to ensure a well managed program.

Effective motivation

At this point, let's examine the motivational aspects of safety in more detail. Perhaps motivation might best be understood by referring to an article published in *The Personnel Journal*, entitled, "Where Have All the Golfers Gone."[2] This article was written by William H. Mobley, Director of the Center for Organizational Research at the University of South Carolina. Mr. Mobley discusses the motivational components of the game of golf. He points out there are a number of clear goals in the game. "You know the pin you are shooting for; you know the par, and you know your previous score for the course." "Recall those occasions when you hit a blind shot? If the entire game of golf were nothing but blind shots, would you continue to be interested? How long would you be motivated to play golf, if there were no pins, no pars, no score board, i.e., no goals?"

Goal setting can be an effective means of motivating our people in safety. Do we consistently set meaningful goals and action plans in our safety programs? Are they measurable and do they adequately address behaviors? We have discovered that one effective way of motivating our plants is to request safety goals and action plans each fiscal year. Goal setting has been a significant factor in improved safety performance.

Mr. Mobley asks, "What would happen to golf and golfers if we applied some commonly heard management logic, such as, it's upper management's job to know goals and monitor goal attainment. We can't really trust employees with important

information like distances, pars, pin placements, etc. Why, the employees might tell our competition at other golf courses about our distances and pars, or they might attempt to peg par at an easier level. In place of clear goals, we'll train our supervisor how to tell employees to keep swinging, do their best, and to give us a fair day's swing. When employees ask what they're shooting at, just tell them that is management information and keep on swinging.

"We need to be careful in how we give feedback to employees. If they find out they are doing well, they may become complacent or want a pay increase. If they find out they are not doing well, they may get demoralized. Instead of direct feedback, we will ask personnel to design a rating form and once a year we will have a performance review and feedback session. Supervisors can keep notes all year on how well people played various holes, on their stance, on whether or not golf shoes were polished."

Relating this to safety, we might ask are we involving employees in the goal setting process? Are we providing direct feedback to their safety behaviors—both good and bad—or are they in the dark concerning their safety performance?

Mr. Mobley also discusses the impact on golf if it were regulated by the government. Some examples he gives are:

- All sand traps will be painted red, and all lakes drained.
- All balls must be designed so as not to cut when sliced and float when hit into water.
- No golfer may take more than 72 swings in a 24 hour period.
- No golfer may carry more than 2 clubs in a bag at one time.

A regulatory tie-in with safety ought to be obvious. Do our interactions with the line organization smack of regulations? Are we viewed as being more concerned with compliance with regulations, rather than helping them run a safe operation? How are we motivating our line managers to be proactive in safety? By setting the stage for them to discover their own shortcomings and assisting in providing solutions, or by a heavy hand regulatory approach? Mr. Mobley concludes the article by asking "where have all the golfers gone?" After managing and governing golf, many previously well motivated golfers have gone to mediocrity, are absent and/or have quit and switched to bowling. We might ask, "are we motivating or demotivating people in safety by our approach?"

Safety training

Earlier we suggested safety activities should be primarily directed at behaviors. This realization provided clearer focus to the organization. There was also some missing logic needed to fit the safety puzzle together and to motivate the organization. They hadn't clearly identified accidents as performance errors that they could control. I have discovered managers are responsive to safety as well as other business needs, if it makes sense to them.

. . . managers are responsive to safety as well as other business needs . . .

The logic of safety, as well as focusing on the behavioral approach, was provided via the Management Safety Training seminar given to the top management in our plants and eventually to all managers. Many seasoned managers commented in the seminars that this was the first time safety had been presented in a logical, straightforward approach and it made sense.

The first MST seminar was conducted in one of our plants that, at the time, was in the bottom position in safety among P&G paper plants. The seminar taught the concept that accidents are performance errors, as well as the concepts of conducting behavior based safety management programs. It also provided a vehicle for the management team to identify effective safety activities. Once they identified where they should be expanding effort, they were committed to follow through. Prior to the training, many managers were likely to use the shotgun approach when they experienced increased injuries because they were not sure which activities were most effective. In fact, after completing the process of identifying effective safety activities, they admitted the activities previously engaged in were those they now identify as not very effective.

Pinpointing effective safety activities proved to be a real eye opener for many managers. Eventually, practically all of our plants and international plants received the MST training and embraced the concepts. Abbreviated MST sessions were also developed for operating division managers, managers of manufacturing, and operating division vice presidents. One vice president sent a letter to the corporate safety section stating that MST provided a logical approach to safety, and the concepts presented were not intuitively obvious and must be taught! This may be a shock to those that claim that safety is just common sense.

Safety results within the company began to improve significantly. In 1977 the Total Incidence Rate was 4.0 and it is currently 2.4. The company has a cost improvement program. For the first time, we were able to relate a specific intervention in safety to improved safety performance to the tune of $1.5 million in direct costs. Safety began to make more sense to managers when we provided the missing logic, began relating accidents to performance errors and explaining why hard number results alone were not adequate measures of true safety performance.

Improved safety programs didn't happen overnight; it took months and years to apply the behavioral approach. We explained to the organization that safety has a fly wheel effect and they could not expect results overnight. As a matter of fact, this same fly wheel effect helps explain apparent good safety performance in certain departments where safety programs are lacking. The logic fit together so well that most plants were encouraged once they were able to apply the principles and accomplish the behavioral changes. They saw value, not only from improved safety performance, but also from skills obtained in the seminar that could be applied elsewhere. The organization began to see safety more closely aligned with business needs. One of our plants actually took the majority of the slides used to teach MST and substituted the words "cost reduction" to form the basis of their cost reduction program.

The logic was so well presented that one plant manager wrote the

following, "The MST seminar was one of the most stimulating sessions that I have experienced in my 25 years with the company. It presented some concepts and approaches to safety in a very logical, straightforward, stimulating manner, which certainly eliminated any skepticism on my part, and left me fully committed to safe behavior reinforcement as the approach that this plant should follow in the future."

How it was done

As part of the process of explaining the logic, we modified the Heinrich pyramid to focus on behavior (Figure 1). The after-the-fact measures are identified as the consequences and are measures of our failures. We also stress the fact that once an event begins to occur, the outcome is largely fortuitous. We remind them of the Heinrich ratio and that there are generally many behaviors before a serious injury occurs. We also point out the behavior includes employee behavior as well as the behavior of management. It is important we consider the entire system.

We then suggest that perhaps a better measure of true safety performance can be found in the quality of their safety programs. At the bottom of the pyramid we provide examples of control activities that are or should be part of the plant safety programs. We point out these are things we can control that will get the right behavior and thus, prevent injuries. We also stress that keying off program activities rather than injury data greatly reduces the cyclic swings in hard number results. This pyramid completes the logic of safety.

One plant depicted the safety pyramid in a cartoon form that illustrates the two tracks of safety. The first track is of after-the-fact performance measures and reactive, responding to injuries, while the second track is at the bottom of the pyramid, working on the control factors that prevent injuries.

Another plant utilized the pyramid as a basis to coach employees that have experienced an excessive number of first aid injuries. They accomplished this by determining plant injury experience over a ten year period and then publicized the ratio between lost time, recordable and first aid injuries. They could then predict when an employee would experience a lost time injury. They would use the information to coach the employees and to inform them if

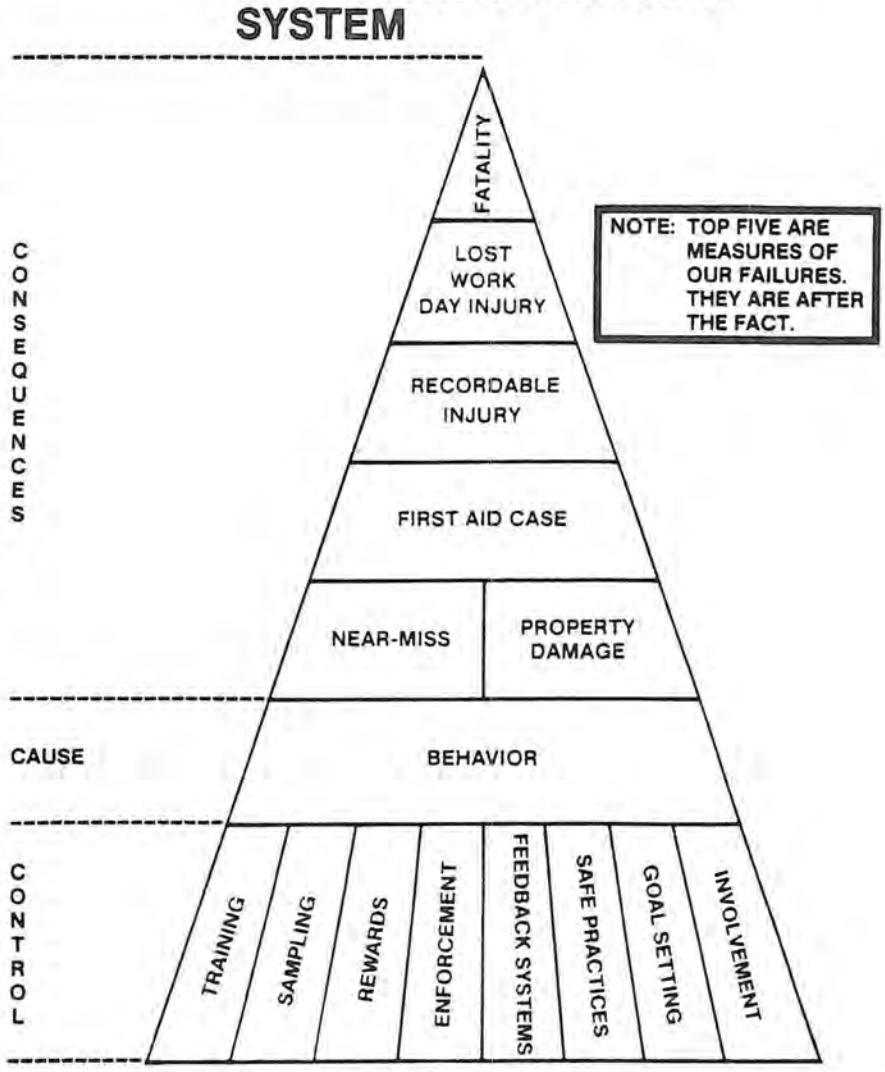

Figure 1

their current behavior continued, it would result in a serious injury in a specified time.

Feedback was well received in that concern for the employee was shown, and using the statistics eliminated the fault finding feeling that can often accompany such discussions. They also discovered that 13% of the employees were experiencing 39% of the injuries. This approach proved to be effective in changing employee behavior.

With the thrust toward behavioral based safety programs, we began examining plant and departmental safe practices to ensure they were behaviorally written. We discovered they varied all over the map from those that were quite well written to those that were poor and contained many words such as "be careful," "think," "watch out for," and similar non-behavioral statements that did not provide clear direction. Incidentally, I believe many of the precautionary terms such as "be careful," "think" and "be alert" found in safe practices are the outgrowth of managerial frustrations in attempting to change employee safety attitudes.

Since safe practices defined acceptable behaviors, it became apparent they must be written in a professional, uniform manner, clearly outlining expectations. Therefore, guidelines and a video tape were developed to assist plants in writing behavioral-oriented safe practices. Written behavioral safe practices minimize confusion, and they tend to manage themselves because expectations are clear.

We also began teaching observation skills so our people would become skilled observers. Observation

was directed primarily at behaviors since this is at least 85% of the problem. We also provided a safety performance analysis chart with general solutions to assist observers in pinpointing the performance deficiency associated with a given behavior.

For example, if an employee performs certain unsafe acts in the presence of a manager or other authority, it indicates a lack of feedback. However, if that behavior changes to a safe behavior when the employee is being observed, this indicates problems with the balance of consequences or reward-punishment system. I have used this skill many times during surveys to assist the organization in pinpointing solutions to behavioral problems. In conducting a behavioral oriented program, observation skills become very important.

We also taught safety sampling concepts so people could make random observations of behaviors in their departments to provide trends and improve behaviors before they resulted in injuries. Some of our plants have computerized their safety sampling systems to improve processing the data. Our safety sampling systems, generally speaking, do not match the book approach. We are not concerned with having a sophisticated statistical tool that will provide a percentage of unsafe behaviors with a given confidence level, but to use this tool not only as a means to identify trends but also as a means to reinforce safe behaviors and to correct unsafe behaviors.

We attempt to have the sampling done by both managers and operating personnel. We also encourage our plants to provide safety sampling data in the form of safe behaviors as opposed to unsafe, to make it more consistent with other performance measures, and to emphasize the positive aspects. Once a safety sampling system is put in place it can then be used for goal setting. For example, if a department is running 90% safe behavior, they can set a goal to improve behavior by a certain percentage.

Correcting unsafe behavior

In regard to correcting unsafe behavior, we utilize a video tape produced by one of our plants to teach confrontation skills. We want all managers and employees to recognize unsafe behavior and have the necessary skills to successfully confront all unsafe behaviors. The tape provides confrontation strategies and contains role plays involving employees confronting other employees, employees confronting managers, and managers confronting employees on safety issues. We also provide written guidelines dealing with effective confrontations. Many people are not good at confrontation skills and get into the fight or flight syndrome rather than using negotiation strategies.

To better equip our people in confrontation skills, we show the tape, review the guidelines and then role play safety confrontations based on situations they will encounter in their departments. This approach has been effective in that it builds confidence in their ability to successfully deal with unsafe behavior.

. . . safe behavior reinforcement makes sense and has a lot of potential.

We are also beginning to teach people safe behavior reinforcement skills; however, this is less advanced than confrontation skills. Believe it or not, it is more difficult to get people to use safe behavior reinforcement than it is to use confrontation skills. There is general agreement that safe behavior reinforcement makes sense and has a lot of potential. But many managers will readily admit they have been taught to "look for the things that are wrong, rather than look for the things that are right."

In other words, the negative approach has been reinforced more than the positive. There is still considerable work to be done in implementing safe behavior reinforcement programs. However, there is considerable benefit to be gained by people acquiring and implementing this important skill, and we will continue to work in this area.

Earlier we differentiated between attitudes and behaviors and mentioned that most P&G managers prior to 1977 were engaged in activities directed at changing attitudes. Now let's discuss safety-related activities and whether they relate to changing behaviors or attitudes. First of all, let me say that I'm not sure there is a clear line of demarcation on many activities as to whether they fall into the attitude or behavioral area. However, I believe there are certain activities that are clearly on both ends of the spectrum (Figure 2).

For example, posters, slogans and emotional films that provide little educational value fall under the attitude end of the spectrum. Also, these items are geared toward group attitudes. An example of such films is one that shows carnage on the highway and provides little specific preventive guidance. Likewise, slogans and posters that contain safety cliches fall under the attitude end of the spectrum. By the way, what does "safety first" or "take the first step to safety" mean? Generally speaking, you will not find activities that fall under the attitude end of the spectrum utilized in managing other areas of the business.

On the behavioral end of the spectrum is safe behavior reinforcement, safety sampling, and confrontation skills. These activities are all directly related to individual behavior and, therefore, are very effective. They impact directly on the behaviors that will determine the hard number results. Contests and promotions are somewhere in the middle; however, most P&G managers have ranked them under the attitude end of the spectrum. I believe this is simply because contests and promotions in which they were involved did not adequately tie in behaviors with rewards. In reality, they probably had not analyzed the relationship between rewards and the desired behavior in designing the contests and promotions.

With the emphasis on behavioral-based safety programs, we have provided guidance for conducting behavioral based contests and promotions. The guidance provided has caused plants to design awards that are more directly related to behaviors. I have not yet read an article dealing with awards that clearly stated winning the award must be contingent upon behavior. Failure to do so can reinforce unsafe behavior. We coach plants on how to design contests and promotions that reward individual behavior for maximum effectiveness.

For example, one plant developed a contest that focuses on behavior entitled "Building a Safety Founda-

Figure 2

tion." The contest requires all employees to do something about safety; all contributions are rewarded.

There are fifty building blocks, and blocks can be obtained based on certain activities. For example, a quarter block can be obtained by confronting unsafe behavior, reinforcing safe behavior of another individual, or housekeeping items, such as coiling up hoses and wiping up spills. Half blocks can be obtained by conducting a safety audit with follow up, conducting a safety team meeting, etc. Full blocks can be obtained by initiating safety projects, such as changing safe practices, making changes to equipment or conditions that reduce hazards or conducting department-wide safety training. This contest has shown very positive results in hard numbers due to improved safety behaviors.

Another plant developed a contest based on observing behaviors dealing with wearing safety spectacles in shop areas. Each time a person was observed not wearing the required eye protection, a check mark was put in a book. At the end of a given period, two persons with the lowest check marks received a token prize. A behavioral approach can also be taken on promotions. For example, one of our plants has rewarded safe behavior by randomly providing silver dollars to people who are performing in a safe manner. This has had very positive results.

I have provided a few examples of how we have changed the way we managed safety—from an attitude approach that was not well defined —to programs that are well defined, are primarily directed at behaviors and are based on sound management principles. These programs have been successful in terms of lower injury rates, as well as greater acceptance of the Safety Section as a significant contributor to improved management.

Corporate surveys reinforce the behavioral approach. Key activities of the safety program are used as a basis to develop a profile of each of the plant's safety programs. The key activities are significantly behavior oriented. For example, evaluation of the quality of plant safe practices is based on guidelines for developing behavioral safe practices. Goal setting and action planning are also evaluated. A video tape developed by the Corporate Safety Section explains how to set safety goals that focus on behaviors. The quality of department safety sampling systems is also evaluated, along with feedback of the results to the organization. Confrontation, discipline and safe behavior reinforcement are also part of the evaluation.

As safety professionals, we are performance improvement specialists that have a bag full of goodies we can offer the organization. However, our success in getting them to fully utilize what we have will be in large part dependent upon how they value us as a resource. Improved recognition of safety as a valuable management resource will not come through running bigger and better contests, promotions, gimmicks and other activities not associated with professional management, but through utilization of sound management principles applied to safety problems.

I am pleased to report that by applying these principles, the safety function at P&G has been successful in getting the organization to want to use the goodies from that bag as can be seen from the following example. Recently an operating vice president called the Safety Section and asked us to discuss with him and a senior vice-president the background and experience we had in developing the safety program, why we chose this approach and what they could learn from it! This says far more than any other story I might tell concerning the success of the behavior management approach.

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EMPLOYER-UNION GROUP TRAINS FOR SURVIVAL

by William S. Odlin

Five years ago the sheet metal and air conditioning industry was plagued with one of the nation's worst job safety records. This report tells how labor and management joined in developing a program of "defensive workmanship" that helped to educate workers in the art of self-preservation.

Ego gratification, resistance to authority, over-familiarity, fatalism . . . these can be some of the ingredients of disaster on the job, yet they are as natural to many of us as eating or breathing. What's worse, their potential, or even their existence, is seldom recognized.

Sheet metal and air conditioning industry members are learning about these and other accident causes—remote and immediate—as part of their training in "defensive workmanship." It is a portion of the learning imparted by the National Training Fund of the Sheet Metal and Air Conditioning Industry (NTF), a management-labor effort designed to provide this group with well-trained artisans—people who can do their job expertly and safely.

The term "defensive workmanship" was borrowed from the field of highway safety. Those seeking, on a professional basis, to prevent motor vehicle accidents have long recognized that a defensive stance promotes survival. Yet in some respects, common sense though it is, being on the defensive, even against a lethal threat, seems repugnant to some people. It's a situation that challenges the best persuasive talents of educators, yet the results justify these efforts.

Craft unions historically have assumed the function of establishing proficiency standards through apprenticeship programs. Job safety was treated with varying intensity in this training, often dependent on the severity of the problem in the industry involved. In the sheet metal field, the nature of the work posed an exceptional array of problems. While programs of widely varying success were underway in different sections of the country, it was not until five years ago, when these efforts were nationally coordinated and made uniform through the NTF, that satisfactory progress was achieved.

Establishment of the NTF and its three basic objectives of productivity, increased employment, and training stemmed from a proposal by Edward J. Carlough, general president of Sheet Metal Workers' International Association (SMWIA), to employers in the industry. It called for insertion of a provision, in the standard form of union agreement, for financing the organization by earmarking for job safety and education a two-cents-per-work-hour payment by employers. It was contemplated that the fund would have an annual budget of $3 million under conditions of full employment in the industry. The revenue, however, has amounted to somewhat less than this because of economically depressed conditions in the construction industry. Currently, the organization operates on an annual budget of $2 million.

Governing the NTF is an eight-member board of trustees, four from the union and four from management. Each of the two groups elected a co-chairman of the overall group: Carlough serves in behalf of the union; and Ronald E. VanGelderen, executive vice president of the Sheet Metal and Air Conditioning Contractors National Association, represents employers. There are about 6,000 members in the employers group. The union has a membership of 82,000 in the construction industry. There are about 10,000 apprentices, ineligible for full membership in the union until successful completion of the four-year apprenticeship training course.

Standards for apprenticeship

Employees and management in the industry operate under a standard form of agreement that provides for apprenticeship training. Each local of the union, however, retains the right to negotiate provisions varying from the national model.

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Similarly, each local sets its own procedures for recruitment. But the broad outlines of training are suggested in *National Apprenticeship and Training Standards for the Sheet Metal Industry,* which was jointly developed by the employer and employee groups in cooperation with the U.S. Department of Labor, Bureau of Apprenticeship Training.

The standards provide that applicants for apprenticeship shall be 18 to 25 years of age. For purposes of eligibility, years of military service do not count against the maximum age, thus veterans over 25 may qualify for the training. Applicants must be high school graduates or possess equivalency certificates, and must be physically fit to perform work of the trade.

The standards further provide that the term of apprenticeship will be at least four years (approximately 8,000 hours) "of reasonably continuous employment." Sheet metal apprentices, under the standards, are given training and job experience in all branches of their trade. The standards provide: "Instruction in accident prevention and safe working habits will be coordinated with the actual work performed and the job and the tools and equipment used."

Training provided for under the standards for apprenticeship includes: 1,000 hours devoted to air conditioning and controls; 1,000 learning sheet metal work, including welding; 1,000 spent on industrial sheet metal work, such as blow piping and collective systems; and 500 spent on substitute materials, such as plastics.

Under the standards, in addition to on-the-job training, apprentices are given a day of school work each week or, at the discretion of the local joint apprenticeship committee, take night school instruction on their own time.

Safety related to proficiency

From its inception, according to Gerald R. Olejniczak, administrative assistant of the National Training Fund, the NTF has operated on the premise that expert performance is seldom maintained where poor safety practices are tolerated. In adopting the mission of improving standards and performance of all who work in the industry, he adds, the NTF "has assigned priority to accident prevention."

Discussing some of the general accident causes the program aims to correct, Olejniczak cited ego gratification as a problem which may be difficult to assign as the reason for a particular accident. It is recognized, nevertheless, as an important component of accident-causing attitudes, he explained. Another example of dangerous attitude can be seen in the worker who, often unconsciously, gets a feeling of well-being by skirting rules and practices designed to prevent accidents—risk-taking that could be likened to jaywalking in heavy traffic. Resistance to authority, such as disobeying safety rules and instructions, is another of the NTF's targeted attitudinal problems.

Over-familiarity, Olejniczak said, is more common among experienced workers—people for whom the job has become routine. A danger here, he explained, is that the employee will go through the motions without concentrating on what he is doing. This makes him more vulnerable to accident and injury, particularly when something out of the ordinary happens.

Dr. Earl D. Heath, chief of training and education of the Occupational Safety and Health Administration, says OSHA has found contract construction to have the highest job injury rate of all industries covered by OSHAct. The sheet metal and air conditioning trades, although many of their functions are performed in factory-like fabrication shops, are regarded essentially as part of the construction industry.

Many hazards associated with building trades also confront sheet metal and air conditioning workers. These include high ladder and scaffold work, exposure to electrical burns and shocks, injury from falling objects, welding burns, and contusions and lacerations.

In addition to job-site types of injuries, workers covered by the NTF program are exposed to perils associated with metalwork shop machines —including power shears capable of severing not only fingers (the most common casualties) but a worker's arm. Another machine that can be dangerous is the press brake, a set of dies perhaps 10 feet in length and operated by pairs of workers. It is imperative that they operate as a well-coordinated team if injuries are to be avoided.

Dangerous attitudes the first target

Initially targeted by the National Training Fund were the attitudes of sheet metal workers toward safety regulations and practices. Much of what apprentices learn is from examples set by the journeymen. NTF, recognizing this, aimed

much of its program at impressing veteran members of the work force with the never-ending need for a wholesome attitude toward safety. This involved dispelling overconfidence and the well-known "it can't happen to me" attitude regarding accidents.

Under industry practice, an apprentice works with the guidance and instruction of journeymen, both on the job and in the classroom. Unsafe practices on the part of journeymen, therefore, could have a compounding effect.

NTF established a curriculum aimed at providing apprentices with skills and safety instruction in every phase of the trade. The four-year course is built around a series of texts. Two volumes, one each for the first and second year, are in use, and the third- and fourth-year volumes are in preparation. All are loose-leaf style, so that as techniques change the texts can be updated easily.

Films used in training

Supplementing the textbooks and on-job instruction is a series of sound/motion pictures. These training aids are accompanied by printed guides for instructors, designed to promote audience attention and involvement. The instructions also key discussion leaders to the objectives of each film and how it fits into the overall training program. Other aids, such as material for describing the film to the class before showing it and a suggested list of questions to be asked after the students have seen the film, are included in the instructions.

An example of the film series' attack on poor work attitudes is "A Simple Choice," described by NTF as "a major film presentation utilizing modern methods of psychology to emphasize the need for safety attitudes and practices as they apply to the entire industry, both directly and indirectly."

A persistent theme of this and all NTF films is the unspoken but nevertheless penetrating message, "It can happen to you." One means of getting this idea across is the incorporation of comments from metalworkers who are actual accident victims. The film dealing with safe and correct operation of shearing machines, for example, is introduced by a worker with the joints of four fingers missing from one of his hands. He tells how momentary "wool gathering" on his part exacted this price.

Produced by Robert Drucker & Co., Northridge, California, all of the films are written and acted by professionals. Olejniczak of NTF says the films have been well received by both apprentices and journeymen undergoing retraining.

Films are made available to participating contractors and their employees in 16 mm. prints or videotape cassettes. One film, "A Simple Choice," is also available to persons outside the NTF group. (Contact Cally Curtis Company, 1111 North Las Palmas Avenue, Hollywood, California 90038.) For showings to small groups, the cassettes are often the better choice. With a film player, they can be viewed on an ordinary television screen; the person conducting the cassette showing requires no special training. There is more of a trick to operating the 16 mm. equipment, but this larger size projection often is desirable where the audience is larger than 20.

Robert Schluter, SMWIA coordinator of training for the New York City area, regards the films, texts, and other material developed by the NTF as the answer to a great need in the industry. Previously, he explains, safety training had to be conducted with materials aimed at employees in other industries, and sheet metal workers found it difficult to identify with the other trades' problems.

Schluter points out that although in the past the industry had various safety activities going in most areas of the country, there was little in the way of curriculum or standards to assure thoroughness and uniformity. Schluter, who now serves as chairman of the curriculum committee of the NTF, says, "We were a target industry [in OSHA's Target Industry Program, which ran from June 1971 to July 1976]. We had a terrible accident rate, but until the labor-management program was formed there was no single source of training materials."

Previously, says Schluter, safety instructors had to use whatever was available from the National Safety Council and the American National Red Cross, "and the material often was not totally appropriate." NTF, he says, served as a "sort of catlyst" when the industry set out to deal with its problem on a national basis.

He discusses the training problem in terms of New York area locals. With only 2,000 union members, he says, "It would take most of the budget of the locals to obtain materials that would even begin to meet the need." The national program, he feels, is especially useful in solving this problem by furnishing what is need-

ed to instill and maintain desirable attitudes toward safety. He feels that attitudes definitely have become healthier among older workers, as well as those entering the trade.

"They are working side by side," he says, "and the older guy realizes that the safe practice the apprentice is learning relates also to him."

Employer's evaluation

William DeYoung, vice president, Wheeler-Blaney Company, Kalamazoo, Michigan, comments on the program from the viewpoint of an employer. DeYoung also is a member of NTF's National Curriculum Committee and has been active in the labor-management program since its founding.

"There was an urgent need for better methods," he says. "The program has brought whole new concepts to the training of apprentices. It has demonstrated its value just in getting the interest of the old timers—the journeymen—in learning things they had never learned before."

DeYoung says he is enthusiastic about the accomplishments of the program in training apprentices and retraining older workers. He points out that techniques in fields such as welding have undergone considerable change over the years, and journeymen who learned their trade before these developments need to be brought up-to-date. Retraining, he explains, also involves the growing use of new materials, such as stainless steel, requiring techniques that sheet metal workers seldom were taught in the past.

Films and other materials used in the program, DeYoung avers, have served to make more employers mindful that "safety is a moneymaker." Accident prevention, he points out, reduces time lost because of injuries and lessens employers' costs for workers' compensation insurance. The program, he says, has promoted an awareness in members of the industry at all levels that job efficiency and safe work practices go hand-in-hand.

The importance of the program's contribution in standardizing training practices was stressed by another NTF curriculum planner, Jules Freund, Jr., director of training, Sheet Metal Workers Joint Apprenticeship Council, Houston. The biggest problem brought about by the lack of uniformity was, according to Freund, uncertainty whether journeymen could perform all the tasks usually associated with the job. Frequently, says Freund, they could not.

Technological advances, Freund says, sometimes are accompanied by new threats to the safety of working people. He mentions as an example the general use of ballistic charges for anchoring studs in concrete. While this technique saves labor it also creates a new problem: flying concrete particles that could cause painful and serious injuries to persons using the equipment and others nearby. Training in proper use of these "guns" is essential in the same sense that firearms training is needed if accidents in that area are to be avoided.

Training is seen by Freund as particularly helpful in preventing injuries to welders and others exposed to the perils of the torch and arc. He regards eye "burns" from ultraviolet rays as a particular threat to the unwary. Failure to use protective clothing, such as gloves and aprons, can also endanger welders.

Deficiencies in earlier training have also been noted by people in other parts of the country. A contractor in Buffalo, who had a better-than-ordinary training program for members of the industry, nevertheless is of the opinion that no journeyman in his area "knows how to put up a scaffold safely." When one considers the extent of high building operations performed by sheet metal workers, the danger inherent in such a problem becomes evident.

W. L. Fillipini heads the staff of NTF as administrator. He served an apprenticeship in the pre-World War II period and from 1946 to 1953, after Navy service, worked as a journeyman. He then became a business manager in the union and has since held at number of labor leader jobs.

Fillipini says no statistics have been developed to prove the effectiveness of the National Training Fund program, but he is confident that it has resulted in the avoidance of countless injuries. As the national effort improves, he believes, still safer conditions will prevail because of the growing proportion of well-trained workers—workers drilled in the fine points of self-preservation.

A MODEL UNION PROGRAM

by Virginia Reinhart

When a union's safety and health needs are not met by OSHA basics, something more must be devised. This report tells how one union took the initiative in furthering the protection of its members, including the design of a unique training program.

Explosions and cave-ins, slippery floors and unguarded machines—American laborers have always faced such dangers in the performance of their jobs. Historically, labor unions have striven toward abolishing these and other unsafe work conditions for their members. Among the leading unions working for job safety and health is the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada (U.A.), with 330,000 members in 570 locals.

Founded in 1889, the U.A. has a long history of involvement in the advancement of job health and safety. For years it has been an active member of the National Safety Council and the American National Standards Institute. Since 1954, the U.A. has conducted annual instructor seminars at Purdue University — drawing an average of almost 1,200 of the apprentice instructors—offering, among other activities, classroom instruction by U.A. safety personnel.

To maintain utmost usefulness of the seminars, in 1972 the U.A. contacted Dr. Earl Heath, director of OSHA's Office of Training and Education. At the union's request, two instructors from OSHA's Training Institute at Rosemont, Illinois, attended the 1972 seminar where they gave 40 U.A. instructors official OSHA training. These "super instructors" were then certified to teach OSHA's 40-hour course, "Safety and Health Training for the Construction Industry," to other union personnel at succeeding seminars at various locations around the country. The latter returned to their locals as instructors to conduct OSHA-certified 10- and 30-hour safety courses. By 1975 the U.A. had approximately 250 members qualified to teach the 10- and 30-hour OSHA classes, and 8,000 members had received instruction.

The union, however, was not entirely satisfied with the nature and scope of its OSHA training curriculum. Due to promotions, geographical moves, attrition, and other factors, not all OSHA-qualified instructors were continuing to teach. Additionally, the union felt that the general nature of OSHA training dealt insufficiently with safety and health problems peculiar to its membership.

Fitting the course to the workers

To rectify this situation, the U.A. contacted Heath's office for guidance, then proceeded to develop its own safety training program which related instruction specifically to the concerns of plumbers, steamfitters, and pipefitters. Stating that ". . . the current approach does not fully integrate safety and health training with the normal operating procedures of tools, materials, equipment, systems, and job environment," the U.A. drew on practical experience and its long-established apprentice training program to create a new training program. This program was then presented to Heath's office in the hope that it would qualify as OSHA-certified training.

The U.A. proposed that OSHA's training course be replaced in the union program by training from its own safety instructors, and that completion of two of the union's annual 20-hour sessions at Purdue be recognized by OSHA as equivalent to OSHA's 40-hour training. Thereby, union-apprentice instructors, taught by U.A. instructors from curricula developed entirely by the union, would become authorized to conduct a 12-hour OSHA-certified training program. After reviewing the presentation, OSHA accepted the U.A.'s proposal in November 1975, recognizing the union as an official qualifying agency.

Heath reports that he "is delighted with the union's activities" in the area of job safety and health. "The U.A. has been a model for other unions and large organizations in fulfilling the goals of OSHA," he says. "The U.A. exemplifies how an organization, with a little governmental advice, can develop a strong safety and health program to meet its needs. Giving technical help to the U.A. is one good way my office has met the requirement of the law—to provide for es-

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tablishment and supervision of programs for the education and training of employers and employees in the recognition, avoidance, and prevention of unsafe or unhealthy working conditions covered by OSHAct."

Since 1971 OSHA's Training Institute has regularly conducted two five-day, 40-hour instructor training courses: "Safety and Health Training for the Construction Industry" and "A Guide to Voluntary Compliance; Instructors' Course." The first course is designed to develop construction supervisors' ability to present safety and health training to workers and management, stressing the importance of hazard recognition and reduction. The latter course prepares instructors from schools, trade associations, employee organizations, insurance companies, and local safety councils to teach self-inspection with the goal of positive action to correct workplace deficiencies. Organizations and individuals not affiliated with any of these groups, but who can use the course to teach others, may also register. Both courses are free. For further information contact:

OSHA Training Institute
10600 West Higgins Road
Rosemont, IL 60018
(312) 297-4810

This accolade has not made the U.A. complacent about job safety and health. Instead of resting on the laurels bestowed by Heath, the U.A. has continued its progressive activities.

On January 1, 1976 general president Martin J. Ward established a department of safety and health. By so doing, he made the U.A. one of the first among the 17 international unions comprising the Building and Construction Trades Department of the AFL-CIO to create a separate department with full-time staff devoted entirely to dealing with problems of safety and health in the industry.

Stressing that the department would be given a broad range of duties, Ward chose member Joe Adam to serve as its first director. Adam's qualifications for the job include experience as a plumber, mechanical engineer, and apprentice instructor. In addition, Adam was primary creator of the union's programmed textbook, *Job Safety and Health for the Piping Industry.* The professionalism evident in this textbook was a major factor in obtaining OSHA's endorsement of the U.A.'s training program. Heath says of it, "That manual is excellent. We would be proud to have published it." (Copies of the textbook and curriculum details of U.A. training are available to the union's members only.)

Adam takes pride in the manual, saying, "It was written by plumbers and pipefitters for the piping industry. So are all the course guides for the whole apprentice program." He is proud, too, that the U.A. did not take one penny from the government to publish the safety and health manual. "We got a lot of technical help from Dr. Heath's office, but we financed it and wrote it ourselves."

A program without precedent

As first occupant of the new U.A. post, Adam will be largely trailblazing as he develops the goals and programs of his department. His plans are pragmatic and aggressive. Explaining the union's disappointment with the effects of OSHAct thus far, Adam says, "Frankly, too many people—our own union members included—thought the law would eliminate all job hazards. We know now that it hasn't. What we have got to do is let our men know we can't sit around waiting for the law to solve all safety and health problems for us."

The U.A.'s safety and health director points out that continuous change is the nature of the construction industry. "If an OSHA compliance officer comes to a job site even half a day after a complaint is made, the danger that was reported may be past and the work situation completely different. Our problems are not the same as those of men working in the same plant, using the same machines and equipment every day."

To Adam, the most important part of his job will be communicating information to local union officers. "We have to get specific information to the membership so they know what the law says. We have to keep them up to date on new technology, and teach the safe use of new tools. We see safety in the operation of equipment as being step one, not step 10 or 11 tacked on at the end. Too often if one man forgets a

safety procedure, somebody else nearby gets hurt."

Accordingly, Adam uses the union's weekly general officers' newsletter to alert members to newly discovered hazards and recently developed safety procedures. He also uses the monthly *UA Journal,* distributed to every member, when he wishes to share important safety and health news. Additionally, the 1976 U.A. local union officers' seminar at Purdue in May offered Adam the opportunity to inform hundreds of union officers personally what his department can do for them and what they can do for him.

At the seminar he told representatives of all 570 locals how to deal with OSHA on the local level. Adam explained, "I wanted to be sure they know how to ask for an inspection, who signs the request, how to contest an unreasonable abatement period—the entire procedure for getting the law to work." The seminar also afforded him the opportunity to ask members' opinions on safety training and hear what the locals are doing to protect members' health and safety.

Feedback from the locals

Adam regards feedback from the locals as crucial to the success of the new department. Knowing that members "have an ear at headquarters" eager to hear their suggestions and opinions is expected to encourage lively interest and involvement among U.A. members. Participation also will be essential to the success of a new accident reporting system Adam plans to implement soon.

Each month jobsite accidents cause serious or fatal injuries to U.A. members. Adam's job includes investigating these incidents. In his first week on the job, an explosion in Florida killed three members. Adam found, when he visited the scene a day later, that much of the evidence had been destroyed when the company cleaned up after the accident. He thinks it is urgent that the federal law be amended so that the scene of a fatality can be "frozen" until after an investigation is completed. At present only local police can close off an accident area; if they do not, by the time federal or state officials arrive important information may be lost forever.

The proposed accident reporting system would give the department detailed reports on all fatalities. Adam hopes to add to that store of information by requiring reports on all multiple-person accidents, lost-time accidents, and site-damage accidents. Local officers at the accident would use either a TWX or telegram system to send the department pertinent information about any incident: local number; site, type, and extent of accident; hiring company; OSHA area representative.

Adam firmly believes, "It is very important that we have a central clearinghouse on serious accidents. I don't want the men in the field to prejudge the information but just to relay to us, as fast as they can, the facts about the accident. We're here to prevent accidents, not to pin blame. That's the job of the courts. But if there is a trend, one kind of accident happening more often than others, we can pinpoint it, look for ways to prevent it, and let our members know of the dangers."

Health hazard research planned

As its title implies, the new U.A. department is as concerned with job health hazards as it is with safety. Adam points out, "A lot of us don't know enough about the health side of the question. Illness and disease may not seem as spectacular as an accident on the job, but they leave you just as dead."

Soon after his appointment as director, Adam contacted NIOSH's Division of Surveillance, Hazard Evaluations, and Field Studies in Cincinnati, and persuaded division leaders to begin a study of the death certificates of all 8,000 U.A. members who died in 1973 and 1974. "Our records are on a computer and valuable information can be gathered from such a large sampling," says Adam.

The U.A. death benefit records show where and how members worked and died—data which NIOSH will use to determine whether serious job health patterns exist. Scheduled to begin this month, the NIOSH study will take about two years to complete. Deaths by cancer, heart attack, and respiratory failure will be closely analyzed and compared with the general population averages. If suspicious patterns exist, Adam's department will study methods to correct and control the health hazards involved.

For the U.A., education seems to be the key to job safety and health: studies in cooperation with NIOSH, seminars, newsletters, bulletins, extensive training courses—all with an accent on safety and health concerns. And this education never stops, even for the man who, literally, wrote the book. "I'm still learning about my job," Adam says. He has been taking courses,

for instance, in industrial hygiene and noise hazards. "I must still find time to take a seminar on nuclear safety," he says, "because our union now has men who do maintenance on nuclear power plants around the country. I'm not interested in starting a super program before I know what I'm doing. We don't need lip service to safety."

SECTION IV

OCCUPATIONAL HEALTH CARE COST CONTAINMENT

IV. OCCUPATIONAL HEALTH CARE COST CONTAINMENT

In spite of increasing efforts made during the last decade to bring health care costs under control, they have continued to increase more rapidly than most other costs. In 1982 American industry paid $67 billion for employee and dependent health care, approximately 20% of the total U.S. health bill. By the early 1990's when the U.S. medical care costs are expected to exceed $1 trillion, industry's health care costs will approach $200 billion. As health costs continue to rise at a rate that is faster than other costs, managers are becoming more concerned about finding more effective ways to help contain all of their firm's health related costs.

The first of the five articles reprinted in this section provides an excellent review of corporate benefit programs but focuses on corporate attitudes toward health care costs. Based on the results of a survey of 69 firms which was conducted in 1979, Harvey Sapolsky and his co-authors concluded that the top executives of large corporations were not greatly concerned about health care costs and were not adequately motivated to do much to reduce these costs. In general, executives were more concerned about the employee dissatisfaction which is historically associated with attempts to reduce benefits than with the cost of providing the benefits. Although they were concerned about the rate at which health care costs were increasing, they usually preferred to control the costs by limiting new benefits rather than reducing existing benefits. Most of the executives believed that many of the proposed solutions for reducing health care costs would produce only marginal savings.

By 1981 at least one executive, David Roderick, the Chairman of U.S. Steel, was sufficiently concerned about health-care costs to let his views be known by writing a short article which indicated some actions which he felt could be taken to reduce health care costs and to increase hospital productivity.

The author of the third article, John Inglehart, agrees with Sapolsky's conclusion that health care costs are not among the highest concerns of most CEO's, and clearly indicates why they would prefer not to become involved in trying to change the health care delivery system. However, his article in the *New England Journal of Medicine* reports on a range of activities which indicate that by 1982 corporations were beginning to adopt some programs which promote the use of alternatives to the fee-for-service systems that have traditionally been used to deliver health care.

In the fourth article in this section, Louis Richman provides an excellent summary of some of the approaches organizations were investigating by 1983 to reduce health care costs.

Other articles in the bibliography which provide an overview of various types of cost containment activities include: Friedman (1978), Larson (1980), Sass (1982) and an article in the October 15, 1984 issue of *Business Week*. These articles discuss many different approaches for containing health care costs but almost all of them belong to one of eight general strategies for controlling costs and reducing the use of health care resources.

1. Reducing administrative expenses by self-insuring and self-administering health care programs.

2. Controlling expenditures by negotiating fixed fee contracts, reviewing claims more carefully, pursuing coordination of benefit clauses more rigorously and by encouraging the use of less expensive out-patient services and generic prescription drugs. The article by Woodsides (1980) explains how Southern Bell-Georgia reduced health costs by more carefully monitoring medical disability claims. The article by Fannin (1983) discusses the coordination of benefit clause which is included in almost all medical insurance policies and shows how the rigorous enforcement of this clause can result in significant savings in health care costs.

3. Sharing costs with employees by increasing the size of the deductible and co-payments on claims.

4. Sharing information with employees by establishing joint labor-management committees to review health care costs and to develop new health cost containment programs. The use of this approach seems to be growing rapidly because it is generally agreed that the success of most cost containment programs requires (i) an awareness by both labor and management of the financial problems that rising medical costs pose today and in the future, and (ii) the design of a program that is acceptable to both labor and management.

5. Reducing the use of health resources by requiring second opinions for non-emergency surgery, requiring preadmission testing and encouraging the use of out-patient surgery.

6. Reducing the need for the use of health resources by developing health education, health promotion and disease prevention programs which encourage employees to adopt more healthy life styles. Several of the readings in the first section of this book discuss the development of preventive medicine programs which are designed to achieve this objective. Other articles which discuss health promotion programs include Brennen (1982), Wright (1982) and Kristein (1982). The article by Stunkard (1980) reports on the treatment for obesity at the work site and the articles by Masi (1974) and Knox (1975) discuss employee assistance programs which are designed to combat alcoholism in industry.

7. The acquisition of health care facilities by business and the promotion of HMO's, preferred provider organizations, independent practice associations and other alternate health care delivery systems. The articles by Ellwood (1973) and Edgahl (1977) identify and discuss several alternate health care delivery systems and Sahin (1979) carefully examines the economics of employer acquisition of health care facilities.

8. The organization of coalitions to provide better information on medical costs and to put pressure on health care providers to provide needed services at a reasonable cost. Beginning with the establishment of a few groups in the 1970's, coalitions of employers have been seeking strategies to reduce the annual increases in health care costs. By August 1984, at least 123 state, regional and local coalitions had been formed to address the health care cost question. The article by Lispchultz (1981) presents examples of the kinds of activities a business health group could engage in to further cost containment.

Another way to reduce health care costs is to change the laws which provide health care for employees who are injured on the job or customers who are injured by a firm's product. The last

paper in this section discusses changes in worker's compensation laws and product liability laws which have been made by some states to reduce job related health care costs by protecting companies from suits brought by victims of occupational disease and limiting manufacturer's liability exposure to product liability suits. Although the article concludes that the best way for an employer to reduce the costs resulting from job-related accidents is to provide an effective safety program at the work site, it is clear that changes in the legal environment could significantly reduce the risk of incurring very large losses as a result of unforeseen health problems.

IV. OCCUPATIONAL HEALTH CARE COST CONTAINMENT

1. Corporate Attitudes Toward Health Care Costs
   Harvey M. Sapolsky, Drew Altman, Richard Greene and Judith D. Moore
   Milbank Memorial Fund Quarterly/Health and Society
   Summer, 1981

2. David Roderick on Health Care
   David M. Roderick
   World
   Spring, 1981

3. Health Policy Report. Health Care and American Business
   John K. Inglehart
   New England Journal of Medicine
   January 14, 1982

4. Health Benefits Come Under the Knife
   Louis S. Richman
   Fortune
   December 12, 1984

5. The Soaring Costs of Industrial Accidents
   Frank W. Lancianese
   Occupational Hazards
   August, 1983

CORPORATE ATTITUDES TOWARD HEALTH CARE COSTS

Harvey M. Sapolsky, Drew Altman, Richard Greene, and Judith D. Moore

Massachusetts Institute of Technology;
Robert Wood Johnson Foundation;
Veterans Administration; and
Health Care Financing Administration

WITH THE GOVERNMENT STRAINING TO MEET its health benefit obligations to the poor and the elderly, it is not surprising that some policy analysts see the development of an alliance between business and government as the only effective means to control inflation in the health sector. Most Americans receive health benefits from their employers rather than from government (Carroll and Arnett, 1979). Rising health care costs, however, affect all purchasers of health care services. Government action alone has been unable to limit the growth in these costs. An aroused business community could make the difference if it added its purchasing power to that of government in an effort to discipline the utilization and pricing of health care services.

Businesses are certainly important purchasers of health care services, buying annually tens of billions of dollars worth of care on behalf of their employees. Many observers believe that firms, because of these expenditures, are a potential force for health sector reform (Council on Wage and Price Stability, 1976; Havighurst, 1978; Altman, 1978). The view they offer is that firms, especially the largest are concerned about increases in health care costs; are seeking to improve the efficiency of health care services; are willing to use their influence to restrain the growth of duplicating medical facilities; are interested in exploring alternative modes for delivering care; and are ready to join with government in instituting reforms.

It is also not surprising that to realize this envisioned alliance between business and government some analysts are tempted to exaggerate its necessity and likelihood. There is no better example of this sin of exaggeration than the several versions of the auto makers' health care cost problem. One has General Motors buying more health insurance than it does steel; another attributes $2,000 of the price of a $5,500 Ford to the health care costs of the Ford employees (Iglehart, 1976; Cahill, 1979). If all 26 of the Blue Cross and Blue Shield associations from which General Motors buys health insurance are taken as one organization, then it is true that Blue Cross/Blue Shield is General Motors' largest supplier, much more important to their operations than U.S. Steel. But the 26 Blue Cross and Blue Shield associations are not one organization, and General Motors buys steel and steel products from more than 1,000 suppliers, U.S. Steel being only one of them. The $2,000 figure is the approximate annual cost of the health benefits of the average auto worker, not the price of health care in the average car. If we count all wages and benefits, each of its workers costs the auto manufacturers $30,000 a year. The auto workers' health benefit, generous as it may be, accounts for less than 7 percent of the total wage bill, a percentage not outrageously out of line with the experience in other heavy industries. The cost of health care included in the price of the average car ranges from $150 to $300, depending on model and manufacturer. As disappointing as this information may be to some, there is more steel than health care in American automobiles, even in the lighter weight cars now being produced (Zink, 1976b; 1978).

Still, one can be curious about the extent to which corporations are concerned about their health care costs and are willing to take action to control them. Even if firms are not overwhelmed by rising health costs, they might view these costs as a threat to their prosperity and be willing to join government in pursuing cost containment strategies. Perhaps there are particular containment strategies to which corporations are especially attracted and for which government might appropriately offer its assistance or collaboration.

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To explore these topics, we interviewed executives in 69 firms (Table 1). In each firm we sought and in most cases were able to obtain interviews with the chief executive officer or other board level officer, as well as with officials directly responsible for the management of the firm's employee benefit programs. Half of the firms were selected randomly from the various *Fortune* lists (the first 500 Industrials, the second 500 Industrials, the 50 largest Financial-diversified, Commercial banks, Life insurance, Retail, Transportation, and Utility firms). Only 9 firms (Table 2) refused to participate in the study, 3 of them still headed by their founders. In addition, we interviewed executives from major firms whose headquarters were either in cities that have a reputation for business involvement in health affairs (Minneapolis and Rochester), or representatives of industries in which there was widely reported special interest in health care costs (automotive and steel), managers from a sample of small firms located in the Boston area, senior representatives of major insurers selling group policies, insurance brokers, health benefit consultants, knowledgeable and relevant state and local officials, representatives of health provider associations concerned about the topics we were exploring, labor union officials, and the federal officials responsible for the design of federal employee benefit programs. Approximately 250 individuals were interviewed in sessions ranging from one half to four hours. Because of the diversity of the sample and the complexity of the issues involved in the study we did not utilize a standardized questionnaire for interviews. Instead, we followed a topic guide, exploring specific topics in depth as was thought appropriate.

TABLE 1
Firms Surveyed

Number of Firms	Industry	1979 Employment
2	Aerospace	178,000
2	Airline	110,800
3	Broadcasting/Publishing	38,800
4	Chemicals	188,600
6	Computers/Office equipment	652,000
4	Conglomerate	188,200
6	Consumer products	257,700
3	Electronics	407,000
6	Finance/Banking	86,400
3	Food products	221,000
4	Industrial products	105,300
3	Insurance	76,500
4	Metals	185,000
4	Motor vehicles/Parts	1,441,000
4	Pharmaceuticals/Scientific	53,700
3	Raw materials/Oils, Lumber, etc.	160,800
3	Retailing	580,000
2	Service	106,700
3	Utilities	1,015,600
69		6,053,100

We concentrated our attention on large firms because they are a significant factor in the market for private insurance and because, owing to their bureaucratic structure and public visibility, they are the business organizations most likely to work with government if a collaboration were established. The firms on the *Fortune* 500 lists, for example, employ nearly 30 percent of the labor force in the United States and generally offer the richest benefit packages to their workers. The firms we interviewed employ over 6,000,000 persons (or approximately 6 percent of the American labor force) and are responsible either partially or totally for the health care benefits of more than 12,000,000 individuals when retirees and dependents are also considered. In comparison, the total of federal beneficiaries, counting current employees, federal retirees, and dependents, is about 10,000,000. Because the interview information gathered was obtained with the promise of confidentiality, the specific firms visited will not be identified. (Tables 1 and 2 describe the type of industry and size of employment of the firms approached in the survey.) The references to specific firms in this paper are taken from published sources and may or may not involve firms at which interviews were conducted. Our study of the federal government as employer will be reported separately.

Notwithstanding our efforts to be discreet, systematic, and comprehensive, we make no claim that the survey was scientific in the strictest sense of the term. For example, we did select some of the firms for interviews, not randomly, but rather because of their reputation or location. We also avoided the use of standardized questionnaires, thinking them too confining for the discussion we sought with senior executives. We are confident, however, that our exploration of the topics covered in the survey will stimulate others to attempt to apply more rigorous methodologies to the same issues.

TABLE 2
Firms That Refused to Participate in Survey

Number of Firms	Industry	1979 Employment
2	Chemicals	22,500
2	Consumer products	22,600
2	Finance/Banking	8,700
2	Industrial products	43,000
1	Pharmaceuticals/Scientific	49,000
9		145,800

Corporate Benefits

Before reporting our findings, it is useful to describe briefly the type of benefits the firms offer and the origin of employer-provided health care insurance. Health care, of course, is only one of a number of benefits American employers offer their employees. Retirement income, vacations, insurance covering life, accidental death, short- and long-term disability, and income protection are among the more common benefits, in addition to medical service and hospitalization insurance. Increasingly, however, firms are adding dental care, vision services, matched savings, legal assistance, recreational services, and educational opportunities to the list. The range of possible benefits is enormous. Pace-setting firms, International Business Machines and Texas Instruments for example, are said now to offer such unusual benefits as financial assistance for the care of the dependent with severe handicaps, and lump-sum payments to employees who adopt children; these firms also are thought to be considering sabbaticals for employees (Kneen, 1978; Matlock, 1980). One petroleum industry executive, commenting wryly on the trend, noted that it was possible to insure against everything including lunch; he ignored the fact that many large employers already subsidize the lunch of their executives and headquarters' staff, if not of all their employees.

The percentage of total compensation accounted for by benefits has been growing. In 1960 it was about 25 percent; today it is about 40 percent (Geisel, 1980). Table 3 summarizes the historical experience—although measurements problems are reporting variability cast doubt on the precise accuracy of the figures. This growth is largely attributed to favorable tax treatment of benefits, by which most benefits are not considered as taxable income for employees, and employers can claim them as a cost of business. Table 4 shows the distribution of costs by specific benefit. Vacation and retirement benefit costs exceed those of health care, but health care and disability costs are thought to be due to benefit expansion and changing employee attitudes toward work; the increases in health care cost are considered most likely to be due to inflation in the health sector rather than to increases in benefits or utilization.

TABLE 3
Employee Benefits as Percent of Total Payroll Costs, 1959–1979 (Panel of 182 Firms)

Year	Percent
1979	41.2
1977	39.9
1975	37.6
1973	35.1
1971	33.0
1969	31.0
1967	29.1
1965	27.1
1963	26.8
1961	25.8
1959	24.4

Source: Chamber of Commerce of the United States, *Employee Benefits 1979*, Table 19, p. 27. Washington, D.C., 1980.

TABLE 4
Average Employee Benefit Payments, by Type of Benefit, as Percent of Employee Payroll Costs, 1979 (922 Firms Reported)

Benefit	Percent of Payroll Costs
Social security taxes	5.8
Unemployment taxes	1.5
Workers' compensation	1.7
Pension costs	5.4
Life, health insurance	5.7
Long-term disability	0.3
Dental insurance	0.3
Discounts	0.1
Employee meals	0.1
Paid rest, lunch periods	3.5
Vacations	4.7
Holidays	3.2
Paid sick leave	1.2
Other leaves	0.4
Profit-sharing	1.4
Savings plans	0.7
Miscellaneous	0.6
	36.6

Source: Chamber of Commerce of the United States, *Employee Benefits 1979*, Table 4, p. 8. Washington, D.C., 1980.

The health care benefit is usually defined to include insurance coverage for hospitalization, medical, surgical, laboratory, and X-ray services, dental care, vision care, drug usage, mental health services, nursing and physical rehabilitation services, specialized services such as those for alcohol and drug dependence, and any direct care provided through clinics maintained by the employer. Normally excluded are income replacement and sick leave payments made directly to employees. As the specifics of the benefits are determined either unilaterally by firms, or jointly through negotiations with unions, subject only to minimal government regulation, there is great variation throughout the economy. Further variation occurs because firms differentiate among employee categories, provisions for dependent and retiree coverage, and requirements for employee cost-sharing in the form of deductibles, copayments, and coinsurance. There are literally hundreds of thousands of health benefit packages.

We do know through insurance surveys conducted by the government that over 80 percent of the work force has some private group protection against the costs of hospitalization and nearly as high a percentage is protected against some medical and surgical expenses as well. The precise percentage of work force coverage is in doubt because of different methods of data collection. Lee (1979) cites an 80+ percentage and official reports listing over 90 percent. Skolnik (1976) cites a 70 percent figure. If consideration is limited to firms employing over 100 workers, the figures approach 100 percent coverage. For further discussion, see Sudovar and Feinstein (1979).

For much of the covered work force, this protection extends to dependents as well. Coverage is most extensive for acute illness and accidents. Less well protected are costs employees and their dependents may incur for other types of health care services such as outpatient services, drugs, and home nursing. But improvements are constantly being made in the range of benefits available to employees. Dental care insurance now covers 30 percent of the work force, up from 12.8 percent in 1975 (Shapiro, 1980). Some states—Massachusetts and Minnesota, for example—have begun to require employers to offer coverage for mental health care and substance abuse (alcohol and drug) treatments. Only part-time workers and those employed in industries dominated by very small firms are left behind in the trend to ever-increasing health care coverage (Congressional Budget Office, 1979).

The firms we studied rank among those that offer the broadest and deepest protection for their employees and the employees' dependents. A typical health benefit includes 365 days of protection against hospitalization, reimbursement for the usual and customary charges of physicians for medical and surgical services, 180 days of inpatient and up to $1,000 of outpatient mental health coverage, alcohol and drug rehabilitation care, scheduled dental coverage, and a limited amount of home nursing and physical therapy. All of the firms require employees to share in the cost, usually in the form of paying an annual deductible of $50 to $100 and 20 percent of medical charges. Most, however, pay the full premium for the employee and the employee's dependents. A 1979–1980 survey of 601 companies by Hays Associates indicates that 71 percent pay full cost for employees and 48 percent for employee dependents, up from 64 percent and 40 percent respectively in 1978–1979 (Shapiro, 1980). Many establish a stop loss of $1,000 or $2,000, after which the benefit plan will pay all costs incurred until the limit of coverage is reached (often as high as $500,000 or $1,000,000). Increasingly, supplemental coverage is provided for retirees who receive Medicare benefits under Social Security.

Sometimes distinctions are made between executive level and other employees, the executives receiving free health insurance coverage and/or special benefits such as annual physical examinations or additional coverage when stationed abroad. More usually, the distinction made is between unionized and nonunionized employees. Benefit differences exist because those for unionized employees are framed in collective bargaining agreements, often on a plant-by-plant or craft-by-craft basis. As will be discussed more fully below, however, many firms with substantial numbers of unionized employees, or potentially subject to union organizing drives, follow carefully drawn strategies in which their nonunionized employees are provided with benefit improvements either in anticipation of or in keeping with union demands.

Unions clearly have played an important role in the development and expansion of employee benefits (Goldman, 1948). Historically, workers banded together not only to press wage demands, but also for common succor, providing aid to one another in time of personal illness or family distress. In the early twentieth century, major industrial employers sought to woo workers away from unions by offering similar assistance. Competition among employers and between employers and unions for the loyalties of workers led to an expansion of the number and types of benefits being offered. When unionization did occur or was maintained, benefits gradually became a subject of bargaining and part of the collective agreement.[1] The inability of unions to maintain the financial solvency of their programs, largely because of fluctuating membership, increased their willingness to accept employer-provided benefits. Union leaders are thought to favor benefit increases over additional wages, as bargaining for benefits is a complicated undertaking that adds to their power within the union (Greene, 1964; Swidinsky, 1971; Mabry, 1973).

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1 Fringe benefits became a legally inclusive element of collective bargaining in *Inland Steel Co. v. National Labor Relations Board* 170 F. 2d 247, September 23, 1948. Health benefits were specified as being included in the Inland case ruling in *W.W. Cross / Co., Inc. v. National Labor Relations Board* 174 F. 2d 875, May 24, 1949.

Government also was instrumental in the growth of these benefits. Legislation and court rulings established the right of workers to organize collectively and to bargain for wages, working conditions, and benefits. During the Second World War the government, seeking to control wages and prices, but also wishing to avoid strikes, permitted substantial additions in so-called fringes (nonwage income increases including health care benefits). Favorable tax interpretations allowed these additions to occur without affecting tax liabilities of either worker or employer (Steurle and Hoffman, 1979; Comanor, 1979; Congressional Budget Office, 1980; Greenspan and Vogel, 1980; Vogel, 1980).

Insurers too have aided the growth of benefits, first in demonstrating the wisdom of sharing risks and then in providing convenient and efficient management of benefit plans for employers preoccupied with their own businesses. The competition among insurers reduced price of providing benefits and improved their design and acceptability. Experience-rating gave employers the feeling that they were controlling their benefit costs, or at least paying only for the costs for which their employees were responsible, while the use of usual and customary charges for reimbursement increased the satisfaction of employees and health care providers. Health insurance, it was said, initially was a loss leader by which insurers found an opportunity to sell additional types of group and business insurance.

The Favorite Benefit

Although unions now enroll only 20 percent of the national work force and are concentrated in a limited number of industries, they are never far from the thoughts of corporate executives. Most of the firms we studied have predominantly nonunion work forces and their executives want to keep it that way. Providing generous benefits is universally held to be an effective policy to reduce the attractiveness of unionization. Freeman and Medoff (1979) believe that the presence of unions increases spending on fringe benefits, especially health benefits, as unions respond more to the needs of the average worker than to the marginal worker. The average worker tends to be older, with more family responsibilities, than the marginal worker. Nonunion firms, they argue, respond more to the needs of the marginal worker whose needs act as a barometer of the current labor market. Where unions exist, we found, the policy is often to isolate them by offering superior benefit packages to nonunionized employees. Firms seem quite willing to pay a premium, at least in terms of benefits, to retain the managerial freedom a nonunionized work force is perceived to give.

With rare exceptions, the benefit design and benefit management activities are assigned to the vice-president for personnel, human relations, or some similar category. This organizational location appears to reinforce the tendency to be generous with benefits, because the overriding concern is recruiting employees with scarce skills and maintaining work force morale. Although the assertion is never made that benefits attract potential employees, it is widely thought that comparatively inferior benefits are an impediment to recruitment and the retention of key employees (Greene, 1964). Given that there are usually several categories of workers in short supply, such as engineers or technicians (Rundle, 1980), and given that firms prefer to offer the same or similar benefits across their entire work force or at least broad segments of it, there seems to be an inherent upward pull in benefits through its assignment as a subordinate activity within the personnel function.

Benefit design begins with the identification of broad compensation goals. Invariably, the goals are derived from surveys of firms in the same industry or those who are said to be "peer firms" either because of their similarly structured work forces or because of their national standing. The goals take the form of corporate objective statements such as these: Our intention is to set our wages and salaries at the 75 percentile level of peer firms and our benefits at the 60 percentile level; or, We want to pay average wages and above-average benefits. For technologically based firms, the comparisons always involve Texas Instruments and IBM; for unionized firms, the comparisons involve settlements achieved by the auto makers and the United Autoworkers and the major steel

companies and the United Steelworkers (Brown, 1979). Even firms that lack a technological orientation or a large unionized work force, retailers, for example, cannot completely ignore these pattern setters as they all worry about unionization and employ computer specialists, who are in short supply. Thus, major benefit improvements implemented by the nation's richest or most unionized firms diffuse throughout the economy by means of a chain of interfirm comparisons.

All the firms visited claimed also to be sensitive to the desires of their employees; many conducted periodic opinion surveys of workers and dependents to determine areas of benefit-related dissatisfaction. Complaints about poor benefit yields, or reports that friends and relatives are receiving better benefits such as dental care and drug coverage through other employers, become evidence for proposals to improve benefits. Given that the benefit staffs are designing their own benefits at the same time, there is a natural tendency to see benefit improvements in the most favorable light. Organizational self-interest works in the same direction; unless there are benefit improvements to be made, there is usually no need to suppprt a staff to design benefits.

The survey evidence, however, shows clearly that, among available benefits, employees generally appreciate their health benefits most. Health benefits are viewed favorably throughout the age spectrum and among all classes of employees. Alone among benefits, they are used frequently by nearly all employees. (Disability, retirement, and death benefits, to be sure, are intended for limited use; not everyone saves money, or desires extra educational opportunities.) Not surprisingly, management is disposed to improve the health care benefit.

In fact, top executives are occasionally so sensitive to the morale aspects of the health benefit and the human needs it embodies that they are willing to break company rules in order to provide extra care and financial support for employees and their families. In one instance, a president of a firm told us that he ordered major dental work at company expense for several low-ranking employees even though the company lacked a dental plan. In another, the benefit manager of one of the nation's largest industrial firms told us that senior executives had granted extended coverage for the severely ill child of an employee whose care had exceeded the firm's maximum health benefit. And, in a third, the firm's personnel vice-prisident quietly maintained a fund from which he would reimburse employees for expenses denied or not fully paid by the firm's insurer. Other executives told us that their firms would never permit such practices; they admitted though that an accumulation of instances where needs were manifest would likely bring quick improvements in the firm's health benefit.

Several well-publicized labor disputes stand as reminders to executives who fail immediately to grasp the importance that workers place on health benefits. In 1976, Ford took a 4-week strike at the behest of the industry in an attempt to achieve additional cost-sharing from the United Autoworkers (UAW) for the auto workers' health benefit (Weber, 1979). That strike ended without any concession by the UAW on this point. Since then, cost-sharing has not been a significant factor in the industry's labor negotiations. Instead, the industry's effort has been directed, but not very successfully, toward limiting increases in health-related benefits (Zink, 1978a). In 1977, the United Mine Workers struck the coal industry in order to regain health benefits lost in the bankruptcy of their own health fund (Derzon, 1977). More recently, both the oil refining and steel industries sought to limit the employer's share of health benefits; the oil refiners attempted to hold the employer's contribution to a fixed dollar amount, and the steel producer attempted to reinstitute cost-sharing. Neither succeeded. The oil refiners ended a 7-week strike by raising the contribution significantly. Steel producers, warned by the union that they would face the longest strike in the industry's history if they persevered, dropped the issue during contract-bargaining. Although it is clear that multiple issues are usually involved in labor negotiations, and that there is much posturing for the record and the press on both sides in such negotiations, it is also clear that tampering with health benefits is unprofitable.

But most of the firms we visited felt little impetus to seek changes in health benefits. For many, rapidly rising disability costs, or complaints from retirees about inadequate pension benefits

loomed as larger problems. Health care costs were growing, but often at or below national averages. Although benefit managers might be tempted to claim their good judgment as the cause, most attributed this apparent good fortune to the fact that their firms had long offered excellent benefits, and that large increases usually occur when extensive new opportunities are offered for service utilization. The firms had already given away the benefit and were pleased to learn that its costs simply kept pace with that of competitors and the rest of society. Top management rarely expressed a deep interest in health care costs, preferring instead to wonder only whether or not benefits were up to date with those of major rivals. Assured on this, they would concentrate on the central features of the business.

Only 4 of the firms had recently reduced a health care benefit, and 3 of them had offered their employees compensating increases in other benefits. Two were insurers seeking to sell their clients a health cost containment package that included benefit redesign and they felt compelled to accept it for themselves before facing customers. To pacify their employees, they asked for only nominal contributions, and increased life and disability benefits by more than comparative amounts. The third was a financial firm also in the business of health insurance and also willing to compensate its employees for the benefit retraction, this time with a dental plan.

Only an industrial equipment firm actually withdrew benefits. It required employees with dependents to contribute a greater share of the health benefit costs by paying an increased deductible. The change was made with great trepidation and was preceded by an internal publicity campaign that emphasized the effect of rising costs of health care premiums on the firm's profitability. When the change took place without significant protest, the publicity program was quickly dropped. No further benefit retractions are planned.

More commonly, firms were ready to increase health care benefits. Several retailers, recovering from poor earnings, felt that they had dropped too far behind their industry norms in providing benefits. One manufacturer, feeling the pressure of a local labor market, also wanted to increase benefits. Several conglomerates on our list were pursuing policies of offering comparable benefits throughout the firm and thus were in the process of improving the benefits for new acquisitions. A newspaper publisher saw the corporate mission as instituting decent benefits for the staff and printers of the several suburban and small-town papers it recently added to its holdings.

Although not entirely typical, one firm's behavior does demonstrate the problem the government faces in seeking an alliance with business in containing health care costs. Long a laggard in its industry, the firm recently became quite profitable. Much of its personnel effort is now devoted to compensating its employees for the many lean years. It has recognized the national inflation of health care costs and is ready to do something about the problem. Retirees' pension checks recently were accompanied by a note that read: "Due to rising health costs we have increased your supplemental health care benefit." Industry is not inclined to be tough on its retirees, employees, and dependents. After all, they are family. We discovered that there is much more paternalism in American industry than is commonly admitted.

Those who specialize in advising firms on health benefits have a number of standard recommendations for ways to contain rising costs. Their favorites are: redesigning benefits to increase cost-sharing by employees (Di Prete, 1977); tightening of claims control (Fillotson and Rosals, 1978); promoting health maintenance organizations *(Washington Post,* 1978*)*; and involving employers in attempts to limit the local supply of expensive health services (Goldbeck, 1977). Few corporations, however, find these recommendations congenial.

As we have reported, there is little inclination to require employees to absorb a greater share of their health care costs. The design of the dental benefit, the newest addition to the list of corporate benefits, appears to be the exception. Reluctant to take back benefits once given, corporations tend to be more careful in structuring new benefits. The standard dental benefit involves the

use of a fee schedule that enumerates maximums for each procedure and a sliding copayment arrangement that favors preventive dental care over major reconstructive procedures. Some firms also require previous authorization for procedures priced over a certain amount. It would seem then that firms are likely to take a tougher stand toward health care costs.

But the dental benefit experience is deceptive. The firms recognize that there are important differences between medical and dental needs. Although medical care may involve the treatment of life-threatening conditions and the expenditure of prodigious sums, dental care almost always involves the provision of routine services and has predictable, limited costs. Dental care can often be delayed, without undue pain or aggravation of the condition, while approval for treatment is sought. The burdens placed on employees in the case of dental care, then, are modest when compared with what would be required if increased cost-sharing were required for medical care. Moreover, firms expect dental benefits to grow. One firm, when faced with the choice among what were described as Chevrolet, Buick, and Cadillac dental plans, picked the Buick. There was no point, we were told, in giving away everything at once. There had to be room for future benevolence.

There is a similar disinclination to implement tighter claims control. Firms fear disrupting employee relations by appearing suspicious or miserly when claims are filed. The prime concern in benefit administration appears to be to make certain that employees in time of need identify the benefit they receive with the corporation, rather than that they meet restricted access to these benefits. Thus, some firms use their own staffs to process claims instead of that of their insurer so as to heighten the firms' identification with the benefits.

The excuse firms often give for failing to use claims control as a mechanism to contain costs is that they lack the data necessary for action. Indeed, it was surprising at first to learn how little most firms know about the details of their claims experience. Some blamed their insurance carriers for this lack of information; others blamed competing priorities for the failure to obtain the data. The pattern of ignorance, however, was so universal as to belie any real intention to gather the data. Most firms, it seems, simply do not want to know what they would need to know to police the behavior of their employees and service providers.

To be sure, firms try to discourage fraud on the part of employees and health care providers and will act to protect themselves when flagrant patterns of abuse are uncovered. The existence of a claims-checking procedure, as innocuous as it might be, is thought to be a sufficient deterrent to fraud in most cases. Few firms, though, seem anxious to test the effectiveness of their current systems or to impose more stringent ones. The presence of a union only heightens their reluctance to get tough with their employees. The fear of bad publicity is the constraint on chasing providers.

There is considerable variation in the attitudes of corporations toward health maintenance organizations (HMOs). For some, HMOs are the answer to rising health costs and they do everything within their power to encourage their employees to enroll in these prepaid group practices. But, for most, HMOs are not viewed as the panacea advocates claim they are, but as having many faults.

To begin with, firms that are national in scope find it administratively inconvenient to deal with dozens of HMOs, each enrolling a small percentage of their work force. Their preference is for a national contract with one or two insurance firms to manage their entire health benefit package. To protect their employees from fraudulent or inadequate providers they feel compelled to investigate each HMO that seeks access to the firm's employees. This time-consuming process contrasts with the ease of signing a contract with one or another major insurer. With a major insurer there is a single price for the services rendered, standard reporting forms, and a uniform set of benefits for the employees.

In addition, some executives remain skeptical about the savings HMOs are supposed to achieve. Its headquarters work force (several thousand workers) enrolled in 3 health maintenance organiza-

tions. The firm's chief medical director, an HMO advocate, praised the corporation's record in encouraging employees to enroll. The firm's insurance director, concerned about a rapidly rising Blue Cross rate, complained about HMOs' "skimming" (seeking out or attracting only the healthiest clients), and the fact that the firm's overall health insurance costs had increased rather than decreased despite their large HMO participation. No firm we visited could provide documented evidence of savings, though some still believed that savings would eventually be obtained.

Finally, no matter what the attitude toward HMOs, there is great reluctance to force employees to select one type of health service delivery system over another. We were constantly told that the employee's freedom of choice had to be protected. Since most managers are unlikely to sacrifice their relationship with particular providers, they cannot in good conscience attempt to direct the choice of the firm's employees. The potential, then, for the growth of independent practice associations (IPAs) is great, as this form of prepaid care does not restrict employee choice of physician as does the standard HMO format and thus is more compatible with the attitudes we found among executives.

Of course, the attitudes of union leaders also have to be considered. In most cases they, too, resist attempts to restrict the choice of employees to particular types of delivery systems. The firms with the highest HMO penetration tended to be those with low union membership. It may be that the desire of union leaders to act as the negotiator for the specific benefits members receive is the inhibitor. At least, that is what several benefit managers suggested to us.

Corporations are also reluctant to participate in attempts to restrict the local availability to expensive health facilities. In most cases they feel that they lack the employment concentration to be a significant influence locally. And when they have such an employment concentration, they are reluctant to use the power it gives them to further their health benefit interests.

To be sure, there are glaring exceptions. In Rochester, New York, for example, a handful of major employers—Kodak, Xerox, Sybron—dominate the economic life of the city and are willing to use their resources to achieve such self-defined health goals as restricting the duplication of services and the growth in number of acute care beds (Sorensen and Saward, 1978). But the Rochester experience, as enticing as it may be for health policy analysts, can be duplicated in only a few locations across the country and raises important questions of equitable political representation and social justice. Most firms feel their political power is limited at the local level, and prefer to husband it for tax or zoning purposes, problems more central to the firm's financial condition.

There have been some experiments in training firm managers to improve the quality of their service on local hospital and health planning boards and in taking official stands against the expansion of particular health care institutions. But the fear of lawsuits, provider boycotts, and community backlashes against involvement in local decision-making serves as an important restraint on these activities. It is still less risky to appear as a community benefactor, donating to the local hospital building fund, than as an antagonist to community medical care ambitions.

A favorite example reinforcing this point is the story of the major industrial firm that decided it was not going to pay for chiropractic services. The staff work preceding the decision was impressive. So, too, was the flood of postcards from chiropractors to the president of the firm, promising him never to buy another one of the firm's products if the decision stood. Although chiropractors do not account for a significant share of the firm's market, the president was unwilling to jeopardize any sales for a small saving in benefit costs. Quickly the decision was reversed.

When firms are motivated to act they prefer to do it in concert with others. Thus, local health cost-control coalitions have been formed by firms in Westchester County/Fairfield County, Philadelphia, Chicago, and elsewhere (Government Research Corporation, 1979a, 1979b; Demkovich, 1980). Such coalitions are exploring the establishment of projects to control local hospital growth and develop outpatient and day surgery facilities. However, these coalitions are potentially quite

unstable as their member firms are involved in different markets, jealous of their independence, and subject to changing internal priorities. The least hint of bad publicity is certain to strain the coalition.

Actual Policies

Firms have taken some steps to control health care costs, but not the ones advanced by health policy analysts. Large firms know how to manage large amounts of money. As health care costs have risen, health benefits have come to involve large amounts of money. Not surprisingly, firms devote a lot of attention to being certain that the money set aside for health benefits is managed well.

Most major firms now self-insure (Egdahl and Walsh, 1979). This means that they carry their own risks for fluctuations in benefit costs. By doing so they avoid placing significant reserves in the hands of insurance firms and the 2 percent tax that states levy against insurance premiums. Insurance companies are usually retained to administer the benefits—to process claims, maintain records, issue reimbursement checks, and monitor relations with providers, tasks for which they are paid a negotiated fee. The benefit administrators, whoever they may be, draw funds to pay health care providers from the employer's account. Any reserves or claim set-asides are invested for the firm's own advantage (Herzlinger, 1978). The insurers find some comfort in the new arrangements as they no longer bear risks and can charge for each service (e.g., report) they provide their clients. They compete now on the efficiency and speed of their administrative services as well as their ability to calculate risks.

Even if firms do not formally self-insure, they can gain equivalent benefits by bargaining with their insurers. Minimum premiums and other devices guarantee that large firms do not lose the use of funds accrued for claims. Insistence on experience-rating even when dealing with HMOs and Blue Cross assures firms that their interests always are protected and their premium costs are kept to a minimum.

Firms have also begun to seek discounts from hospitals that are heavily used by their employees. The discounts are obtained in consideration for prompt payment and continued patronage. Another 2 to 5 percent of benefit costs can be saved in this manner. Discounts loom large in potential importance when one recognizes that hospitals often transfer losses on government clients to private payers. No longer are the government and Blue Cross the only favored buyers of hospital services.

To most firms, however, health benefit costs are simply one small component of the wage bill. Seriously pressed, they do not look for significant savings by carefully managing benefits. Instead, they seek to trim labor costs as a whole by laying off workers and/or shifting to other businesses. The effects layoffs have on the availability of health insurance are discussed in Lee (1979).

Many firms sought to emphasize this point by underlining the role that business strategy plays in controlling benefit costs, to which we have already alluded in the discussion of compensation goals. Another aspect of the business strategy is selecting carefully the areas for investment. Several firms, burdened with what they thought were expensive union settlements, told us that future growth was to be limited to businesses in which the work forces were unorganized and largely part-time. Others stressed plans to close factories in urban areas where labor costs were high, and shift production to lower-cost rural areas or abroad. Rather than focusing on a small component of the wage bill—health benefits—these firms preferred to stress ways to reduce overall labor costs.

Still other firms reported to us that labor costs, in whole or in part, are not important to them. In their industries, profits depend on raw material prices or the pace of technological advancement. As long as these crucial aspects of the business were properly managed, the costs of increased health

benefits could easily be recovered through increased prices on the products.

It was largely these firms that seem most interested in health promotion and programs for modification of lifestyles. Although some references were made to the potential of preventive health efforts to reduce future health care costs, most executives know that these claims were as yet unproven. Instead, preventive health was viewed as simply another benefit and a popular one at that. Their work forces tend to be professional and middle class. Providing employees with well-equipped gyms, time off for jogging, and guidance on good nutrition and weight loss fits perfectly with the values prevailing among these workers.

Of course, it is possible to take these programs to an extreme. The capacity of chief executives in some corporations to impose their whims on the organization appears near boundless. Thus, we find headquarters staffs entering teams in local marathons and enduring noontime sessions of Alcoholics Anonymous just because the boss is a reformed fatty or an alcoholic.

Nevertheless, there is no doubt of the popularity of preventive health programs as additional employee benefits (Kaplan, 1980). And if the claims made for these prevention programs by their advocates even partially materialize, then the future medical costs of many corporations may decline. Certainly many benefit managers recognize the potential savings accruable to corporations by reductions in time lost and in the frequency of early death due to common illnesses and inadequate physical conditioning. These savings, however, may only mean additional costs for the government as it is the government and not the corporation that bears the burden for most of the care of the elderly (and the poor and the unemployed as well) in our society.

Conclusions

We found in our interviews that corporations were neither greatly concerned nor strongly motivated to do much about their health benefit costs. In our view, the opportunity for a close collaboration between business and government to contain health care costs simply does not seem to exist. To be sure, firms are no longer totally passive about health care costs; continual expenditure increases could provoke stronger action than what we have observed. However, firms are not now nor are they likely to be the force for system reform that some have imagined.

Major corporations are under no illusion that they can do much individually to alter their health benefit costs. The benefits have long since been given to employees and cannot now be called back without risking more employee dissatisfaction than most of these firms appear willing to tolerate. Moreover, once the benefits are established, the level of costs the corporation will incur is largely determined outside the firm by health care providers, physicians, and hospitals interacting in the overall health care system. The firm's ability to influence the system is not thought to be great. The political risks of attempting anything ambitious is believed to outweigh any savings the firm might achieve. Collaborative action tends to be limited by the least-willing participant.

Firms also believe that none of the proposed solutions, including some that they favor and have implemented, is likely to be very efficacious. Self-insurance, HMSs, and second-opinion programs are viewed as producing marginal savings. Even proposals to eliminate the tax advantage are greeted unenthusiastically, as it is thought that compensatory wage increases would have to be provided if the proposals were adopted.

Benefits are provided because many workers want them. The level of benefits provided depends on the market conditions in the industry in which a firm operates and the nature of its work force (i.e., its age, sex, and location). Competition for key categories of employees and the threat of unionization spread benefit increases throughout the economy. For most of the firms we interviewed the key benefit issue is whether or not the employees are satisfied, not why the benefit costs are high. Until the benefit function is transferred to the jurisdiction of corporate financial managers, who naturally view every expenditure with a jaundiced eye, it will be considered largely

as an adjunct to employee recruitment and retention activities.

Although government may be concerned with rising health care costs, we think most major corporations are not. Health benefits for the poor and the elderly account for nearly 10 percent of the federal budget and have recently been growing at twice the rate of other expenditures. In contrast, employee health benefits account for 2 or 3 percent of corporate expenditures and are growing less rapidly than many other business costs.

Doing absolutely everything it is advised to do to control health care costs, a company might be able to save 0.1 percent of total expenditures if it is fortunate. The equivalent managerial energy expended on activities more central to the business is almost always seen as more productive and certainly as less disruptive of corporate routines. Government not only uses a different calculus, but also has a larger health care cost problem.

This difference in perspective was dramatically shown in the stand the Business Roundtable (1979), the organization of America's major corporations, and its health care spin-off, the Washington Business Group on Health (1977), took on the Carter administration's Hospital Cost Containment proposal. Both groups opposed the bill, not just because they believed it would be ineffective, but also because they were opposed to any increase in governmental regulatory authority, regardless of the intended purpose. Although government has to place priority on controlling health costs, major corporations do not. They apparently perceive that there are greater evils to be combated.

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The chairman of U.S. Steel looks at health care costs from an industry point of view and comes away pretty steamed.

DAVID RODERICK ON HEALTH CARE

If the cost of subsidizing employee health care continues its significant rise, the corporate balance sheet might well become a candidate for intensive care.

Some industries have seen a 250 percent increase in their medical benefits in the course of just four years. Ford Motor Company's health costs have increased 240 percent in the last eight years, culminating last year with an expenditure of half a billion dollars — or roughly $2,300 per employee. In 1960, General Motors spent $38 million on health care. In 1979—one and a half billion.

No wonder, then, that U.S. Steel Chairman David Roderick was not surprised to learn that he had recently been supplanted as General Motors' leading supplier. GM now spends more for the medical needs of its employees and their families than it does for the steel in its cars.

In executive suites across the country, company-sponsored health plans are widely viewed as a burdensome fringe benefit out of control. In a uniquely frank and hard-hitting article, Roderick—himself a trustee of Pittsburgh's Mercy Hospital—lends the stature of his office to this growing industrial concern.

by David M. Roderick

Health care costs are out of hand because the system has been constructed in such a way that the employee, at best, has very little concern for the cost he is incurring. Since the system is not self-policing, users tend to be immune to the dollar value of the services they consume. The situation is akin to leading a small child into a candy store and, rather than telling him he has a nickel to spend, placing him behind the counter and giving him carte blanche. "Take anything you want," we are saying in effect, "and eat till you're happy."

If an employee were to worry about the amount of money he is spending for medical services, he would be less inclined to let the doctor prescribe future visits when he feels they are unnecessary. He would begin to view constraint as part of his responsibility. One of the problems we currently face is that people do not view the matter as their responsibility because we have guaranteed a benefit. But we have done very little in the way of containing the cost of that benefit.

Health care is like any other element of life. It must be used prudently, and not to excess. The unions of this country have employed a "cradle to the grave" concept of protecting their members. But since that approach mitigates against sensitizing users to the cost of health care, it works against them, the employees and the companies.

We have gotten into the mode of going beyond "insuring" our workers. "Insurance" is a way of protecting an individual against an expense he cannot afford to incur. But in additon to that, we are buying his glasses, having his teeth cleaned, and having his cavities filled. Can today's average worker afford to pay for those things by himself? You bet he can! And can today's average worker afford to defray a portion of his own hospital and doctor bill? You bet! We are giving away much too much.

Another factor which, to a certain degree, has contributed to runaway costs, is the use of an outside organization to administer a company's health care plan. Those who retain insurance companies, for example, are not only building that extra cost into their product, but are removing themselves from the total process. What we need is better administration from the source of subsidy. Not to withhold medical needs, not to deny where there really is true need, but to find ways—administratively—to better control the cost of needed health care.

Some of the fault for unreasonable medical costs belongs to the medical profession itself. By and large, the members of that community are fine, dedicated professionals. But there are those among the group who have abused the fact that their patients don't have to pay for services rendered. They subject the patients to a battery of tests that are, in many cases, unrelated to the problems. They utilize radiology, for example, when—in many cases—it is uncalled for. You have to remember that many of today's doctors are running a medical supermarket. Once you enter the front door,

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they want to provide you everything from soup to nuts.

I think we get into the same problems with hospitals. Every hospital wants its own CAT Scanner. Well, every hospital doesn't need its own CAT Scanner. Once they get it, though, they have to pay for it. So what do they do? Anytime they can put a patient on that machine, you can bet that they are going to. The patient might not require scanning, and if he had to pay for it himself, the doctor might feel quite reluctant to order it. But since the patient is covered, there is often no hesitation.

In many cases, hospitals hold their patients too long. They frequently delay discharging them because, again, they are worried about the economics of the hospital. Apparently, they are not worried about the economics of the organization paying the bill.

Unfortunately, unions and employees don't realize that although they are getting all of these benefits, they are negotiating them in such a way that the controls are virtually lost. Someone has to absorb the cost of all of this, and, in the case of industry, the cost is inevitably defrayed by the consumer. Costly benefits simply price products out of the market. Industry suffers, as a result, and is then forced to impose lay offs, which bring the inevitable termination of benefits. Let's ask the laid-off worker, then, how smart it was to demand that medical free-for-all.

Fundamentally, we have to stop negotiating away unreasonable benefits guarantees, and the union has to stop demanding an arrangement whereby the employee gets off scot-free. The person getting the service should always be sensitive to the cost of that service. The minute you've destroyed that, you've destroyed your best audit control.

I don't think anyone can object to major medical. Everyone realizes that a man who saves his money and buys a home should not have to forfeit that home or his life savings to pay for a catastrophic illness. But I think that up to a certain point, say $3,000 to $5,000, the employee — regardless of the benefit or the nature of the hospital stay — should pay roughly a quarter of the bill. If an employee has to pick up $300 to $400 of a $1,500 bill, you can be sure that he is going to scrutinize those costs.

There is a lot that can be done from the standpoint of increasing hospital productivity and containing hospital costs. Hospitals should aim to render services in a more efficient way so that there is less required of the nurses, less required of the attendants and less travel time within the hospital on the part of the physicians. I think that there is some progress being made in that area. We find, in industry, that the greatest productivity improvements come from building a new facility. Many of today's hospitals are outdated in the sense that their design does not promote productive use. They are eight stories high, for example, with ten rooms on a floor. How can you expect high productivity from a medical staff that has to work within that type of layout?

Another way to increase hospital productivity is to consolidate community health-care facilities. Instead of endowing an area with three mediocre hospitals, eliminate one and shore up the remaining two. It's time to start applying some smart business sense to the delivery of health care. Concurrently, it is time to eliminate the abuse and extravagance that have ignited health-care costs. ■

HEALTH POLICY REPORT

JOHN K. IGLEHART

Health Care and American Business

AMERICAN industry, historically a slumbering giant when it came to influencing the delivery of health-care services that it purchased, is awakening to the need to become a more sophisticated buyer of such services for one overriding reason: Soaring costs are crimping profit margins as never before. Closer scrutiny by private employers (and, in selected instances, their affiliated labor unions) of their health-care purchases is a slowly evolving phenomenon. Once passive, private businesses began to demonstrate moderate interest in national health issues in the 1970s during debates over national health insurance, health planning, alternative delivery systems, and medical quality assurance. Now the involvement of business is growing, but its focus is drifting away from Washington and toward more concentrated attention on local health-care activities.

Whether on a national or a local scale, greater involvement of private business in the affairs of medicine poses a challenge to providers of care, because although both worlds share a strong belief in free enterprise, no longer will this philosophical tie so readily buffer their conflicting interests as buyer and seller of health services. The same dynamic is likely to lead to growing conflicts between the Reagan administration and medicine. In short, business and government have begun to look at medical care as more nearly an economic product than a social good.

The signs of an awakening business community can be found in spheres that reflect a collective concern, such as the national activities of the Washington Business Group on Health (WBGH) and the health-care concerns of the Chamber of Commerce of the United States, and in communities where business-sponsored coalitions are emerging to deal with the medical world. The American Medical Association (AMA) considered the growing interest of business important enough that it created a corporation-liaison program. By mid-1980, AMA member physicians and association staff members had engaged in discussions with 100 big businesses and 500 executives as a consequence. The AMA has also published a handbook entitled *The Formation of Medicine/Business Coalitions*. The association's principal short-term goal in its contact with businessmen is to make certain that doctors are included as equal participants in local coalitions dealing with health issues.

Sorting out what will be the real meaning of more business involvement in the purchase and delivery of medical care is itself a challenge. Indeed, a recently published study,* based on interviews conducted two years ago with chief executive officers (CEOs) and employee-benefit managers of 69 major United States corporations, concluded that businesses were not especially concerned about rising health-care costs and saw little advantage in taking aggressive steps to control benefit expenditures.

The study, undertaken by Prof. Harvey M. Sapolsky of the Massachusetts Institute of Technology and three colleagues, generated a storm of protest from employee-benefit managers, who argued that the work simply reached an erroneous conclusion. In a speech made on October 20, Sapolsky lamented, "All I've gotten since the day the study leaked out are hostile stares and muttered threats." Reflecting the umbrage that employee-benefit managers took at Sapolsky's work, Willis B. Goldbeck, executive director of the WBGH, said in an interview, "You're damn right, health-care costs are not the Number 1 concern of chief executive officers. If they were, they would not be CEOs very long."

The views of employee-benefit managers notwithstanding, there is strong general support for the view that CEOs historically have not devoted much attention to the often complex, rather mundane world of fringe benefits. Prof. Alain C. Enthoven of the Stanford Graduate School of Business, who has sought to sell his health competition strategy to the corporate world, said in a telephone interview, "I agree with Sapolsky's conclusion. Based on the evidence to date, it's a realistic conclusion."

David A. Winston, chairman of a private-sector task force chartered by Health and Human Services Secretary Richard S. Schweiker to study the health-competition model, said in an interview, "On a scale of 1 to 100, I would rank corporate interest in health-policy issues 25, but moving up rapidly." Robert Burnett, CEO of Meredith Publishing Company, a $400-million-a-year publishing enterprise based in Des Moines, Iowa, said in a speech on September 21, 1981, to the National Industry Council for HMO Development, "What's the average CEO's information quotient on the subject of health-care costs? Somewhere in the area of 0 to 5 on a scale of 100."

The point is not to split hairs over the differing views on corporate involvement in health matters, but simply to note that, historically, it has been minimal, when one considers the fact that American industry invests vast sums in health insurance — $42 billion on group-health-insurance premiums in 1978, according to the U.S. Commerce Department. This article will report on a range of activities suggesting that the traditional corporate indifference is giving way to a growing interest in making changes in the delivery and financing of medical care.

Involvement of private business in medical care is by no means a new development, if such activity is defined to include the manufacture of pharmaceutical products, technology, and all the other paraphernalia found in the modern hospital. But corporate participation in the actual delivery of health care has been rare until very recently, with one major excep-

*Sapolsky HM, Altman D, Greene R, Moore JD. Corporate attitudes toward health care costs. Milbank Mem Fund Q. 1981; 59:561-85.

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tion: industrialist Henry J. Kaiser. After World War II, Kaiser decided to offer the public the kind of health care that he had provided Kaiser employees during the war. Out of Kaiser's commitment to put his substantial financial muscle into what was viewed then by most doctors and is still viewed by some as a heretical concept of health-care delivery (prepaid group practice) has emerged the largest private, nonprofit direct-service-delivery program in the world. The Kaiser–Permanente Medical Care Program serves 4 million people in eight regions, which span from Hawaii to Washington, D.C.

There are other examples of early industrial involvement in direct delivery of medical care, but they were generally viewed as anomalies. The Gillette Company began its health-care program for employees 30 years ago. Many large corporations have always staffed industrial medical programs, but more to treat work-related accidents than to manage acute episodes of illness. The labor movement has also had a long history of sponsoring direct-care programs for union members.

The 1970s were a time when large corporations, those not involved in either the manufacture of health-related products or the delivery of care, began to demonstrate some interest in national health issues. During this period, the federal government implemented statutes that were approved in the socially active 1960s. Medicare and Medicaid, for example, emerged as financially uncontrollable entitlement programs. Congress also enacted laws that affected businesses as taxpayers and employers. Many corporations were forced to incur new costs and change many operations to comply with four laws: the Coal Mine Health and Safety Act (1969), the Occupational Safety and Health Act (1970), the Rehabilitation Act (1973), and the Toxic Substances Control Act (1976).

The early 1970s also marked a period of renewed government interest in national health insurance — an interest stimulated largely by the determination of organized labor and its chief political ally, Sen. Edward M. Kennedy (D-Mass.), to socialize American medicine along the lines of Britain's National Health Service. Responding to this effort, President Nixon offered his own national-health-insurance proposal that would have mandated private businesses to offer medical protection to their employees. Both approaches would have substantially affected business.

Nixon also sought during this period to transform the health-care-delivery system through federal promotion of the model that caught Henry Kaiser's fancy some three decades before: prepaid group practices, or (as the Nixon administration renamed them) HMOs. That saga is only relevant to this article in that during the two-year debate leading to enactment of the Health Maintenance Organization Act of 1973, little consideration was given to the prospect that private businesses would be a driving force behind medical-care reform. The role of private businesses, it was generally envisioned, would be limited to financing the care of employees who enrolled in HMOs, rather than sponsoring the creation of their own alternative delivery systems.

The idea that corporations should apply the leverage of their multi-billion-dollar investment in health care more aggressively emerged strongly for the first time in 1976, when President Ford's Council on Wage and Price Stability published a report entitled *The Complex Puzzle of Rising Health Care Costs: Can the private sector fit it together?* The council, which had held hearings across the country in 1975 on the health-cost issue, challenged business and labor to step up its cost-containment efforts by stating:

> An alternative to federal control of the health-care system is available if promptly seized. . . . That alternative is a concerted and united effort on the part of industry and labor to control costs. . . . But make no mistake about it, the private sector must step up its efforts manyfold; it must apply the full measure of ingenuity and management skills which are so characteristic of the American system.

During the period of the 1970s when Congress most seriously flirted with national-health-insurance legislation — 1974 — The Business Roundtable, an organization of 196 CEOs who represent America's corporate elite, created an affiliated unit and named it the Washington Business Group on Health (WBGH). Henry Ford, Jr., the primary force behind the creation of the WBGH, hoped to head off a national-health-insurance bill that thrust government more deeply into the realm of private business.

Since 1974, the WBGH has become increasingly influential in Washington health-policy circles. Its membership consists of 200 corporations of the *Fortune* 500 variety. These companies pay the cost of health insurance for 55 million employees and their dependents and, in most instances, the supplemental premiums of retirees who are covered by Medicare. The most active participants in the WBGH come from the ranks of employee-benefit managers of member corporations and from representatives of commercial insurance carriers and other companies whose products relate to health care in one way or another (e.g., pharmaceutical manufacturers). As a consequence, the WBGH moves in incremental steps, striving to minimize the role of government and to avoid disruptions in current collective-bargaining agreements and health-insurance contracts.

Nevertheless, within the ranks of the WBGH companies there is a majority view that changing the present cost-based reimbursement system and working toward the creation of alternative delivery systems are essential ingredients of overall reform. Richard Wardrop, general manager of employee benefits of Aluminum Company of America (ALCOA), testifying on October 1 before the House Ways and Means Subcommittee on Health, made it clear that of the three general philosophical directions that the delivery system could take — more federalization, the development of a public-utility model, or the increased use of marketplace forces — the WBGH much preferred the latter.

Wardrop, chairman of the WBGH's Task Force on Competition, explained in his testimony the process through which the group arrived at the conclusion to promote a change in cost-based reimbursement and the development of alternative delivery systems:

> Before the first meeting of the Task Force on Competition, we sent a questionnaire to all members of the WBGH. . . . The first question in the survey was: "Do you think it is necessary to change the existing reimbursement arrangement in order to have significant impact on the nation's health-care cost?" Of the responding companies, 80 per cent said "Yes, we believe that, in order to have significant impact on the nation's health care, we have to change the reimbursement arrangement that now exists." . . . Perhaps one way is to get a significant number of our employees and dependents into "alternative delivery systems" — those with a different reimbursement arrangement. At the conclusion of our second task force meeting, we asked the attending companies to come back to the next meeting with an answer to this question: "Is your top management prepared to make a commitment to articulate definitive corporate policy on encouraging the development of alternative health-care plans, enrolling a sizeable population into such plans?" I posed that question to my own company in August [1981] at a meeting with the vice president of industrial relations, the vice president of human resources and our president. They fully endorsed the proposition of getting a significant number of ALCOA employees and their dependents into alternative delivery systems.

At the WBGH's annual meeting in late September, the organization approved the recommendation of its Task Force on Competition to encourage corporations to promote alternatives to fee-for-service medicine. In keeping with WBGH's resistance to governmental action to foster change in medical care, the corporations oppose the enactment of legislation as a means to implement this thrust. Many companies still take exception to the requirement of the Health Maintenance Organization Act of 1973 that mandates all employers of 25 or more employees to offer their workers a "dual choice" of health plans if such a choice is available in their locales.

The action of the WBGH is not about to transform the delivery system, but it is a recognition that these corporations, with their massive purchasing power and their commitment to offer health-insurance protection to millions of employees, are dissatisfied with the status quo. They will move cautiously as agents of change in the communities where they operate, always sensitive to their local standing. And, if possible, they will strive to cooperate with doctors and hospitals rather than confront them. Forty per cent of the average community-hospital board is made up of people who are affiliated with private business. Thus, most corporations already have ties to their local hospitals.

Some WBGH member companies won't move at all. Corporations that market health-related products are usually reluctant to rock the boat of fee-for-service medicine, and those of that nature that belong to the WBGH are no different. Even given all the caveats, though, WBGH members seem to be listening with more receptivity to the kind of message that the group's executive director, Willis Goldbeck, delivered to them in an address to the organization's 1978 annual meeting:

> It is very important to recognize that you can purchase health care in precisely the way you purchase any other product, and if that disturbs some of the providers, so be it. . . . If industry is serious about cost containment and is serious about quality, you must recognize what the trade-offs are, what tough policy and value decisions need to be made, and where economic leverage must be brought to bear. If not, then go ahead and pay for thousands of empty beds in your community, pay for false and unnecessary claims, pay for lots of unnecessary surgery, acquiesce to providers, employees, or dependents who equate unthinking demand with need. However, remember that you are using your stockholders' money, your employees' money, and your profits to pay for health care that is not really needed. That's really what it comes down to, and in this era of limited resources none of us can afford that kind of waste."

The Chamber of Commerce of the United States, 85 per cent of whose members have 100 or fewer employees, is also moving in directions that are similar to those of the WBGH. The Chamber is less aggressive in its approaches because it has a more diverse and conservative membership, but it is also an organization with state and local affiliates that often wield more influence through their collective membership than do large corporations alone.

For a number of reasons, organizations and individuals with an interest in changing the American health-care system are shifting away from an exclusive focus on Washington and looking toward more locally based activity. Among the reasons are a societal disillusionment with government as a problem solver, the conservative nature of the Reagan administration and its commitment to devolve power to state and local levels, and a growing recognition that health-care delivery is, after all, basically a local phenomenon.

In 1978, the Chamber published a series of monographs to help businesses mobilize efforts to control medical costs at the local level through coalitions of interested parties. Richard L. Lesher, president of the Chamber, said in the foreword of its monograph series, entitled "National Health Care Strategy":

> The challenge before us is to improve health and contain health costs. The National Chamber HEALTH/ACTION kit, including this book, provides information on how business and other community leaders and community organizations can apply voluntary, private solutions to health cost problems at the local community level. The success of these solutions will reduce the need for further government involvement and still achieve the desired results: improved health at reasonable costs.

The Business Roundtable's Task Force on Health has plans in the works to make its CEO members more sensitive to involvement in health issues at the local level. This effort is being led by Walter B. Wriston, chairman of the board and CEO of Citicorp and chairman of The Business Roundtable's Task Force on Health. If plans go forward as now envisioned, The Business Roundtable's leadership will write its 196 CEO members in February, urging them to become more involved in efforts to inject market forces into medicine, to become involved in local coalitions, and to support ongoing efforts to monitor health care through health-planning agencies and utilization-review mechanisms.

The members of The Business Roundtable's Task Force on Health, the group that devised this plan, are the chief executive officers of Citicorp, Eli Lilly and

Company, Armstrong World Industries, Honeywell, Merck & Company, Koppers Company, Hospital Corporation of America, Ralston-Purina Company, and Metropolitan Life Insurance Company. Historically, The Business Roundtable has used the substantial influence of its CEO members to lobby for federal legislation in ways reflecting the corporate viewpoint. The Roundtable has never before been used as a mechanism to influence CEOs on issues that directly affect them in the communities where they operate. Out of The Business Roundtable's greater involvement in dealing with health issues, the organization hopes to develop local success stories that underscore its belief that private-sector solutions to the cost spiral are preferable to federal legislation.

The Chamber of Commerce is devoting its attention to local health issues by promoting the concept of local coalitions. There are at present some 60 coalitions in communities throughout the United States; in some instances they include as members just representatives of private businesses, and in others they involve an amalgam of interests, including business, medicine, hospitals, insurance, and other health-related concerns. The coalitions are engaged in a wide variety of activities from cost-control experiments to health-promotion campaigns, education of hospital trustees, gathering and analysis of data on resource use, and redesign of health-insurance benefits. Jan Peter Ozga, the Chamber's health professional, conceded in an interview that "there is more promise to coalitions than performance at this point."

Another organization that plans to become involved in efforts to engage business more heavily in health-care delivery is the Robert Wood Johnson Foundation, which wields substantial influence by virtue of the $50 million that it distributes annually to health projects of its choosing. The foundation's staff is unwilling to discuss its plans, but from information gleaned in interviews with people who have worked on the project, it is apparent that the foundation plans to unveil soon an ambitious, multi-year, multi-million-dollar program involving private businesses and health-care providers.

Johnson plans to fund about 10 projects that will engage communities in demonstrations involving different approaches to reimbursement for hospital care. Among the strings that it will attach to the money, Johnson will apparently require that these projects be directed by a board that includes representatives from private business, organized labor, medicine, hospitals, and private insurance companies.

Robert M. Sigmond, a former Philadelphia hospital administrator who has been working in recent years as a consultant to the Blue Cross and Blue Shield associations, has been enlisted by the foundation to direct the program. The exact nature of the local demonstrations that Johnson would fund is not altogether clear, but an experiment in voluntary reimbursement control currently under way in Rochester, N.Y., could well be the kind of activity that the foundation has in mind. This project is called the Rochester Area Hospitals' Experimental Payments Program, and its president is Dr. James A. Block, who also serves the Johnson Foundation as a consultant.

Boston University's Health Policy Institute has also devoted an increasing amount of its time to working with corporations. Through the institute's Center for Industry and Health Care, a series of nine volumes on business-related health issues has been published. Dr. Richard H. Egdahl, director of the Boston University Medical Center and the Health Policy Institute, devotes his time with corporations to analyzing their employees' use of hospitals and seeking ways to reduce overuse where it exists. Egdahl has worked closely with ALCOA, E. I. duPont de Nemours, and Johnson and Johnson, tracking their use of medical facilities, and he is also studying patterns of medical treatment on behalf of the interests of a number of other corporations.

Egdahl's Health Policy Institute is just completing a survey of HMOs in New York for Citicorp, which has been offering these alternative systems to their employees but has not promoted them in any way. Citicorp wanted to find out whether HMOs could save the corporation money while still delivering high-quality care if they enrolled more Citicorp employees. Over the years, Egdahl has worked closely with the WBGH and its executive director.

Dr. Paul M. Gertman, a colleague of Egdahl's at Boston University, launched in the past year the Health Data Institute, an organization that has been working with private corporations and Blue Cross of Massachusetts, using claims data to identify problems related to overuse, particularly of ancillary services. Charges for ancillary services represent approximately half the total bill for hospital care received by Massachusetts Blue Cross. On October 1, William M. Mercer, Inc., which describes itself as "the world's largest employer benefit consulting firm," took a step toward working more closely with corporations on questions of health-care use by hiring Elliot Segal, who had previously worked for the House Energy and Commerce Subcommittee on Oversight and Investigations. While working on Capitol Hill, Segal developed two controversial studies, which the committee published and held hearings on. The studies were entitled *Cost and Quality of Health Care: Unnecessary surgery,* published in 1976, and *Surgical Performance: Necessity and quality,* released in 1978.

Private businesses, foundations, and universities are not alone, though, in shifting their attention to communities and away from Washington's policy swirl in pursuit of reforming health-care delivery. So, too, are a tiny cadre of persons who once viewed Washington as the place where medical care could be transformed through broad strokes of national policy. Such persons and their organizations are devoting themselves now to the more time-consuming (but, on occasion, more rewarding) local setting as their target of opportunity. Dr. Paul M. Ellwood, Jr., president of InterStudy, a Minneapolis-based health-policy-research organization, is a good example of a person who has made this geographic switch.

Ellwood, who was educated at Stanford Medical

School and has training and teaching credentials in pediatrics, neurology, physical medicine, and rehabilitation, began working in Washington on behalf of health-system reform in 1969. The high point of what became a decade-long odyssey came in 1970, when Ellwood persuaded the Nixon administration to promote the HMO concept through legislation that would extend federal subsidies to organizations interested in creating alternative delivery systems. Throughout the 1970s, Ellwood made frequent trips to Washington on behalf of the marketplace model of medicine. But never again did he match his earlier feat. By the end of the decade, Ellwood had turned his attention and that of InterStudy, which is staffed by 17 professionals of various backgrounds, to local communities. Ellwood said in an interview:

> I used to feel that there were some magic buttons in Washington. If they could be found and pushed, the medical-care system could be transformed. But I have literally given up on the federal government as an effective change agent. I simply have not been able to change its basic ways whether it is controlled by politicians who share my reform philosophy or by people who oppose it. I have been trying to change Medicare for 12 years, and I still haven't gotten there. . . . The health-care system is a series of local enterprises. To change them, they must be taken on one at a time, because each is different. Different ingredients, different interests dominate, and they are just all over the lot when it comes to a willingness to change.

InterStudy's community program has involved it in activity in Salt Lake City; San Francisco; San Diego; Dayton; Des Moines; Boston; Harrisburg, Pa.; Richmond; Omaha; and the states of Florida and Louisiana. Funding sources that InterStudy has tapped for its community-based activities include the Health Care Financing Administration, the John A. Hartford Foundation, and the Joyce Foundation. InterStudy is by no means the only force at work in these locations, and in many of them work has only begun. InterStudy can point to the considerable changes that the health-care system in the Twin Cities of Minneapolis and St. Paul is currently undergoing. Some 450,000 persons are enrolled in HMOs there (about 20 per cent of the population in the metropolitan area), and large corporations with headquarters there are playing important parts as agents of change.

Clearly, though, the road to changing health-care delivery is fraught with peril, and the constituents for supporting such a course are still few and far between. Burnett, the CEO of Meredith Publishing, has been working with Ellwood in Des Moines to launch an HMO there. Burnett, in his speech to the National Industry Council for HMO Development, discussed some of the problems he has encountered:

> Health-care cost containment is a dirty project — it's filled with personal and sensitive relationships and interrelationships that cause any thinking person, if at all possible, to want to avoid it. Any CEO who tells you he relishes getting into the middle of that can of worms, I think, is suspect. I don't feel that way. I've been in the middle of it, and my family and I would have to leave town to get medical care in the next two or three years. I don't think it's fun and I don't like it and I wouldn't want to do it again. . . . If you want to know one of the reasons why CEOs really don't want to get into an HMO situation in a community, it's because if they've talked to anybody about it they've found . . . there is a great potential for losing. No CEO wants to be a loser, particularly in public. So if his staff says to him, "Well look chief, there are failure rates of X and here are some communities where it didn't work and here are the problems that you're going to have in order to make it work," what's the safe course of action for that CEO to take? That's a very human and normal reaction, especially when his own compensation committee review and his performance standard review don't say a damn thing about health care costs or cost containment or for that matter even any health care standards. The whole arena to most of these CEOs is a bit on the esoteric side.

Burnett went on to describe how many CEOs regard HMOs as a "somewhat socialistic concept" — a view, he said, that is shared by most Des Moines doctors. "That's an overlay that is there; deny it or not, it's there. It involves government, it involves complex structures, it involves all the kinds of concepts that many people associate with a socialistic approach to society."

Concluding his saga of one CEO's experience with medicine, Burnett discussed how he and persons with whom he is allied in Des Moines sought to cut a deal with doctors and failed, and why it is in his corporation's best interests to remain involved in medical-care reform in Iowa's largest city.

> I told you it's costing us $.50 a share [of a 1980 earnings base of $7.00]. We made an offer to the medical community, who told us that we didn't need an HMO in Des Moines. We made the offer publicly at board meetings [of the business coalition] on two different occasions. We said if you the provider community hold escalation of health care costs in this community to 10 per cent or less, in whatever voluntary way you choose to do it, we're not going to get into it, we'll go away, and there won't be an HMO. We won't even pursue this subject any longer because I wouldn't be here if they had accepted that one. . . . I don't like fooling around with projects like this. I think I've made that clear, but the tragedy is that I can make more money for this corporation and its stockholders in the next three or four or five years . . . by doing something effective in the way of cost control than I can by selling. . . . Every dollar of health care cost that's saved goes straight to the bottom line, and every dollar of revenue that I sell goes through and filters through a dozen places before three or four sets of them get to the bottom line.

Burnett's closest corporate ally in Des Moines is Michael Gartner, president and editor of the *Des Moines Register and Tribune,* Iowa's largest newspaper. In a candid speech, delivered on June 4, 1981, to a seminar for a business–health-care coalition, Gartner said that Des Moines businessmen who were working to create an HMO had found representatives of organized labor to be their closest allies, but found it impossible to work cooperatively with doctors there. "We've . . . given them an opportunity to design their future, offered to help them resist government intervention, and we've been rejected."

Corporate involvement in health-care delivery is increasing, not because business lacks better things to do or because executives take delight in intervening in the affairs of medicine. But this involvement will continue to grow until the delivery and financing of health care become more manageable. As federal funding for health-systems agencies, professional standards review organizations, and HMOs dries up, corporations in some communities could emerge as tougher allocators of resources in the future.

HEALTH BENEFITS COME UNDER THE KNIFE

If there was ever a year for American industry to get serious about curbing the runaway cost of employee medical benefits, 1982 was it. While profits of the FORTUNE 500 were tumbling and inflation was slowing dramatically, the price index for health care surged another 11.6%. Many companies' medical insurance premiums jumped 20% or more, and business collectively shelled out $67 billion—more than a fifth of the total national health bill. Little wonder, then, that some top managements at last are looking for cures, and finding at least partial relief.

"Five years ago you could hardly find a C.E.O. who knew much about health benefits," observes former Blue Cross/Blue Shield President Walter J. McNerney. "Now they all do." What's busting corporate health budgets is no deep mystery. The payment of medical bills by third parties—most prominently Blue Cross and the insurance companies that actually disburse employers' money—tends to promote waste. With big costs borne by others, neither patient nor the providers of medical care—doctors and hospitals— are prone to challenge excessive tests and treatments. Estimates vary, but some health experts contend that at least 25% of all medical care paid for by the third parties may be unnecessary.

Business, instead of intervening to make sure the money was spent efficiently, long chose not to get involved. One reason: medical premiums have been tax deductible to employer and tax exempt to employee, at a cost to the U.S. Treasury of $23 billion in lost revenues last year. But the sheer magnitude of medical costs, even after the tax saving is figured in, is beginning to jolt business out of its passivity. So is President Reagan's recent proposal for slowing the growth of medical benefits; he wants to deny the premiums exceeding $70 a month in the case of individuals and $175 a month for families. Some 18 million workers—particularly those in the auto and steel industries whose unions have exacted some of the country's most generous health benefits—would have to pay income taxes on premium payments about these ceilings.

Some of the remedies that companies are reaching for are like new drugs whose efficacy has yet to be proved. One of them is better information on medical costs, which would enable companies to play hardball with the providers. Over the past few years, 110 business coalitions have sprung up around the country, mainly to compare notes on who charges what. Considering the amounts they spend, corporations are amazingly ignorant on the matter. Says Lindon E. Saline, a General Electric executive on loan to the Business Roundtable's task force on health: "We know more about what goes into the cost of the 75-cent box of screws we use on the factory floor than we know about what goes into the cost of health care."

Prices vary widely from region to region, and even within cities some hospitals have doctors charge far more than others for the same treatment. Unfortunately, most coalitions have yet to move from talking to setting up real clearinghouses for cost data. They remain more promise than performance.

The same, alas, is true of a much hailed miracle cure: health maintenance organizations. In theory HMOs can achieve big savings for companies whose employees enroll in these comprehensive, prepaid plans in large numbers.

Unlike hospitals and doctors in private practice, who are paid on a piece-work basis, HMOs charge a fixed annual fee from which they must cover all their expenses. Forced to operate within each year's "subscription income," they have a mighty incentive to limit treatment, and especially to avoid costly hospitalization.

HERE AND THERE, HMO boosters can point to dramatic successes. In the area around its Moline, Illinois, headquarters, for example, Deere & Co., the agricultural equipment manufacturer, used to pay for a staggering 1,400 days in the hospital each year for every thousand workers. Then, in 1980, Deere took the lead in helping local doctors to establish an HMO, and annual hospitalization has since plummeted to 500 days per thousand workers. Results like those persuaded Chrysler Corporation to announce a bold initiative last month. The cash-strapped automaker offered bounties of up to $250 to employees in the Detroit area who persuaded colleagues to join an HMO.

For companies with scattered employment sites, however, HMOs hold out little prospect of help in the near term. There are still just 265 of them around the country. And even though Congress mandated in 1973

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that major employers offer the prepaid plans as options wherever possible, HMOs today enroll only 11.5 million, counting dependents. That's a threefold increase in a decade, but a meager 6% of the population covered by third-party payment for health care.

Even more discouraging is new evidence that HMOs as a whole are saving little money. A government-funded national survey of employers' experience with HMOs over the past three years, not yet released, shows that the rate of cost escalation has been flatter than for conventional health plans. But not until last year, the study says, did the average monthly premium paid for HMOs become less expensive than that of other plans—and then only for individuals, not families, and only by a few pennies. Admits Dr. Paul M. Ellwood Jr., head of a medical think tank near Minneapolis and longtime apostle of prepaid care: "HMOs are not yet equal to the task."

Clearly companies cannot wait for institutional changes that could take years or decades. To save money right now, they are turning to faster-acting medicines. The quickest and most potent step has been to make employees pick up more of their health costs. According to a survey by William M. Mercer Inc., a benefits consulting firm, 468 employers out of the 1,390 it surveyed have done this since 1981. "Outright reductions in benefits were unthinkable until the past two years," says Albert Cole Jr., of Buck Consultants. "But shifting the cost to employees saves the most money. There is not a close second." Typically a company can pare its medical bill 7% by replacing a $50 deductible for each family member's services, other than hospital and surgical bills, with one three times as large. If the latter items have no deductible and a $150 one is introduced, the company can save another 3%.

Far from being harsh, such steps are belated adjustment for inflation. Many health plans with $50 deductibles were established in the 1950s when the sum paid for two days in the hospital. Today it doesn't cover the average daily room-and-board costs for a single day's stay. Benefit plans now are paying for a level of coverage that was never envisioned when the plans were originally offered. "Employers have been patsies too long," says Walter McNerney. "They have confused their buyer roles with noblesse oblige."

So far employers have boosted deductibles mostly for salaried employees. These workers have also borne most of the recent increases in co-payments, or the portion of bills a patient pays once the deductible is exceeded. Labor unions are predictably suspicious of greater cost-sharing. One AFL-CIO official flatly rejects it as "playing roulette with workers' health." Moreover, some who are unconnected with the labor movement argue that the cure would be as bad as the disease if employers merely shifted some of their swollen health costs back to the workers. By itself, they say, this would not necessarily curb waste.

PRELIMINARY EVIDENCE published recently by the Rand Corporation, however, indicates that at some point it would. A substantial increase in co-payments, the Rand study suggested, could conceivably induce such a stunning cutback in the use of medical services that companies' premiums might fall by 50%.

Few employers want the economizing to go that far since it might menace health. But all believe that big savings are possible. As soon as it starts coming out of their own pockets, employees become pretty sophisticated shoppers for lower-cost health care, says Henry E. Simmons, a physician who serves as a health planning consultant for Peat Marwick Mitchell & Co.

Raising deductibles and co-payments by fiat has its limits, even where unions don't stand in the way. So steep is medical inflation, moreover, that any savings are wiped out in a few years unless further measures are taken. The most promising one, already pioneered by several companies, is to induce employees voluntarily to choose slimmer medical coverage.

American Can, starting in 1978, was one of the first to accomplish this by offering flexible fringe benefit packages. Each of its 4,000 salaried employees is alloted annual credits according to age, salary, and seniority. The employee "spends" these like someone going through a cafeteria, picking varying amounts of life insurance, pension benefits, disability protection, supplemental vacation time, and health care coverage. Everyone is required to take a minimum amount of each item, but has enough credits to partake more generously of some. Says American Can's benefits director Robert B. Bogart, one of the plan's chief architects: "It's common sense to recognize that no two people have the same needs. A lot of benefits probably were being used inefficiently."

Under flexible plans, health benefits generally have the most flex. American Can's program offers six levels of coverage, starting with a lost-cost option carrying a $200 deductible for an individual and providing no

coverage of outpatient care in doctors' offices. It still offers a lot of protection: the most an employee would pay for an illness requiring hospitalization is $1,200 a year.

At the other extreme is what Bogart calls the "Cadillac Plan"—the old pre-flex benefit—featuring a $50 deductible, total coverage of hospitalization, and 80% of reimbursement for office visits to doctors. Two-thirds of the American Can workers are unmarried or childless, and Bogart was not surprised when 90% settled for less than the "Cadillac Plan." That option will be dropped from the menu in 1984. Prior to the introduction of flexible benefits, American Can's health costs were rising at the same double-digit rate as the national average. Since then the increase in health costs has slowed by a quarter. Through the cafeteria plan, moreover, American Can has braked the growth of fringe benefits costs as a whole.

PEPSICO went to the cafeteria in 1980, and last year held the increase in medical premiums for those in the flex plan to three-fifths of the rise in its conventional plan. Benefit managers are pleased not only by the money they are saving now, but by the prospect of reining in costs further in years to come. "In the past we had the information that our health care costs were going up," says Pepsico's benefits chief C. Stewart Patrick, "but it seemed there was nothing we could do about it." Now the company can set its own ceiling on total fringe benefit costs and let the employees worry about which choices to make.

Critics of flexible benefits charge that they encourage what insurers call "adverse selection." Healthy employees, they argue, will tend to choose lower coverage, shrinking the pool of funds to cover those who are more sickness-prone. But this doesn't necessarily happen. Unlike American Can, Pepsico found that nearly 70% of its eligible employees chose a high level of protection, costing them more cafeteria credits, even though as a group they are younger and healthier than the adult population as a whole.

"The theory of adverse selection assumes that people make choices about their health as rational consumers," says Patrick. In fact, he says, "they don't know what their health is going to be in the future and select their coverage very conservatively." In any case, Pepsico's risk pool for catastrophic illnesses is unaffected by the flexible plan, since they are covered under all options.

If medical inflation remains unchecked, cafeteria plans could begin to lose their popularity. Forced to spend an ever greater portion of their benefit credits for health care, employees might grow dissatisfied or demand compensatory pay increases. The best way to stave off this development is to teach employees to be more frugal health care consumers. Companies have long shrunk from doing this. Says one benefit manager, "The animosity you can create by tampering with the doctor-patient relationship is frightening."

But companies can modify the way health services are consumed without excessive meddling. Some are starting to remove the irrational incentives in their benefits plans that have long favored hospitalization over less costly outpatient care. In its flexible plan, American Can waives co-payments for employees who choose outpatient care when it is a suitable alternative to hospitalization. Other companies, such as DuPont, encourage the use of out-of-hospital birthing clinics by picking up all the costs.

More controversial, but still a good idea, is the approach that Chrysler now takes, with the assent of the United Auto Workers. Employees faced with any of a dozen or so types of elective operations—from simple tonsillectomies to delicate coronary bypasses—must consult a second specialist. If the employee fails to get a second opinion, Chrysler will not pay the entire bill. On the other hand, it will pay the whole bill even if the second doctor is opposed to surgery. Some voluntary second-opinion programs—notably one launched in 1977 for Medicare patients and discontinued four years later—have not been cost-effective. But one extensive study of mandatory programs estimates they could save $2.63 for every dollar spent on second opinions.

If employees must go to the hospital, experts warn, set some rules. Refuse to let them enter on the weekend if treatment is not scheduled until Monday. When they are released and the hospital renders its bill, it helps to have large bills audited. Towers Perrin Forster & Crosby, a benefits consulting firm, estimates that this could cut hospitalization expenses as much as 8%. The newest cost-cutting approach, called pre-admission certification, requires doctors to get clearance for the treatment they want before patients are admitted to hospitals in nonemergency cases. When additional treatment or testing is given, companies refuse to pay bills unless doctors can confirm that a deviation from the original plan was necessary.

TRUE CONTROL over medical costs will require more than mere tightening-up along these lines. Some companies are taking the initiative to head off a far bigger health care crisis that looms just down the road. As the baby boom contingent marches into middle ages, the number of people who will be exposed to age-related health risks will grow proportionately. Says Michael F. Cataldo, a professor at the Johns Hopkins medical school: "If I were a corporate executive involved in health care today, I would be concerned about whether my company will be able to afford health insurance at all by the year 2000."

One innovation, known as the "wellness" program, aims to stand the traditional concept of corporate health benefits on its head. A growing number of companies—among them AT&T, Control Data, Lockheed, and Johnson & Johnson—are pioneering this new approach based on the unexceptionable logic that the best way to keep employees out of hospitals is to keep them healthy. These programs have a long way to go before they can be proved cost-effective. But the companies involved are wagering that a comparatively modest investment in promoting good health will save them from shelling out far larger sums to treat bad health.

The concept begins with a recognition that a third of the adult working-age population suffers from chronic ailments. Left unchecked, many of these can develop into a heart attack, stroke, or cancer. Such afflictions often arise from controllable patterns of behavior, such as smoking, stress, obesity, and physical inactivity. The programs—called Staywell at Control Data and Live for Life at Johnson & Johnson—are designed to help employees to modify their behavior and prevent or delay the onset of these diseases.

Wellness programs, with their corny names, are no mere frill like executive saunas. Instead they are skillfully packaged and based on firm principles of applied behavioral psychology and clinical experience. By now everyone knows that smoking leads to increased risk of lung cancer and heart disease; evidence that changing the behavior reduces the risk is undisputed by most medical authorities. A 45-year old male who smokes two packs of cigarettes a day, for example, is nearly 3½ times more likely to suffer a fatal heart attack than a non-smoker of the same age. Helping that smoker to quit can reduce or eliminate the health risk.

Johnson & Johnson is conducting the most ambitious work site emperiment. The company is tight-lipped about how much the program costs, but Live for Life, now in its fifth year, reaches 18,000 employees. The voluntary program begins with a simplified physical examination to identify health risks; almost all employees willingly submit. After this, they and their spouses can sign up to take part in free, professionally run workshops on smoking cessation, weight control and nutrition, stress reduction, and physical fitness. About 50% choose to participate in one of these initially. The courses are repeated in modified form, and those who aren't yet ready to quit smoking or who gained back the weight they lost six months ago can have another crack at it.

Preliminary results have confirmed that the program achieves measurable, statistically significant health gains. This was proof enough to convince J&J Chairman James E. Burke, an ex-smoker who jogs; he has given the go-ahead to expand the program to all 77,000 J&J employees by the end of 1985.

THE BIG QUESTION is whether the improved health will benefit J&J's bottom line. While the employees turn to exercise, company executives are exercising the calculators to find out whether dollars-and-cents benefits of Live for Life outweigh the costs. The gains presumably will go beyond mere reductions in health insurance claims; they will include reductions in absenteeism and turnover and increases in productivity. By the very nature of the experiment, convincing proof of these benefits will not be available for some time to come—not until it is possible to estimate the number of heart attacks and cancers that were avoided.

One of the principal advances from wellness programs will be more knowledge of the total business costs of employees' ill health. These can go well beyond the medical bills incurred when, for example, the 42-year old vice president of marketing is in the hospital recovering from a heart attack. They can include reduced output from his weakened health preceding the attack, as well as lost output while he is recuperating. Clearly the potential bonus to business goes far beyond savings in those monthly medical premiums.

An economic recovery, bringing a healthy rise in corporate profits, could be a tranquillizer, easing chief executives' current worries about a frightening cost problem. Management could once again relapse into its traditional pattern of chronic neglect. That would be unfortunate, for health benefits are no longer an incident cost of doing business. Developing a strategy for managing them, moreover, is the only real option for companies that want to live up to the obligation they accepted when they made health care a part of employee compensation in the first place.

The soaring costs of industrial accidents

By Frank W. Lancianese

THE U.S. Department of Health and Human Services estimates that employers spent $22 billion to insure or self-insure workers against job-related injuries and illnesses in 1980 (the latest year for which statistics are available), up approximately 10 percent from the $20 billion in 1979.

Medical costs totaled $3.9 billion in 1980, while compensation payments amounted to $9.5 billion. The $13.4 billion in total benefits represented a 13 percent increase over the prior year. Additionally, in the period 1970-79, workers' comp benefit costs more than tripled.

The recession has contributed to the continuing rise in comp costs. California mirrors the problem. There, by the end of last year, more than 6,000 cumulative injury claims had been filed against employers in a two-year period by workers who had lost their jobs in plant closings or relocations. Adding to employers' anguish is the fact that the cost of an average cumulative injury claim in California has jumped nearly 30 percent since 1976.

Some States have amended their workers' comp statutes in an effort to counter these escalating costs to industry. One such approach, a wage-loss system of workers' compensation, was enacted in Florida in August, 1979. The wage-loss statute provides that:

- An employee who loses more than seven days of work because of an occupational injury receives temporary total disability benefits. Once he reaches maximum medical improvement (recovers from his injury as much as possible), he is no longer eligible for benefits unless he can prove that he has actually suffered a loss of wages.
- Employees receive permanent impairment awards only if they have suffered an amputation, loss of 80 percent of vision (after correction), or serious facial or head disfigurement.
- Lump sum settlements are prohibited until at least six months after maximum medical improvement.

The system has paid off handsomely for Florida employers. Over the last four years, workers' compensation insurance rates have plummeted 43 percent. The number of comp claims filed since 1980 has decreased 47 percent, benefits paid to claimants have declined 31 percent, lump sum settlements have been slashed by 60 percent, and attorney fees have been cut by 20 percent.

Nevertheless, while most State legislatures are aware of Florida's success with its wage-loss system, only Louisiana has been able to mobilize the support needed to pass similar legislation. Proposed wage-loss bills in Maine, Washington, Delaware, and Oregon have all failed of enactment. Federal organized labor forces have posed the major opposition, arguing that the system is inherently unfair in that it restricts compensation to injured workers who suffer a loss of wages.

Another concept aimed at moderating workers' compensation costs is open rating, now operational in eight states—Oregon, Minnesota, Michigan, Kentucky, Arkansas, Illinois, Rhode Island, and Georgia.

Under open rating laws, insurance companies are required to file rates with the State's insurance department individually, without knowing what other companies are charging. Currently, insurers in most States file for rates through the

National Council on Compensation Insurance (NCCI), a ratemaking organization which submits proposed rates on behalf of workers' compensation insurers to State regulatory commissions for approval.

Proponents of open rating laws contend that they create a more competitive atmosphere which eventually results in lower rates, since insurers set their own rates without the advantage of shared loss data.

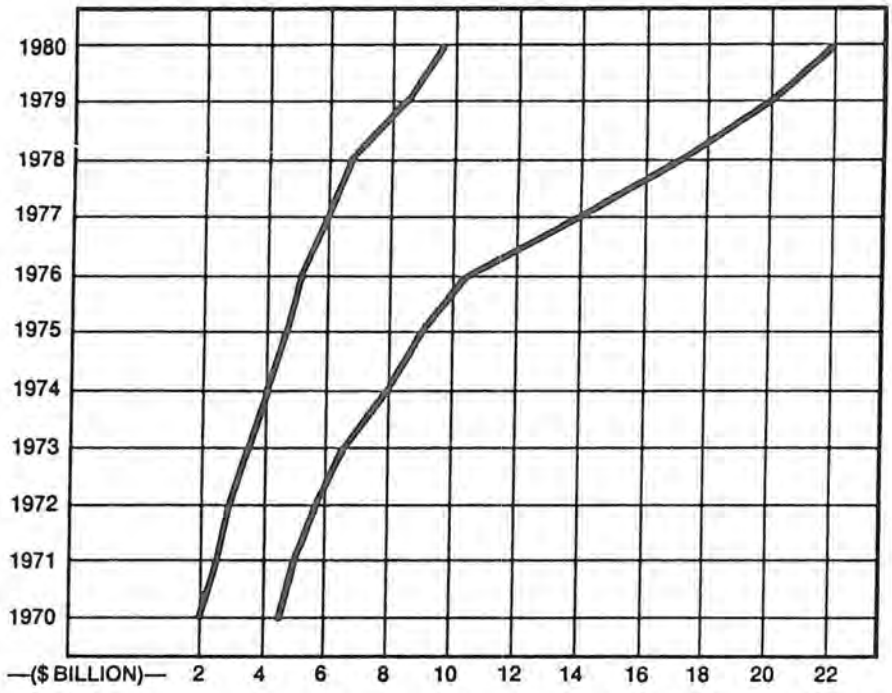
However, according to open rating opponents, states enacting these laws invite rate swings that may prove destabilizing. "Competitive rating will result in the erosion of NCCI's data base," states Steve Millikan, director of workers' compensation for the Alliance of American Insurers. "Subsequently, ratemaking will become very speculative. Companies will have no idea of where to set their prices." Millikan also cites a report issued last year by the National Association of Insurance Commissioners, concluding that while open rating laws will bring about comp insurance price changes, only large employers will be paying smaller premiums.

Some employers seeking to cut costs resort to group self-insurance or monopolistic State funds. Group self-insurance, permitted in 22 States, is intended for smaller businesses which can supposedly reduce comp expenses by pooling their risks and liabilities.

Monopolistic funds exist in six States — Nevada, North Dakota, Ohio, Washington, West Virginia, and Wyoming. Employers pay into a State fund from which injured workers obtain comp benefits. The state establishes the prices for comp insurance premiums and controls the operation of the fund. Supporters of this approach maintain that the States, since they are not motivated to make a profit, can charge employers far less for workers' comp coverage than a private insurer.

These two approaches, like wageloss and open rating, have received their share of criticism. Group seifinsurance critics point out that group members are not required to furnish any type of security to guarantee their solvency and that, as a result, no financial remedy is available when a member is unable to cover his comp costs. Critics of monopolistic funds argue that insurance is not a proper function of government and also maintain that commercial insurers provide superior consultative services.

Workers' Comp. Costs (1970-1980)*



*Red line represents employers' total workers' compensation expenditures (including insurance costs, administrative costs, etc.). Black line indicates comp payments to employees. Statistics compiled by the U.S. Department of Health and Human Services.

Exclusive remedy?

Intrinsic to the workers' compensation system is the doctrine of exclusive remedy, whereby injured workers are entitled to seek benefits only through the workers' comp system.

However, according to Eric Oxfeld, associate director of employee benefits for the U. S. Chamber of Commerce: "Recently some courts have made a mockery of the exclusive remedy concept by permitting injured workers to bring lawsuits against their employers under special circumstances." Oxfeld notes that "these suits can prove very costly for employers."

In California and Ohio, employers have been sued in their capacity as manufacturers when a worker has been injured by their product. In addition, the claim that one can sue an employer in his role as landlord or owner of the worksite is accepted in California and Florida.

Employers have also been sued in cases where it has been alleged that they intentionally harmed an employee. Moreover, a 1978 West Virginia Supreme Court decision held that a jury can reasonably infer intentional harm if the employer knowingly violates a safety rule and the employee is injured or killed as a result.

The case (*Mandolidis* v. *Elkins Industries, Inc.*) involved a machine operator, Mandolidis. Two fingers of his right hand and part of the hand itself were severed by a table saw he was operating. The incident occurred just a few days after Mandolidis' employer, Elkins, had been cited by an OSHA inspector for not having a safety guard on the saw. Mandolidis and four of his fellow workers testified that their foreman had ordered them to run the saw without a guard.

The effect of the decision on West Virginia employers was devastating. Three years after the ruling was

handed down, more than 250 lawsuits seeking over $5 billion in damages had been filed by injured workers against their employers.

Even where the injured worker brings suit against the manufacturer of an allegedly defective product, rather than the employer, the employer may nevertheless wind up in court. Chicago attorney Douglas Stevenson points out that employers are sometimes brought into suits through third-party actions by defendant manufacturers. The employers must defend themselves in these suits and often contribute to any award granted the injured worker, as well as providing comp benefits, Stevenson said.

OD dilemma

Suits brought by victims of occupational diseases have been exacting an enormous toll on employers.

To date, the most widely publicized occupational diseases have been those associated with worker exposure to asbestos. A recent U. S. Labor Department report projects some 8,200 to 9,700 deaths from asbestos-related cancer each year for the next 20 years, for a total of over 200,000 deaths by the end of the century.

The report also cited evidence that workers contracting asbestos-related cancer often have a hard time collecting compensation benefits. In their uphill battle to obtain benefits, many disabled workers or their survivors have filed product liability lawsuits against the asbestos industry asking for billions in damages. The suits typically charge that the asbestos manufacturers failed in their duty under the law of strict liability to warn of the hazards of using products containing asbestos.

Manville Corp., the largest asbestos manufacturer in the United States, has been the defendant in the majority of these suits. Since the mid-1970's, suits have been brought against the company on behalf of some 20,000 people alleging illnesses from excessive asbestos exposure. The company expects at least 32,000 more suits to be filed in the future. It estimates potential liability from the suits at "from anywhere between $2 billion to many times that amount over the next 20 years." Last August, faced with these potentially destructive expenses, Manville filed for reorganization under Chapter 11 of the Federal Bankruptcy Code.

> *Excessively high product liability insurance rates threaten "the very existence of certain businesses."*
>
> Malcolm Baldrige
> Secretary of Commerce

Within the last year, several solutions to the asbestos problem have been suggested, although none have been implemented. Among the leading proposals are:

- Legislation sponsored by Representative George Miller (D-Cal.) that would establish a national system for asbestos-related disease compensation. Under the bill, H. R. 3175, claims would be paid from an insurance pool based on the estimated liability of responsible industry parties. No public funds would be expended for administration of the program or payment of benefits. In addition, victims would be allowed to resume tort liability litigation if their claims under the comp system are not resolved within 18 months.
- A private settlement among claimants, asbestos defendants, and their insurers that would resolve the massive litigation over how much insurance coverage defendants must carry and that would establish a central claims-handling facility to negotiate settlements with claimants. The Asbestos Claims Council, a group of the major asbestos insurers, has been meeting with asbestos companies and plaintiffs' attorneys to discuss how such an agreement would be carried out.
- Federal law creating an asbestos "Superfund" to be underwritten by asbestos companies and their insurers and administered by the U. S. Social Security Administration. The fund would be the exclusive remedy for asbestos victims participating in it. However, participation would not be mandatory and victims could still opt to bring suits against asbestos companies.
- Methods that would streamline court procedures in order to handle the tens of thousands of claims already filed and the many more to come. These methods are currently being discussed by a group of judges, insurers, plaintiffs' attorneys, and asbestos defendants under the auspices of the National Center for State Courts. They include mandating bench trials for asbestos suits, working out mass settlement procedures, and instituting group discovery practices relating to submission of evidence.

As the search for the solution to the asbestos problem continues, potential explosions of other types of toxic tort litigation are on the horizon. According to research conducted by Commercial Union and Liberty Mutual insurance companies, other substances and products that either have triggered substantial litigation or could in the future include: Agent Orange, formaldehyde, benzene, vinyl chloride, lead, radiation, and toluene diisocynate (TDI).

Agent Orange, used during the Vietnam War as a defoliant, contains dioxin and has been linked to a number of ailments including skin disorders, liver diseases, and many forms of cancer. Currently, there are more than 10,000 Agent Orange

States appearing in dark blue on map are those that have enacted product liability tort reforms. States appearing in light blue have tort reforms pending in their State legislatures.

suits pending in the U. S. District Court in New York alone. In addition, more than 700 formaldehyde, 1,000 vinyl chloride, 300 radiation, and several hundred TDI lawsuits are presently lining court dockets across the country.

Additional costs

Not surprisingly, the cost of product liability insurance premiums has risen along with the dramatic increase in toxic tort litigation.

Two years ago, Congress passed a law intended to help control these costs. The Risk Retention Act enables businesses to form self-insurance cooperatives, called risk retention groups, whose members share their product liability. It also allows companies to purchase insurance as a group, thereby presumably obtaining lower rates than they could get individually. Under the new law, businesses can pool their risks with companies nationwide, provided they become licensed under an insurance company charter in any state.

The Reagan Administration supported this legislation. In a letter delivered to members of the House three days before the bill reached the floor for consideration, Secretary of Commerce Malcolm Baldrige wrote: "For a number of years excessively high product liability insurance rates have been a threat to the very existence of certain businesses. Although a necessary business expense, such large payments cannot be borne by many companies, particularly small businesses. . . . The Risk Retention Act would help allay the product liability problem and encourage industry to be both more productive and innovative."

Since its enactment, however, employers have failed to take advantage of the new law. Only one risk retention group has been formed. However, some observers attribute this to the soft commercial insurance market. Insurers, they point out, haven't been particularly responsive to group insurance, but this may only be a temporary condition.

A second product liability reform bill was introduced earlier this year by Senator Robert Kasten (R-Wis.). The Product Liability Act, S. 44, currently pending before the Senate Commerce Committee's Consumer Subcommittee, would establish one uniform Federal law which would preempt State product liability statutes.

The bill would also limit manufacturers' exposure to product liability suits in several ways. In the case of capital goods, a suit would be barred against manufacturers 25 years after a product was sold. In addition, punitive damages would only be allowed if a plaintiff could show "clear and convincing" proof of a manufacturer's reckless disregard for consumer safety. More-

over, manufacturers no longer would be strictly liable for the design of their products, nor would they be liable if an unauthorized product alteration or modification caused an accident.

Over the past few months, the Association of Trial Lawyers of America, consumer groups, and labor organizations have all lobbied heavily to defeat S. 44. They contend that the bill unfairly reduces the consumer's ability to protect himself, and that product liability legislation should be reserved to the states.

Twenty-five States have enacted product liability reform laws since 1977, and four other States have reform bills pending. Comprehensive reform laws, enacted in Arizona, Indiana, Kentucky, and Tennessee, provide manufacturers with a variety of legal defenses against product liability claims, such as:

- Invoking a statute of repose, which limits suits to specific time periods after a product was first sold or manufactured.
- Showing that a product met the state-of-the-art at the time it was manufactured.
- Establishing compliance with duty-to-warn requirements.
- Establishing that products were altered after leaving the manufacturer.

However, extensive tort reform has not been enacted in any major industrial states. Though Illinois and Michigan have enacted reform laws, their scope is relatively limited. Furthermore, only four states have passed tort reform laws since 1979.

Cost-cutting key

The best way for an employer to reduce the costs resulting from job-related accidents is to provide an effective safety program at the worksite. This message came through loud and clear in an *Occupational Hazards* field check of specialists from the business, insurance, and labor sectors.

Kate Carroll, assistant counsel for the American Insurance Association, said that "if an employer wants to lower workplace accident costs, he should ensure that proper preventive measures are implemented, including safety committees, inspections, protective equipment and clothing, and engineering controls."

> *A tax credit system would encourage employers to hire more health and safety professionals.*
>
> Steve Settle
> NAM

Carroll also stressed the importance of safety awareness among workers. "There must be an emphasis on safety conveyed from the employer to the employee, along with serious efforts to make safety procedures an essential element of a worker's job," she said.

According to Frank Mirer, director of the UAW health and safety department: "The key to reducing workplace accident costs is reducing accidents. This can be accomplished through effective safety programs, strong safety and health standards, and adequate enforcement of those standards." Cooperative efforts between labor and management are also helpful, Mirer added.

Steve Settle, director of loss prevention and control at the National Association of Manufacturers, also rates a sound safety program as the number one cost-cutting device. He emphasized that "in order for a company to turn the ideal of accident prevention into a reality, the proper attitude toward workplace safety and health is necessary. There must be a personal commitment at all levels. The employer's first step should be to thoroughly monitor the workplace for all types of hazards, and then use the findings to develop an effective control strategy."

To encourage employers to hire professionals to design and manage their safety programs, Settle recommends that government establish a tax credit system. "Such an incentive would help upgrade workplace safety by increasing the number of certified safety professionals, industrial hygienists, and medical personnel currently staffed by industry," he said.

Plaintiff attorney Robert Sweeney agrees with our respondents and adds these words of warning for employers: "Employers must be willing to put out the money for an adequate staff of industrial hygienists, effective protective equipment and clothing, and sufficient engineering controls. If not, they are risking serious financial losses, and possibly even bankruptcy, which may result from lawsuits brought by disabled workers."

Exactly how much difference can a good safety record make to a company's costs? A 1981 study conducted by the Stanford University Department of Civil Engineering came up with this answer.

Workers' compensation insurers set premiums according to an experience modification rate (EMR), a multiplier applied to a basic premium and reflecting a company's work-related accident rate. The Stanford study found that the EMR multiplier for national contractors ranged from .5 to 2.05. On a $100-million job, assuming direct labor to be 30 percent of the total cost, an EMR of .5 would result in workers' compensation premiums of $1.1 million. An EMR of 2.05 would require the employer to pay nearly four times that amount ($4.3 million) in premiums. ■

SECTION V

COST/BENEFIT ANALYSIS

V. COST/BENEFIT ANALYSIS

Although some companies may be willing to implement some types of occupational health and safety programs without requiring an economic analysis of the program's costs and benefits, it is clear that a cost/benefit analysis which indicates that the company's return on an investment in employee health or safety is equivalent to its returns on other types of investments, will always be a strong selling point for any proposed health program.

Many articles on health promotion, health care cost-containment, and other health related programs, claim or imply that the programs are cost beneficial. However, only a few health-related cost/benefit studies which have been published have used the cost/benefit methodology carefully and completely. It is generally agreed that alcohol/drug abuse programs and blood pressure control (hypertension) programs are the only health programs that are almost always cost effective. All other health programs may or may not be cost effective in a particular setting. Safety programs are much more likely to be cost effective, but the safety literature is also replete with many examples of incomplete or invalid cost/benefit analyses.

Unlike most of the managerially oriented articles which were selected for the first three sections of the book, the articles which are reprinted in this section are primarily concerned with the methodology of cost/benefit analysis. Although they present the technical aspects of cost/benefit analysis, the articles focus on the potential problems inherent in the use of cost/benefit analysis for the evaluation of health related programs.

In the first article in this section, Nicholas Ashford presents an excellent survey of the difficulties encountered in estimating the costs and benefits associated with health and safety programs and the problems of comparing these costs and benefits within the cost/benefit framework. The author also discusses other benchmarks, such as economic efficiency, cost-effectiveness, and health effectiveness, which might be used by a decision maker to evaluate alternative strategies for reducing the health consequences from exposures to occupational environments.

The second article examines the ethical considerations in the use of cost/benefit analysis by for-profit firms. The author uses the Ford Pinto gas tank fire case to illustrate why he believes the question of balancing costs and benefits involves special ethical concerns when the decision is made by a for-profit concern and the consumer must act without complete information. The author also reviews a variety of policy recommendations that might address the ethical concerns which are identified.

The third article proposes a two-step decision model for evaluating costs and benefits. In the first step all program variables to which dollar values can be attached are analyzed using the traditional CBA framework. In the second step the intangible and nonquantifiable variables which were not included in the first step are identified and evaluated vis-a-vis the net quantifiable cost of the project.

The last article in this section carefully analyzes the economic impact of construction accidents resulting from the direct costs of accidents and insurance, the indirect costs of accidents, and the costs of safety programs. This cost is compared with the potential savings resulting from reduced accidents. This article not only demonstrates the correct use of the methodology of cost/

benefit analysis but also provides an illustration of a safety program which clearly is desirable from a financial point-of-view.

The bibliography includes several articles which discuss or utilize the techniques of cost/benefit analysis. The articles by Head (1984), Ossler (1984) Jacobs (1983) and Chovil (1983) provide a general discussion of the use of cost/benefit analysis in various health-related settings. Ruchlin (1980) presents a detailed analysis of the cost of hypertension control in the workplace. Swint (1978) describes a model for estimating the economic returns to a firm investing in an occupational-based alcoholism rehabilitation program.

Almost any cost/benefit analysis which involves health can be criticized. However, I believe thest articles clearly demonstrate that cost/benefit analysis, when carefully performed, can provide relevant information for a manager who must make a health or safety-related decision.

V. COST/BENEFIT ANALYSIS

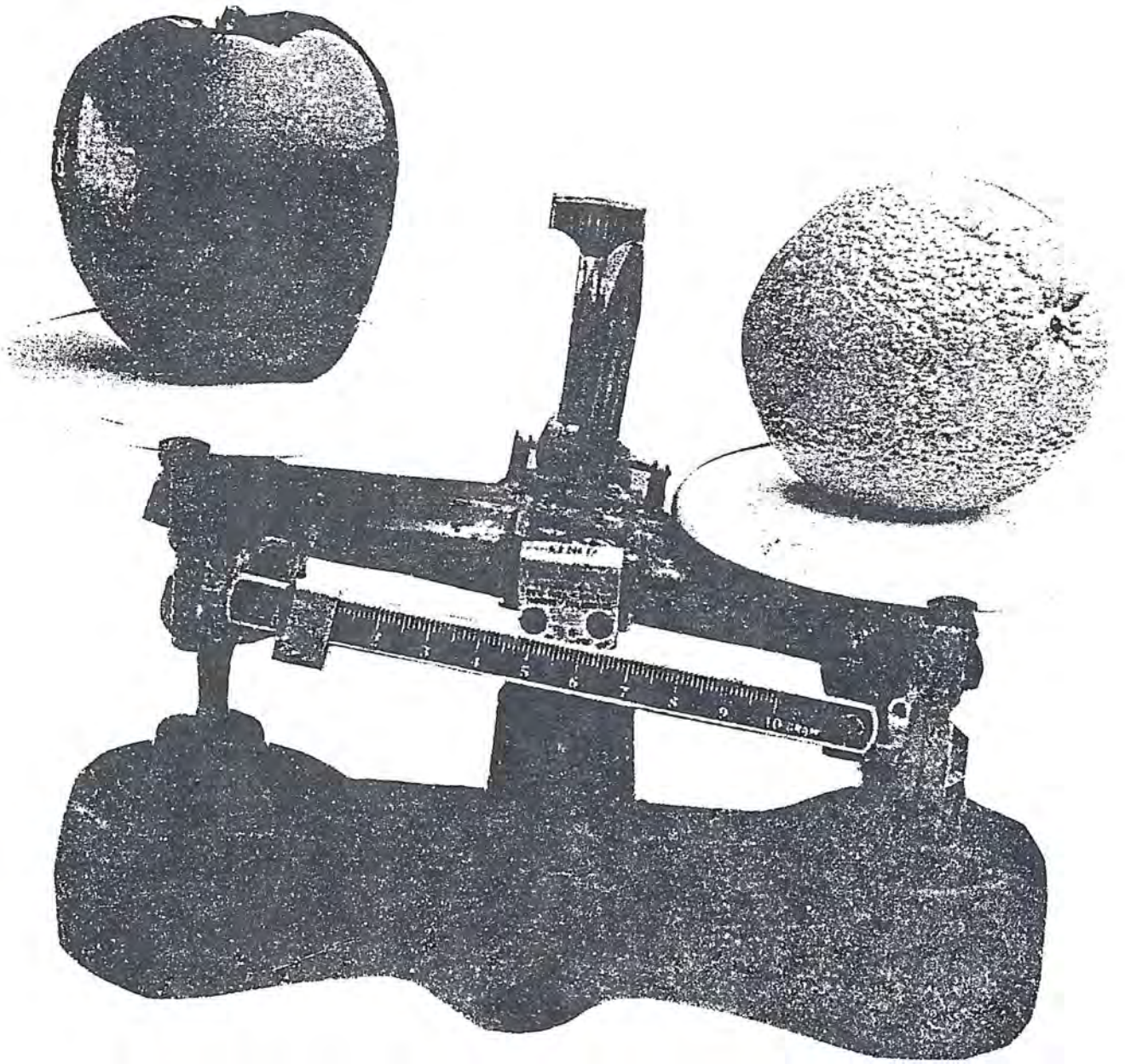
1. Cost-Benefit Analysis: Can Balance Be Achieved?
   Nicholas A. Ashford
   Occupational Health and Safety
   May, 1982

2. $s for Lives: Ethical Considerations in the Use of Cost/Benefit Analysis by For-Profit Firms
   William W. May
   Risk Analysis
   May, 1982

3. Planning for Employee Health and Safety
   Herbert G. Hunt III
   Business Horizons
   September/October, 1984

4. *Improving Construction Safety Performance*
   Report A-3 from The Business Roundtable
   Construction Industry Cost Effectiveness Project
   January, 1982

COST-BENEFIT ANALYSIS
CAN BALANCE BE ACHIEVED?



The comparison of costs and benefits is beset by serious methodological difficulties and value-laden assumptions

Reprinted by permission from OCCUPATIONAL HEALTH AND SAFETY, May 1982.

Cost-benefit analysis can be a useful tool, but some regulatory reformers would have us apply it as an indiscriminate, decision-making rule. I would like to offer some words of caution on the use of the technique that may be summarized as follows:

- **Costs** are easier to express than **benefits,** but their quantifiability makes them no more certain or reliable.
- Benefits include improved quality of life and good health as well as positive economic side-effects, but they defy accurate estimation and their recipients are not a well-organized lobbying group.
- The comparison of costs and benefits is beset by serious methodological difficulties and requires the analyst to make value-laden assumptions; yet cost-benefit analysis appears, deceptively, to be a neutral technique.

Problems with Estimating The Costs of Regulation

It is often assumed that, because the costs of complying with regulation can be easily monetized, they are reliable estimates of true costs. Unfortunately, there are many instances in which the costs are not only *uncertain* but *unreliable.*

Agencies depend to a large extent on industry data to derive estimates of compliance costs. I do not believe it is too unkind to question the bias of those estimates. The regulatory agencies themselves do not have access to the information concerning alternative products and processes and resultant costs, which will enable them to come up with the best estimates of the costs of compliance.

In addition, compliance cost estimates often fail to take three crucial issues into account:

1) economics of scale which inevitably arise in the demand-induced increase in the production of compliance technology;

2) the ability of a regulated industrial segment to learn, over time, to comply more cost-effectively — what the management scientists call the *learning curve;*

3) compliance costs based on present technological capabilities ignore the crucial role played by technological innovation, which yields benefits to both the regulated firm and to the public intended to be protected.

There are no facile rules of thumb, no quick fixes, no simple indices of correctness in health and safety decisions.

Indeed, environmental, health, and safety regulation has been called "technology-forcing" by the courts and by analysts. The costs of compliance should not be based on static assumptions about the firm and its technology. Otherwise, a large overestimation will result.

The minimal effects of the OSHA vinyl chloride standard on the private sector are a striking example of how different the actual economic impacts can be, compared to some analysts' ominous preregulation predictions of the economic demise of the industry.

Problems with Estimating the Health, Safety, and Environmental Benefits of Regulation.

The state-of-the-art in estimating the number of cancers or cases of chronic disease prevented — or even injuries — is in its infancy. Many health professionals believe, because of the accepted view of the mechanisms of cancer causation, that there is **no** safe exposure to a carcinogen. Safe levels for chronic toxins which are not carcinogens are often derived from either acute human exposures or high-dosage animal experiments. The extrapolation techniques to lower doses for chronic human exposure are imperfect. Therefore, benefit calculations for a particular maximum exposure level allowed under regulation are often not very meaningful.

Theories of **accident prediction** do not serve us much better. We scarcely need to be reminded of the unanticipated risk that attended the incident at Three Mile Island or the failure to predict design defects in the DC-10. Both costs and benefits of regulation are beset by uncertainty; however, the uncertainty attending the benefit calculations is usually much larger.

It is fair to say that the state-of-the-art in **benefit estimation** is much less developed than the methodologies for calculating compliance costs.* In addition, there is no organized interest group that systematically pursues the benefit estimations in the same way in which the costs of compliance are researched. The tendency by analysts to rely on hard numbers places the estimation of benefits on insecure ground. Softer numbers are harder to believe.

Finally, it must be realized that the benefits derived from direct regulation are only a *part* of the benefits that can be derived from the regulatory process. Indirect, or leveraged, benefits are derived

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** The reader is referred to a recent review of the state-of-the-art of benefit estimation: "The Benefits of Environmental, Health, and Safety Regulations," Nicholas A. Ashford, et al., prepared for the Committee on Governmental Affairs, United States Senate, March 25, 1980.*

from the pressure of regulation to induce industry to deal *preventively* with unregulated hazards, to *innovate,* and to find ways to meet the public's need for a safer workplace or a cleaner environment while maintaining industrial capacity. To put it another way, **the positive side-effect accompanying regulation needs to be included in a complete assessment of the effectiveness of the regulatory agency's strategies.**

An example of leveraging is apparent in the observation that chemical companies are now routinely conducting short-term tests on new chemicals for possible carcinogenic activity, even though no general regulatory requirement exists.

Problems in Comparing Costs and Benefits Within a Cost-Benefit Framework

Even if we could accurately estimate the amount of disease or injury prevented by regulation and the compliance costs of doing so, the tasks of (1) monetizing health benefits that may accrue far into the future (or even monetizing current safety benefits from reducing accidents) and (2) comparing those benefits to current compliance costs are fraught with difficulty.

A human life or a lost limb does not have an established unique market value. Payments to workers to assume risky occupations *prior* to their being injured (an *ex ante* valuation) are different than the values placed on the injured workers by their families *after* the injuries have occurred.

Which valuation is correct? The work of Fischoff, Kasperson, Kunreuther, and others amply demonstrates the inability of people and firms to consistently value and assume long-term, low probability risks. These characteristics of risk assumption leave a market valuation of the benefits of regulation in great doubt.

There is another crucial problem with regard to valuation. The person who values or is willing to assume a risk assumes that risk in a way which reflects the bundle of economic goods he/she comes into the marketplace with.

It is naive to talk about workers who sell their labor for their health. A worker sells his labor for

A simple comparison of costs and benefits ignores the fact that costs and benefits are borne by different groups of people and firms.

his/her health cheaply if he/she does not have a large bundle of economic goods. On the supply side, the selling price is determined by the entire set of economic goods the worker has.

If you think it is unfair for poor people to sell their labor more cheaply than wealthy people do, then you do not like the functioning of the market. If you do not care, then you are willing to allow the operation of that market mechanism.

It comes down to the fundamental issue of the distribution of wealth. Economic efficiency reflects the maintenance of the current economic arrangements, and decisions made by the market are themselves value laden.

You cannot be indifferent to the distribution of wealth, and the fact is that the distribution of wealth determines at what price risk is assumed. To ignore equity is to consider equity irrelevant. Deciding what a life is worth by market criteria is value laden itself.

Although this is changing, some analysts still insist on expressing health, safety, and environmental benefits in monetary terms. The successor index to evaluating a change of net social welfare in dollars is the benefit-to-cost ratio, e.g., **the number of fatalities prevented per dollar expended.** The problem with this index is that **it can never be really applied.**

The benefits of regulation include deaths prevented, diseases and injuries prevented, pain and suffering prevented, hospital costs prevented, etc. The benefit side of the equation is itself composed of many elements of different character. How do we decide how many serious injuries are equivalent to one death?

Other problems exist in comparing costs and benefits and they raise doubts about the value of using traditional cost-benefit analysis as a decision-making tool in the regulatory area.

Already discussed were the problem of correctly estimating compliance costs, the problem of monetizing benefits, and the problem of dealing with these kinds of valuations in the face of great uncertainty. An additional problem is discounting, over time, both the benefits *and* the costs.

There are three different approaches to the discounting of nonmonetizable benefits such as the reduction of adverse health effects:

- Discount the health benefits at the **same** discount rate used in the monetary benefit or cost calculations;
- Discount the health benefits but at a **lower** discount rate than that used in the monetary benefit or cost calculations; or
- **Do not discount** benefits.

The first approach would apply the traditional present-discounted-value criterion to non-market items. This approach has the advantage of allowing parallel treatment of all costs and benefits. Any positive discount rate would value one year of health impairment saved in an early year higher than one later year of impairment.

For example, if the discount rate is 7 percent, then one year of health impairment prevented today would be equivalent to 1.4 person-years of health impairment prevented in five years, or two person-years of health impairment prevented in 10 years, or 7.7 person-years of health impairment prevented in 30 years.

The second approach would allow for discounting of nonmonetizable benefits, but at a **lower** discount rate. This approach can be defended in terms of a belief that **certain amenities,** such as health, become **more valuable** relative to other goods in this society as time passes and the standard of living improves.

The following relationship would separate the factors affecting the present value of health impairment prevented in year **n:**

$$\frac{x(1+e)^n}{(1+r)^n}$$

where **x** = metric, expressed in person-years of health impairment prevented in any one year;

e = fractional annual increase in value of health impairment prevented; and

r = annual discount rate.

For small values of **r** and **e**, this is equivalent to:

$$\frac{x}{(1+r-e)^n}$$

Thus, the "effective" discount rate **(r – e)** will be less than the discount rate used for monetary benefit or cost calculations. (Note that, in principle, if the society's valuation of health benefits increases rapidly, the effective discount rate for benefits could even be negative!)

The third approach would not discount nonmonetizable benefits but simply leave them expressed in natural units with a note as to the time-distribution of their realization. The desirability of this approach can be seen from two considerations.

First, there is a question of the *appropriateness* of applying a discount rate to consequences of an action that has significant beneficial effects on future generations.**

Any positive discount rate would value one early year of health impairment saved higher than one year saved in later years.

Clearly, any positive rate of discount will discriminate in favor of choices that involve adverse impacts on earlier generations but not on later ones. The benefits of environmental, health, and safety regulation often extend beyond the current generation who bear the monetary prevention costs.

If the decision-maker is concerned with intergenerational equity, then an argument could be made that the appropriate social rate of discount is zero (not including inflation).

Secondly, the "benefit" of removing a person *now* from risk of *future* damage, which is irreversible, inevitable, and non-arrestable once the risk exposure occurs, can be considered to be a *present* benefit — and quantified, for example, as the benefit of removing those presently at risk from future harm.

The manner in which the discounting problem is handled can alter the comparison of benefits and costs and render the use of a benefit-to-cost ratio as a decision rule highly suspect, even when used to decide between alternative regulatory strategies on health investments.

The present value of the net effects of any given regulation, or the rank ordering the effects of alternative regulatory regimes, can change markedly depending upon the discount rate used in the cost-benefit calculation.

For example, using a discount rate of zero for future health benefits (i.e., not discounting future health benefits) may make a regulatory choice tenable, while using a discount rate for health benefits comparable to the discount rate for capital expenditures may show a proposal to be *undesirable.* The problem is exacerbated when a market/institutionalized "price" exists for the health benefit. For example, an asbestos-using firm may either install a ventilation system today to get rid of asbestos or, instead, pay compensation costs 30 years from now when a worker develops cancer. What should the rational owner of a firm do? The owner can have the use of his money for 30 years, send a worker's children to school, bury him in a gold coffin, and still be ahead financially. Will traditional economic analysis provide a correct answer?

***A complete adoption of this argument might not allow for discounting of costs where the benefits are received currently and the costs are incurred in later generations.*

Further, since the consequences of many regulatory actions may be to impose compliance costs today in order to bring about health benefits far into the future, the choice of a discount rate can make one regulatory option look better or worse than an alternative, depending on the magnitude of the discount rate. Since there is no consensus on what that rate should be, the policymaker's preferences for a particular option can, but should not, be hidden in the choice of a discount rate.

An even more serious limitation of a simple comparison of costs and benefits is that it ignores the equity implications of the fact that the costs and benefits are often borne by different groups of people and firms. It should be noted that the aggregation of costs and benefits without consideration of equity is value laden itself. It is a decision to ignore equity.

Finally, the comparisons of costs and benefits of a regulation must in turn be compared against what *might* have happened in the absence of that regulation.

For example, if we were to estimate the benefits and costs of adopting a safety standard for a consumer product, we must ask whether the producer industry might not have made the product somewhat safer in the absence of regulation in response to increasing product liability suits in the courts. In this example, it would not be correct to attribute to regulation either all of the costs expended or all of the benefits conferred.

What alternative scenario the evaluator chooses can, of course, make the actual regulation look better or worse. Unless we have an alternative universe that we can even begin to define for analytical purposes, evaluations of the effects of a regulation are on very shaky ground. These inherent limitations of cost-benefit analysis render these techniques highly suspect for social decision making.

Alternatives to Cost-Benefit Analysis as a Decision Rule

There are a number of different benchmarks that the regulatory decision-maker might use to arrive at a particular strategy and hence be called on to defend. They include **economic efficiency, cost-effectiveness, health-effectiveness, distributional consequences** (equity), and **specific** mandates embodied in various pieces of legislation.

In some legislation, the discretion on how to "balance" various considerations is broad; in others, it is more narrowly defined.

In many instances, criticism of a particular decision to regulate is really a criticism of the balance struck by Congress in empowering an agency to act. Attacks on the FDA's ban of Saccharin or on OSHA's standard for occupational exposure to benzene standard, for example, are really attacks on the that a standard is not cost-effective or that it is too expensive, critics are attempting to force an evaluation of the proposed regulation against different benchmarks.

The consequence of many regulatory actions may be to impose compliance costs now in order to bring about health benefits far into the future.

What emerges from an examination of federal health, safety, and environmental regulations is that a rational decision-making process does, in fact, exist. The regulatory mandates require application of considerably more sophisticated and appropriate decision rules than those which have been naively suggested as regulatory reforms by some critics. The factors which enter in are: (1) how serious the hazard is, (2) who the recipients of the costs and benefits are, (3) what costs of regulation are imposed on the beneficiaries of the regulation, and (4) how informed and voluntary the risk assumption is.

In general, it appears that agencies *do* consider the distributional and social cost consequences of regulation. For example, when given the choice between increasing the life expectancy of *10,000* workers/consumers by *one* year or increasing the longevity of *1,000* workers/consumers by *eight* years, an agency may choose to avoid the more tragic event.

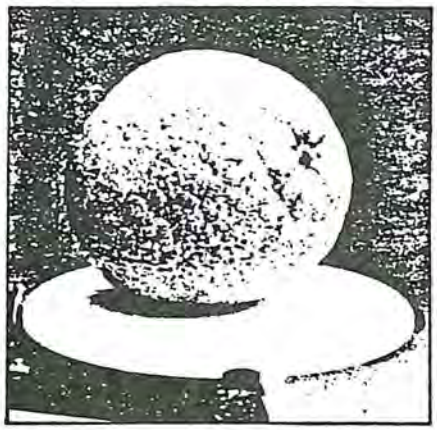
It may opt for the latter alternative although the number of man-years saved has not maximized. When given the choice between protecting workers/consumers from .1 percent chance of death or of protecting 100 workers/consumers from 8 percent chance of death, an agency may similarly choose the second course, even though health benefits are not maximized.

In making these choices, the decision-maker considers the concern and loss that society feels when the more tragic events occur. Because health benefits are not maximized or because no unique decision rule exists does not mean these decisions are irrational.

Similarly, there is a requirement on the part of an agency concerned with health and safety for minimizing equity regret. Whenever a person is not fully compensated for a loss, a question of equity arises. Also, when a person is forced to incur losses that *others* are not selected to incur, this too is unfair.

For example, it is conceivable that asbestos might be banned from use as a brake lining with the result that more lives are lost on the highway (due to less braking effectiveness) than are saved in asbestos-manufacturing operations.

The asbestos workers are, however, a nonvoluntary, select group exposed to harm that others in



Asbestos workers are a nonvoluntary, select group exposed to harm that others in society are not forced to incur.

society are not forced to incur. Community ties and family relations may restrict the workers' mobility for generations and prevent them from leaving the group. Further, if asbestos workers are already a disadvantaged group in society, an additional equity consideration is brought to bear. A consideration of equity along all these lines might justify the increase in the loss of lives on the highway in fairness to the asbestos worker.

The fact that both costs and benefits may be characterized by different degrees of uncertainty has already been mentioned. Clearly, comparing point (single) estimates of costs and benefits is incorrect. Cost and benefit streams must be expressed as *distributions*, which is usually not possible with the data — especially the data for benefits.

If the distribution of risks (health benefits that might be achieved by regulation) contains an especially sensitive subgroup of potential beneficiaries — e.g., children — the equity considerations may lead an agency or society to place a higher value on the regulation even though children represent a small subset of those at risk — a subset at the tails of the risk distribution.

The decision rule which environmental, health, and safety agencies try to follow represents a concern with equity for workers, consumers and society — a desire to *minimize the regret* of not regulating a particular activity. This is accomplished by choosing among different hazards to regulate and by choosing a level of protection for a specific hazard which avoids small probabilities of large harm. While not necessarily maximizing the number of lives saved, these decisions are clearly not irrational — unless rationality is defined tautologically as a maximizing rule.

There are no facile rules of thumb, no quick fixes, no simple indices of correctness in health and safety decisions. A search for a facile decision rule — imposing upon the regulatory decision makers a requirement to undertake analyses that are overly quantitative and restrictive — would in reality absolve regulators from accountability rather than force them to articulate the hard choices.

What can be expressed in a cost-benefit equation is only a small part of the picture. Efforts to improve regulatory decision making might best be focused on ensuring that government, workers, consumers, and industry have better access to information on the nature and extent of health hazards, and on the technological capabilities of industries to respond to regulatory controls. **OH&S**

$S FOR LIVES: ETHICAL CONSIDERATIONS IN THE USE OF COST/BENEFIT ANALYSIS BY FOR-PROFIT FIRMS

*William W. May**

Cost benefits anaysis is often an imprecise tool because of assumptions that must be made about matters that are difficult to quantify. The problems become especially acute when lives or serious bodily injuries are at stake because of the serious nature of that which is being risked. Furthermore, the literature on cost/benefit analysis focuses on public decision-making situations and decisions by individuals. This paper examines the distinctiveness of the use of cost/benefit analysis involving putting dollar values on human life by for-profit firms. The argument developed in the paper is that the lack of participation by the affected party (or government representative) in balancing costs and benefits raises special ethical concerns. A formula that was developed by the Ford Motor Company concerning accidents involving fuel leakage and fire with resultant loss of life and serious burn injuries is used as an example of both the imprecision of the method and the distinctive factors of the decision process that raise special ethical considerations. The paper examines why the for-profit-decision is distinct, what the special ethical considerations are, and concludes with a discussion of several alternative procedures to monitor the use of cost/benefit analysis so that it would be an effective business tool while at the same time the individual is provided maximum protection.

KEY WORDS: cost/benefit analysis; for-profit-firms; ethics; policy alternatives

I. INTRODUCTION

A little over a decade ago, some Ford Motor Company executives decided against making alterations on the gas tank of the Pinto, their new entry into the small-car market. The decision was part of the normal process of development and production of highly complicated technological products involving balancing and assessing several important variables: safety, elasticity in product cost, competitors' price, fiscal strength of the company profit margin, and relative risks of alternative choices. Similar kinds of decisions are made in the development of airplanes, tires, power tools, home appliances, and many other products that have the potential for causing injury or death when accidents occur.

Government requlations, maintenance of a favorable reputation among customers, previous judicial decisions, retaining insurability, and other factors act as constraints on the degree of choice that any firm can exercise. Nonetheless, there is some latitude, some room for choice, and the decisions balance dollar expenditure against lives and limbs.

The decision on the Pinto gas tank became a matter of public knowledge and protracted discussion because of highly publicized civil and criminal lawsuits following rear-end collisions resulting in burn deaths and serious injury. The trials and the appeals still go on, and the ultimate cost in terms of damage to the Ford reputation and resultant loss in sales may never be known. The fuel tank design was changed in 1976 and a recall was issued in 1978 on the 1970–1976 model year cars still on the road, thus reducing much of the potential for continued problems as a result of the design.[1]

The intent of this paper is to deal with the decision process that led to rejection of the alteration in gas tank design precisely because it was part of the normal process in product manufacture.[2] The decision required a balancing of costs and benefits, like many decisions made by individuals, government agencies and manufacturers. In this instance, though, the "benefits" were potential lives saved and burn injuries prevented. The decision required transcribing lives and limbs into dollars.

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[2]Discussion with people in industry, including the automobile industry confirm that cost/benefit analyses are widely used, but not all firms are willing to put an explicit dollar value on life. In some instances, comparative costs of alternatives and comparative risk associated with the alternatives are assessed, but no explicit dollar value is assigned to life or limb. To what extent an implicit valuation occurs has not been determined. That an implicit valuation occurs is inevitable.

Since we are dealing with a business decision, one might argue that if the decision is unwise, or unethical, then it should be handled through normal market mechanisms. As the argument runs, unwise, or unethical decisions damage reputation and profit and companies take corrective action in the face of such damage.

Undoubtedly, the market system does function to some extent to protect consumers through both preventive and corrective measures. The fact that Ford tested fuel tank alterations shows some social concern on the part of the design engineers, whether motivated by concern for the consumer or possible negative impact on reputation or profit, the system worked in part. Reliance on the market system also provides some other distinct advantages, including less costly government regulation, the avoidance of unwarranted delays through external review procedures, and a far better chance to maintain industrial secrecy in a highly competitive market.

Discussion about the market system in economic terms is very complex, but in very simple terms may be discussed in relation to "perfect" and "imperfect" markets and the degree of consumer information, then we have what is called a "hedonic market." In Rosen's development of hedonic prices, "the implicit prices of attributes . . . are revealed to economic agents . . . "[2] In short, consumers have perfect information including on safety, and thus will only buy a less safe car for a lesser price.

In fact, in what we call the real world, consumers lack perfect information, and several alternative economic scenarios arise. In a perfectly competitive market, the price of comparable small cars, say the Pinto and Vega, will be the same. In this instance, Ford could take a profit by keeping the original gas tank design because the consumer will not know about it. In a second scenario, Ford might keep the original design and lower its price to increase its share of the market. In such an instance, the supply curve (or marginal cost) will drop, but the equilibrium between supply and demand will be somewhat less than the entire amount saved by not improving the gas tank design. Thus, in this instance, Ford will profit somewhat, but will pass some of the benefit on to the consumer in terms of lower prices even though nothing is said about safety. A third scenario, that of a perfectly operating marketplace with perfect information would see demand reduced by consumer knowledge about the gas tank design.

The point of the above is that how cost savings get distributed depends on the information structure and the market structure. In a perfect market system, the benefit goes to the consumer. In an imperfect system, the manufacturer benefits. In the case at hand, consumers were not given information about the potential safety defect, and Ford either pocketed the extra profit or split the difference to improve its competitive posture with other small cars.

The real world market system with its imperfect information has obvious flaws in terms of consumer protection. The fact that Congress has established a large agency to regulate transportation risks indicates that market forces are not judged to be sufficiently strong in themselves to offer protection. Additionally, after-the-fact recovery in civil suits in the case of injury or death, long delays in response time in marking model changes, and expensive, time-consuming, and uncertain recovery procedures through the judicial process are serious problems with the imperfect market. In Grimshaw v. Ford,[3] a California case growing out of severe burn injuries to a teenager, the lower court case was entered in 1972 and decided in 1978, with the Appeals Court judgment finally rendered in June, 1981.[4] The California Supreme Court refused to hear the case. The lack of responsiveness of the market system in the case of the Pinto design suggests that alternative procedures or improvements in the system may be in order.

There is considerable literature about risk-benefit and cost-benefit analysis involving life and limb (e.g., see refs. 5–7). Some of the literature deals with the problems and methods of arriving at a dollar value of life. In the decade since the Ford Impact Factors Staff performed their cost/benefit analysis (CBA), there has been considerable refinement in the process and growing understanding of the problems involved in the procedure. Surprisingly, there is no attention given to examining whether there are special considerations involved in the use of the CBA by for-profit firms.

I will argue that who makes the decision introduces different ingredients into the decision process and how CBA is to be used. I will also point to some of the ethical considerations that impact on the use of CBA in the for-profit decision process. Finally, I will question whether it is appropriate to use CBA in Pinto-type decisions and make and assess several policy recommendations.

2. IMPRECISION

It is well recognized that CBA is an imprecise tool at best.[8 11] Quantifying intangibles, like the value of human life, requires choosing among values and assumptions on which there is substantial disagreement. Indeed, the $200,000 figure that Ford used in 1970, provided by the National Highway Traffic Safety Administration (NHTSA), was based almost entirely on deferred future earnings (DFE). At the time of the Ford decision, there were at least three different figures all based on DFE being used by as many different Federal agencies ranging from $200,000 to $350,000. In the last decade willingness to pay (WTP) to reduce the risk of death (or to accept if risk is increased) has replaced DFE as the preferred method of assessing the value of life. Bloomquist[12] shows that various WTP studies reveal a higher median value than Ford used. On the basis of his review of many studies, Bloomquist concludes that there is a strong indication that the value of life is greater than future earnings.

There are other sources of imprecision in CBAs though, since they are based on projected future events. In one document in the Grimshaw records, the maximum number of predicted burn deaths per annum provided by two Federal agencies differed by a factor of 5, from 700 to 3500.[3] The imprecision is well recognized by practitioners and theorists of RBA and CBA, and the recognition leads to the cautionary observation that the method should only be used for making rough comparisons or contributing to gross estimates.

The Ford CBA presented as evidence to Grimshaw v. Ford Motor Company in California showed a $137 million cost and a $49.5 million benefit. In the formula, the number of deaths, the cost per vehicle to make the design change, and the proportion of deaths to be attributed to small light vehicles were all subject to such dramatic change that the $2.75 cost to $1.00 benefit ratio achieved could have easily been changed so that the benefit exceeded the cost even if the value of life used was accepted and left unchanged.[3] In the event, the formula would have met Starr's criterion:[13]

> Ideally, safety expenditures should be made until the marginal exchange between social cost and control is equal: that is, the expenditures of one dollar for safety is expected to reduce the social cost by one dollar. This results in the most efficient allocation of resources available to reduce all risks.

[3]The CBA performed by Ford on crash induced fuel leakage and fires presents a startling example of the imprecision of CBA as well as the strong possibility for manipulation of figures to achieve a desired result. In Grimshaw, the Grush-Saunby memo contained a CBA report for static rollover tests. In the text the authors said. ". . . Similar analysis for other impact modes would be expected to yield comparable results with the implementation costs far outweighting the expected benefits." The Grush-Saunby formula was as follows:

BENEFITS AND COSTS RELATING TO FUEL
LEAKAGE ASSOCIATED WITH THE STATIC
ROLLOVER TESTS PORTION OF FMVSS 208

BENEFITS:

Savings—180 burn deaths, 180 serious burn injuries, 2100 burned vehicles
Unit Cost—$200,000 per death, $67,000 per injury, $700 per vehicle
Total Benefit—180 × ($200,000) + 180 × ($67,000) + 2100 × ($700) = $49.5 million

COSTS:

Sales—11 million cars, 1.5 million light trucks
Unit Cost—$11 per car $11 per truck
Total Cost— 11,000,000 × ($11) + 1,500,000 × ($11) = $137 million

> By using the high estimated death figure from the NHTSA, the benefit total would have been $161.2 million even if everything else was held constant. By using the low alteration figure of $5.08 presented in the trial testimony, the cost figure would have been

> $63 million. If only small cars had been used rather than all automobiles and light trucks, the cost figure would have been lower still. Increasing the value of life would have further skewed the results.

3. TYPE OF RISK

An important distinction that impacts on the way in which RBA or CBA is used is the nature of the risk. Starr used the term "involuntary" a decade ago, and Schulze has refined that somewhat to "compensated" and "uncompensated" to describe differing kinds of risk that require different applications of RBA.[14] [15] In both cases, the point is made that the situation changes drastically if the elements of individual choice or acceptance is missing. In the Pinto case, the risk was involuntary and uncompensated indeed unknown to the risk-taker.

By extending Starr and Schulze, we can say that there is a greater burden on the risk-imposer when there is not prior knowledge, choice, and compensation on the part of the risk-taker. Indeed, Schulze examines the imposition of uncompensated risk from the perspective of four different ethical systems all with distinctive values, and concludes that none of them would accept the imposition of uncompensated risk in all cases.[15] In contrast, he points out, traditional cost/benefit analyses will accept imposition of uncompensated risk. This leads us to examine the primary value of CBA that causes such a distinctive conclusion and to ask if such a value basis is adequate for decisions that impact on consumers and unknown third parties involved in accidents. Schulze and Kneese[16] extend Schulze's earlier analysis and conclude that ethical systems focusing on human rights would reject uncompensated risk to individuals (consumers in the Pinto case).

It is possible that one could say that Pinto purchasers were compensated by a lower price $5 to $11 per car but in the strongly competitive lower price car market, it is not clear how much, if any, of the increased saving would have been passed on to consumers. Beyond that, passengers in Pintos and any other injured as the result of a crash and fire would not receive any prior compensation. Since purchasers have no knowledge of the design defect, the test of voluntariness could certainly not have been met.[4]

> The use of terminology by Ford is interesting. The "cost" is the price of alteration the "benefit" is lives saved and injuries prevented. A typical comment in discussions of the Ford decision is that the "cost" was to consumers, passengers and others in potential lives lost and injuries sustained while the "benefit" was to Ford in terms of increased profits. This becomes important in the ethical analysis where the equation "who bears the cost, and who gets the benefits?" is a critical factor in evaluating CBA usage. When it is applied on a societal basis for example to evaluate government projects the costs are just what the word implies: direct and indirect (i.e., health) costs. The benefit is the social utility resulting from the project.

4. WHO DECIDES?

What we have look at so far serves as the basis for examining the nature of the decision process and the critical differences that occur when the focus of decision shifts. As we will see, there are important factors present in the decision in the for-profit business setting that set it apart from other types of decisions. The important point here is that the literature on CBA discusses factors in individual choice settings and when decisions are made by society (governmental agencies), but the for-profit business setting is not covered. It is the uniqueness of that setting and how that affects the use of CBA that requires discussion. There are a number of very important differences when Cost-Benefit decisions are made by individuals, society (governmental agencies) or for-profit firms. Very little has been said about the latter.

4.1. When the Individual Decides

Individuals can and do knowingly and willingly undertake high risk, life-threatening activities. In part, discussions of these individual choices have been used to discuss the thought process behind the decision-making. A number of commentators have gone beyond that to try to determine how individuals value their lives in dollar terms and then extrapolate from that to come to a value of life figure for statistical death.[17] [19] This method looks at how much individuals are willing to pay to avoid risk of death (WTP) or, in like manner, how much additional pay they require to take on added risk in some vocations.

> Could Ford have offered alternative gas tank designs as an option? If so, would that have removed any responsibility? In discussions with business executives, it has been pointed out rightly that a $400 saving would be considered a benefit by many consumers. The airbag example is cited in support of the argument. I agree with the observation which leads to the comment that CBA does not utility for gross assessments, and that in the instance somewhere between the $11 and $400 is a cut-off point. The precise point is impossible to determine but it is significant to note that use of CBA in value of life cases is not simply a version of "We've established what you are, not let's determine the price."

There are too many factors affecting individual decision, however, that make extrapolation impossible. Some people like, even seek, high-risk activities and the extra pay involved is not the full or adequate measure of the value on their life. Some individuals undertake risk because of extraordinary financial need. Many individuals misperceive risk, imagining control or lacking an adequate data base.[20] Furthermore, some of the WTP projections are based on attitude surveys, e.g., how much would you pay for improved paramedic services, that are unrelated to what an individual might do in the event of a tax referendum to raise taxes to pay for such services. The most reliable figures, although highly variable, come from studies of wage levels in risky jobs. (See ref. 12)

In any event, all attempts to assess individual decisions and assess value of life from individual expressions of willingness to pay involve choice, promised compensation, or some perceived benefit from an expenditure made. None of these ingredients is present in the for-profit firm's decision.

4.2. When Society Decides

Decisions made by various governmental agencies ("society") are very different than those of the individual. The first, and most important difference is that they deal with statistical death that is the likely future death of unknown individuals if something is done or not done. Should we take a curve out of a highway? Construct a median barrier? Require flame resistant materials in commercial airlines interiors? Pay for kidney dialysis for all who need it? Or require that the most up-to-date sprinkler systems be installed in all high-rise buildings? These decisions involve making public expenditures to provide added protection for users of various facilities. In some cases, one is comparing lives saved by spending money on a certain program versus the lives saved through another expenditure; here the issue is to save as many lives as possible given limited resources. In that event, a dollar value for life is not important. In many cases, though, there is not a trade-off between programs. We can presumably save x number of lives, and y dollars per life by spending = dollars. This process is subject to all of the pitfalls related to using dollars for lives discussed in the literature but the nature of the decision process that is used distinguishes societal decisions from those of both the individual and the for-profit firm.

The governmental unit that makes the decision has either been elected by the citizenry or has been delegated certain responsibilities by elected officials. Ideally, at least the decision process is usually open to public scrutiny through public hearings or public records. Individual constituents or special interest groups may plead for a protest against a particular course of action. Often legal action is possible before accident data are gathered. Unpopular or mistaken decisions can be rescinded through political pressures, e.g., seat belt interlocks. Both the risks and the benefits are borne by or accrue to the public even though they may be distributed unevenly or inequitable. Virtually none of these ingredients characterizes the for-profit firm decision process.

4.3. When the For-Profit Business Decides

There are a number of important factors that distinguish the business decisions from that of either the individual or society.

4.3.1. Cost/Benefit Distribution

If we follow the Ford Grush-Saunby[3] formula as a model, the costs are borne by the company and the benefits go to the consumers. One could reverse that analysis and call the loss of life and injury "costs" and the increased profits "benefits." In any case, the important fact is that costs and benefits are distributed to different parties and one of the affected parties has no knowledge or say in the decision.[21] This is again,

a reflection of inadequate consumer information in an imperfect market. In an asymmetrical information structure the company may profit from not making a change, although partial saving may have been passed on to the consumer.

4.3.2. Closed Decision Process

In contrast to either the individual or governmental decision, the individuals impacted by the decision have neither participation in nor access to the decision process. It was only the discovery process in a judicial proceeding that brought the information on the Ford calculation to light. The party that decides is not the party that suffers.

4.3.3. Professional Knowledge and Control

Fuel integrity systems, as well as many other engineered systems are highly complex and technical. The individual consumer does not possess the professional knowledge to make a judgment about many technical facets of a safety-related system on an automobile. The same is undoubtedly true about air traffic control systems and earthquake-proof construction, although perhaps not about highway median barriers. In any event, the individual citizen does not choose to purchase one of several alternative safety systems imposed regionally or nationally, and presumably decisions have been open to challenge in the public sector.

4.3.4. Involuntary and Uncompensated Risk

The individual who is injured or killed by a malfunctioning or poorly designed product has not participated in the decision (closed decision process) and is not compensated for the risk. Recovery for actual injury is after the fact through a prolonged judicial process in which the injured party may or may not recover for losses suffered. In any event, there is a long delay and high expenses in many cases. The compensation is after the fact and uncertain.

5. ETHICAL CONCERNS

The special considerations of the use of CBA by for-profit firms highlighted by the Ford Pinto example, provide the basis for applying a social ethical framework to the analysis of the procedure in the business setting. What distinctive features of the for-profit business setting evoke the application of an ethical analytical frame? What categories or principles enlighten our understanding of the situation? How do terms like obligation, responsibility, justice, freedom, and value relate to a normal decision-making process in a business setting?

5.1. Obligation and Responsibility

We can establish that Ford engineers and executives had the primary indeed whole responsibility for ensuring that the rights and welfare of all parties were considered fully. Not only did they control the information, but as professionals they had special obligations to the safety of consumers and the public. The Code of Ethics of the National Society of Engineers says this about professional responsibility[22]:

> Section 2—The Engineer will have proper regard for the safety, health, and welfare of the public in the performance of his professional duties. If his engineering judgment is overruled by non-technical authority, he will clearly point out the consequences. He will notify the proper authority of any observed conditions which endanger public safety and health.
> a. He will regard his duty to the public welfare as paramount (Emphasis added).

The complexity and technical nature of essential safety features of the products or modern technology were recognized a decade and a half ago when the courts adopted the concept of strict liability. The move from the traditional buyer beware based on the idea that every purchaser could examine the teeth of a horse to seller beware firmly shifted the responsibility for safety and prevention of defects to the manufacturer.

This shift of responsibility under strict liability parallels the understanding of the responsibility of professionals in other areas. Professional knowledge unavailable to the average person, creates a relation of dependence of patient to physician, client to lawyer and purchaser to engineer. The dependency relationship requires a large degree of trust in the professional, which puts a burden of responsibility on the professional. With that responsibility goes obligation, or as the Code says duty.[5]

[4]The parallel to the physician/patient and attorney/client relationship is recognizably inexact because the professional status of engineers is not fully established. Moreover, liability falls on the company as an entity and seldom on the individual design or test engineer.

More important, the responsibility and obligation are not yet fully understood nor accepted in the business setting. In a discussion of this issue in March 1981, a manager for major aircraft company asked. "What ever became of caveat emptor?" This question underscored the necessity of analyses like this one.

The special burden of responsibility in a Pinto-like decision may be understood further by applying what has been called the Kew Gardens principle.[23] In analyzing the situation from some 20 years ago when a woman named Kitty Genovese was fatally stabbed by an attacker while some 37 witnesses did nothing to help, Simon, Powers, and Gunneman developed a set of principles that apply to the level of responsibility that one bears according to the level of need, proximity, capability, and last resort. The authors have extrapolated these factors from an emergency situation and applied them to corporate activity. If we apply the principles to the decision whether to use an alternative fuel tank placement or design all four of the categories or criteria are met. That there was need for someone to decide is clear and in the controlled decision situation of a design change it was only those involved with the situation (proximity) who had the capability to make a change. When the Pinto came off the assembly line there was no possibility of choice or alteration by the consumer, thus even last resort the most difficult test to meet was present. The fact that a consumer exercises choices in purchasing any automobile and selecting a particular make and model is certainly different from a situation where coercion even violence presents a situation where the affected party has no control. Nonetheless, the absolute control of requisite knowledge and the capability of making change that resides with the design engineers makes the Kew Gardens Principle applicable.

For several reasons then we can say that there is a special obligation in the for-profit business at least when the product requires professional knowledge of complex systems. The special obligation is reinforced when we examine several other unique factors from the perspective of ethics.

5.2. Cost/Benefit Distribution—Justice

One of the first ethical questions that arises in any discussion of cost/benefit analysis, or RBA is whose cost and whose benefit? The simple but important point is that the situation is vastly different when the costs would be borne or the benefits would flow to the same party (individual or group) as against a situation where the costs are borne by one party and the benefits flow to another. The latter situation is exacerbated when the party that decides is also the party to profit from the application of the CBA.

There is very little discussion of this point in the RBA and CBA literature. Part of the problem, that of the inequity of the distribution is addressed by Daniel Callahan in some 1979 Congressional Hearings on Risk/Benefit Analysis in the Legislative Process. At one point in his testimony, Callahan discusses the moral principles that he thinks need to be addressed in assessing risk/benefit analysis. He says[21]:

". . . the first and most important I take to be the principles of justice and equity. All public policy decisions result in a distribution of benefits and burdens. Some will gain from a decision others will lose. The most important technical shorcoming of risk-benefit analysis is that it has no effective way of determining how risk and benefits will in fact be distributed and no criteria whatever for determining how they ought to be distributed. Risk-benefit analysis must therefore, be supplemented by a moral analysis. The first moral question to be asked is this: How ought benefits and risks be distributed? It is a good rule of thumb to assume that no policy based directly on risk-benefit analysis will automatically distribute benefits and burdens fairly. That will happen only as the result of a deliberate additional effort. A very heavy burden of risk on one group while another group gains most of the benefits is clearly inequitable. . ."

One could quarrel with that portion of his statement that RBA has no effective way of determining how risk and benefits will be distributed but he is right in saying that there are no developed criteria for determining how they ought to be distributed. Starr's formula of making expenditures up to the point where

a dollar is expended to a save a dollar cited earlier, gives one of a kind of guidance but that does not deal with the complications of the difficulty of measuring intangibles such as life nor the special situation when the deciding party benefits while the affected party bears the costs.

The closest although not entirely apt analogy to the problem with which we are dealing comes from experimentation with human subjects in medicine. In that situation institutional review boards assigned the task of protecting subjects utilize a risk/benefit analysis as part of the process to determine whether a particular experiment should be approved. If the experiment is being done for the possible benefit of the subject as a possible curative or therapeutic treatment a high level of risk might be acceptable. If on the other hand, the experiment has no immediate benefit for the subject but provides a potential benefit for "society" from knowledge gained then there have to be especially persuasive reasons for permitting an experiment to proceed. The point is that a committee of knowledgeable experts and lay representatives makes a careful assessment of all of the relevant factors including the risks and benefits to determine if there are special considerations that permit what would normally be called an inequitable or unjust distribution to proceed.

In the for-profit business decision there is thus far no review committee of peers to evaluate the situation. The result is that there is an intensified burden upon the in-house decision-makers who must act on behalf of all of the parties. The implications of this situation will be addressed in the concluding section on policy recommendations.

5.3. Choice

The matter of individual choice or participation in the decision process is another major ethical concern which has received very little attention in relation to CBA. In our discussion of the distinguishing characteristics of the three different loci of decision, the individual, the society or the for-profit business it is clear that only in the first case is there clear evidence of individual choice and we pointed out earlier many other factors that cloud or distort choice. Nonetheless, the ideal of individual freedom may be approximated in the individual choice situation.

In societal choice situations, it is only through the theory of elected officials acting on behalf of the citizenry that we can maintain that there is individual choice of individual freedom at all. Presumably, though, even though costs and benefits may be unequally, even inequitably, distributed through various governmental decisions, the decision process was open and subject to challenge. Callahan addresses the matter of individual freedom in the societal-decision situation by proposing a negative test. He says, ". . . if a policy does not allow individuals free choice, then the burden of proof ought to be on those who could curtail that choice."[21]

In the for-profit business situation the "burden of proof" is even higher than the governmental situation of which Callahan was speaking. Why? If we go back to our previous discussion of the distribution of costs and benefits we recognize again that the for-profit business situation lacks even the semblance of representation in the decision process and with highly technical components the deciders are the same people who will benefit. In that situation if it is to be permitted at all, there must be assurance that the affected one-participating party has maximum protection.[6]

In the experimentation with human subjects in medicine analogy discussed earlier, there is one element present that is lacking in the for-profit business decision. The factor is informed consent of the subject. The researchers are required to explain the study and answer questions and may proceed only when approval has been voluntarily given by the subject. But lay understanding is necessarily limited and even then consent does not absolve or remove the responsibility of the researchers or the institution to protect the subject. By extension when the element of consent is not present at all the entire burden of responsibility falls on the deciders.

5.4. The Value of Life

One of the major ethical concerns is the valuation of life in dollar terms. Basic questions arise here. Should we or can we put a dollar value on human life? If we do put such a value how do we arrive at the figure?[24]

Economists, engineers, system analysts, and others have been assigning specific dollar values to lives in RBAs and CBAs for well over a decade, but substantial disagreement still remains about the best method

to use and the precise value to assign even within one method. Differing value assumptions, political pressures, inaccurate public perceptions about real danger levels, and many other factors can all contribute to inflated and radically different values. The method chosen, whether deferred future earnings, willingness to pay, or some other approach, has a value structure explicit or implicit from which the dollar value is derived. The competing values and conceptions about how to value life presents an ethical dilemma that must be acknowledged despite the difficulty of resolution.

[6]The consumer's choice to purchase will mitigate or remove the burden of proof to the extent that full knowledge is really available.

Some people object to putting any value on human life in a cost/benefit procedure, especially in a for-profit situation. They say that each life is priceless, and that it is impossible to assign a specific figure. One problem with that is that a value that is intended to infinity either negates any proposed development where risk to life is at stake or is translated to zero by decision-makers so that some action may be taken. Another problem with this position is that if no value is placed on threatened lives, that side of the equation may be artificially lowered and drastically, leading to the increased likelihood that life-threatening actions will be taken.

The upshot of all of this is that users of RBA and CBA must maintain an awareness of the complexity and continued disagreement about quantifying this particular "intangible." At the very least, when a dollar value is to be used, the analysts should insure that sufficiently high values are used and that the results are used a guidelines rather than precise factors in a decision process. It is especially important that the sensitivities of analysis to alternative assumptions be explored.[7]

6. POLICY RECOMMENDATIONS

The cost/benefit analysis used in the development of the Ford Pinto points up some ethical problems, if not unethical behavior, related to the use of CBA in the for-profit business setting. In this section we will attempt to review a variety of policy recommendations that might address the ethical concerns identified. For convenience, the recommendations will be grouped under the headings of Government Regulation, Industry Regulation, Self-Regulation, and Consumer-Regulation.

[7]In several discussions with business managers and executives from various management ranks and varying types of business, three things stand out: (1) there is always a strong voice for "priceless" as a value leading to an absolute rejection of the use of CBA when it involves human life; (2) the range of values suggested when the managers are pushed runs from $100,000 to tens of millions of dollars; and (3) the "ingredients" to be included in determining life value varies tremendously but is always much richer and more complicated than either the traditional DFE or WTP processes. There is also considerable surprise, even disbelief on the part of some that CBA involving life is used in business decisions. One would assume that the consuming public would have less knowledge than people in business. The reaction described above is instructive and should be cautionary.

6.1. Government Regulation

6.1.1. Required Reporting on Safety-Related Defects or Problems

One suggestion that warrants serious attention is to require that design or impact factor engineers report defects or serious problems in safety-related components to a federal agency. The proposal here, outlined in detail elsewhere parallels on existent and relatively effective structure in the development of new drugs. The heart of the procedure for drugs is the requirement that all "adverse effects" to animals or humans in the testing process be reported to the FDA. The agency then determines whether further development with certain changes is permissible or whether all development must cease.

The strength of the system is that the decision regarding safety is removed from the for-profit pharmaceutical house and put in the hands of a government appointed agency. This situation parallels closely the distinction made throughout this paper between societal and for-profit business decisions and the remedy provided meets a number of specific objections cited here to the for-profit business decision. The procedure has the further merit of protecting the professional researcher who is required to make the reports to the

FDA from charges and negative consequences of "whistle-blowing." The reporting is expected and required and the researcher's professional career could be terminated for failure to comply. In the case of the automobile industry, or other complex manufactured products such a procedure would provide a mechanism to protect the engineer carrying out the responsibility to the public mandated in the Code of Ethics cited earlier.[22]

One major objection to this procedure is that it would create yet another federal agency or substantially increase the power, size, and expense of an existing agency as the NHTSA. This burden would be mitigated to some extent since according to present regulations, safety systems such as the fuel integrity system, must be tested by the manufacturer according to government standards and records must be maintained.

Another objection, which might have more force than the philosophical or budgetary objections to federal control, is that the procedure would cause delay in the introduction of new models in a very competitive industry that would be highly damaging. There is considerable comment about the reduction in the amount of new drug development in the United States, much of which is claimed to be the direct result of increased regulations. The automobile industry and perhaps consumers as well would have a difficult time accommodating a system that would alter the introduction of new models and which might give a tremendous advantage to one company over another even though overall safety might be improved.

6.1.2. Prohibit Use of CBA When Human Life is Involved

It is conceivable that the government could through legislation or regulatory action, prohibit use of CBA in situations similar to the Ford Pinto development. Although there is no discussion of this in the literature, it is a suggestion commonly made in discussions of the process used in the Pinto development. One could hypothesize that expanded discussion of that case along with some other decisions related to potentially dangerous products could lead to a call for limitation or prohibition.

The obvious merit of this option is that it would remove the potential for abuse in the for profit situation altogether. The problem such a prohibition would create, however, is that common and complex safety-related decisions would be made with even less concern for the interests and rights of consumers and affected persons than is now the case. Instead of using CBA, corporate decision-makers would simply play their hunches.

The author is convinced that an improved use of CBA is far better than no use at all, even with the inherent problems with valuing life because the procedure correctly used, insures that some attention is directed to the interests of the passive but affected party in the decision process.

6.2. Industry Regulation

6.2.1. Industry Codes and Guidelines

One response to growing federal regulation has been to have industry groups take on the task of mutual self-regulation. The assessment of some experience with this procedure indicates some positive results and further promise.[25] [26] Industry-wide regulation has the merit of the exercise of control by those people who are most knowledgeable and the greatest capability of taking appropriate action, if they are willing. Although this process lacks the important ingredient of consumer representation, the involvement of people outside a single firm has a salutory effect on anyone tempted to take risks with others' well-being and provides support for individuals who perceived problems but hesitate to act due to their vulnerability.

There are several inhibiting factors to the success of industry-imposed guidelines. First, there is only persuasive power, which tends to be most effective on relatively successful firms. Second, the concern over industrial secrecy and protection of new developments is so powerful that it would be very difficult to develop meaningful and timely inspection or review. Third, the competition for maintaining or increasing market share in most industries would lead to strong temptations to hedge if not evade compliance with industry-imposed standards. Fourth, the largest firms would be virtually immune to urgings by other firms or industrial groups. The Pinto decision was made by the then second largest automobile manufacturer in the world.

6.3. Peer Review

A refinement on the suggestion above would be the development of a panel or board of professionals from within and outside industry to serve as a peer review board on safety-related matters. This group would function in a manner similar to institutional review boards dealing with experimentation with human subjects or peer review boards at the National Institute of Health. Such boards function effectively and with confidentiality. Although such a panel would be subject to some of the objections raised about industry self-control through codes and guidelines, it might be a workable and desirable alternative to federal regulation.

The merit of such a process is that it would provide some assurance to consumers that their safety was being considered by professionals without a direct stake in the product being developed.

Of all of the policy recommendations being suggested this one may have the most promise of being both effective in protecting the interests of consumers and being acceptable to business at the same time. In this or any other procedure short of a government agency, there are obvious problems of limitations of legal liability that would require clarification before any implementation.

6.4. Marketplace

6.4.1. Consumer Choice

In discussion of the Pinto case, at least one semi-serious suggestion has been made that if Ford had presented consumers with two or three alternatives to the original design, as an optional item available for purchase, that they would have been acting properly.

The problem with this suggestion is that in a complex system, consumers would have little real knowledge on which to base their decision. At the same time, consumers make similar decisions all the time. Various grades of tires are available, with safer tires being more expensive; airbags are optional on some automobiles; and numerous other things such as seat belts and safety glass were optional items available for a price when they were first introduced. Most people understand intuitively that big cars are safer than small cars. In many other product lines, various safety features are available for a price and the practice is quite well ingrained in our system.

Perhaps the greatest obstacle here would be the reluctance of an automobile manufacturer to market safety options on a fuel tank or system. Part of the resistance to seat belts and airbags is that many consumers maintain that they are safe drivers and do not need an imposed restraint system. They are in control. One does not have the same control over rear-end collisions.

Despite practical limitations, this suggestion does have some merit. At the very least, it meets some of the objectives raised about the for-profit decision process which excludes the most affected party. By introducing individual choice some of the ethical objections are diminished if not removed.

6.4.2. Reputation and Profit Margin

One suggestion consistently put forward in discussions of mechanisms is to let the marketplace operate. Simply put, a defective product or dangerous design will affect reputation, sales, and profit. The argument is that these forces will affect pre-market decision processes as well as having an after-the-fact impact.

The problem with that line of argument is (i) that there are too many examples of cutting corners that challenge the efficacy of the marketplace, and (ii) that "protection" comes only in after-the-fact recovery of judgments or insurance payment if the individual is successful in submitting a claim or winning a suit. The Grimshaw case against Ford was brought in 1972 and settled in 1978 at the lower court level. It was finally settled by a California Court of Appeals in 1981 in Grimshaw's favor.

7. CONCLUSION

The Grimshaw case, with the assessment of punitive damages casts the spotlight on a commonly used decision process. As often occurs, policies and procedures that are part of the normal way in which an institution operates become part of the fabric of a decision structure and are not questioned. It is only when there is a perceived abuse or a conflict arises that a "business decision" is challenged. The importance of using the occasion for ethical analysis is to determine whether there are factors that require restructuring in order to prevent reoccurrence of similar situations.

One important finding from our analysis is that the locus of decision, the "who" decides changes the relationship of the parties involved in such an essential way that special, and increased obligations fall to the decision-makers.

Close analysis of the decision process and the vulnerable position in which the parties "at risk" find themselves suggests that one or more mechanisms may be required to protect the interests of the affected, but nonparticipating parties. The experience with the Pinto, the knowledge that we have of the pressures and stress within an institution toward accommodating the interests of the firm and the value assumptions involved in a CBA involving potential loss to life and limb suggest the inclusion of an external party in the decision process. Any proposed mechanism involves time, expense, and risk of divulging secrets—all of which are seen as burdensome and as threats to profit and economic health. Of all the mechanisms examined, the committee of peers promises to provide adequate protection while minimizing though not completely removing the factors which business firms would object. Experimentation with peer committees would provide both a test and a way to develop the most effective process and structure. Some standard test of "reasonableness" for safety expenditures, and of "fairness" for risk and cost allocation would be required for such a board. These are thorny problems everywhere, but the board would solve the problem of having the decision made by someone with a financial incentive to cut safety expenses.

The use of CBA involving life and limb in the for-profit business setting is not intrinsically unethical although the matter is subject to dispute.[27] [28] Indeed a strong argument can be made that proper use of CBA with some external participation may be more ethically defensible than non-use. When "intangibles" are left out of the equation because of the difficulty of quantification, there is strong risk of loading the case more heavily in favor of potentially life threatening or injurious action. We would call for reforming the process of utilization of CBA rather than for abolition of its use. It is because there are substantial ethical problems with the existing process as revealed in the analysis that the necessity for change in a basic procedure arises.

When decisions related to safety systems such as fuel integrity, steering, and braking require use of CBA such decisions should include an external check in one of the forms suggested. By including an external authority a surrogate for the affected parties minimizes or removes the major factors that set the for-profit decision apart from individual and societal decisions. When that is accomplished, CBA becomes a responsible and helpful tool.

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Planning for Employee Health and Safety

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Measuring the benefits of health and safety programs is difficult, but the long-term costs faced by companies such as Manville dictate that an effort be made. The author demonstrates a two-step decision model that includes the intangible and nonquantitative factors that are essential to proving the cost effectiveness of these programs.

How can a company with approximately $2.2 billion in assets, $1.2 billion in net worth, a healthy cash flow, and an income potential of up to $150 million annually be forced to seek bankruptcy protection? Many individuals asked that question when, in August 1982, Manville Corporation filed for protection under Chapter 11 of the Federal Bankruptcy Code. Unlike most companies seeking protection under Chapter 11, Manville had a healthy balance sheet and was not forced to take such action by its creditors. What Manville faced, however, was asbestos litigation in the form of 16,500 pending lawsuits (as of August 1982) and the potential for between 30,000 and 120,000 additional lawsuits (as projected by a consulting firm). The estimated disposition costs of the pending lawsuits are $660 million; the costs of the future lawsuits are expected to run between $1.2 billion and $4.8 billion.[1]

Although the Manville case is unique in some respects, the elements that led to the firm's filing for bankruptcy are present in many companies. Asbestos is but one of many substances which have been linked to human health problems and are in common use in industry today. Indeed, a *Wall Street Journal* article reported that, "Government experts estimate that one in four Americans may run a risk of illness because of past exposure to dangerous materials on the job."[2] In

1. "Manville's Costs Could Exceed $5 Billion in Asbestos Suits, Study It Ordered Shows," *Wall Street Journal,* September 15, 1982: 14.

2. "Occupational Diseases Receive More Scrutiny Since the Manville Case," *Wall Street Journal,* December 20, 1982: 1.

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addition to toxic substances, many manufacturing processes have also been found to pose safety risks to workers.

Legislative action in the past few years, recent court decisions, and the activities of government regulatory agencies have all strengthened the contention that society appears intent on holding industry accountable for work-related sickness and injury. In light of these developments and cases such as that of Manville Corporation, the question for many firms is no longer *whether* something should be done to improve employee health and safety but rather *what* should be done. In effect, what may have previously been considered discretionary expenditures have now become, at least in general terms, non-discretionary for firms that wish to survive over the long term.

What is a Company to Do?

The existence of a potential health or safety hazard in a company does not necessarily mean that the firm will end up in a situation similar to that of Manville. However, this possibility does exist and, at a minimum, the future costs to the firm and to the workers and their families could easily far exceed the costs associated with some type of health maintenance program. Indeed there is evidence that Manville knew about the hazards of asbestos more than fifty years ago and chose not to take an active role in the health of its employees. In fact, eleven employees of Johns-Manville Corporation (predecessor of Manville Corporation) sued the company in the late 1920s for asbestosis. The claims were settled in 1933 with a payment by Johns-Manville of $33,000.[3] (Current settlement costs are averaging $40,000 per case.[4] The firm's legal fees are running about $2 million a month.[5])

The question of what a company should do with respect to employee health and safety is not an easy one to answer. Firms are in business to make a profit, and managers have an obligation to accomplish this objective to the best of their abilities. Traditionally, funds committed to employee health and safety programs were viewed as reducing the resources available for more "productive" projects. Indeed, for most firms, the recognition that a problem existed and that the firm would be held accountable for the consequences directly translated into a search for the least costly route to take. As a result, one of the major problems with developing effective health and safety programs has been that the major emphasis has been placed on cost considerations, with only minor recognition of the attendant benefits.

There appear to be three main reasons for making cost the primary criterion for judging health and safety programs. First is the problem of identifying the benefits of such programs. Since many benefits will be in the form of reduced or eliminated future costs, they may not be readily apparent. Furthermore, many of these reduced-costs benefits may not accrue for twenty-five to thirty years. An evaluation period may not allow enough time for the inclusion of some benefits.

The second reason why the emphasis has been on costs stems from the difficulty of attaching dollar values to many of the potential benefits emerging from a health and safety program. This problem is not easily overcome, but cannot be ignored.

Third, there is no universally accepted method for evaluating employee health and safety programs or for quantifying the cost-benefit tradeoffs of decisions relating to them. This problem may be partly a result of the first two difficulties. In addition, the development of a methodology for evaluating health and safety programs requires the expertise of at least two separate functional groups within the firm (accounting or finance and medical personnel). Discussions with managers of various health and safety programs indicate that close working relationships rarely exist between these groups within the firm.

I maintain that firms can no longer afford to ignore the well-being of their employees, even though the bottom line may look brighter in the short run by doing so. Merely being in compliance with federal regulations and exposure standards is no guarantee that any firm will be absolved of liabilities related to the health of its employees. Nor can companies depend on worker's compensation (as apparently Manville did) to provide complete restitution to sick and injured workers. It is absolutely essential that, as part of long-range planning, firms identify potential health and safety problems in the workplace and perform detailed analysis on alternative methods of dealing with them. In the following pages, I offer a decision model which should prove to be effective in analyzing the nonroutine type of decisions firms face when confronted with a potential health or safety problem.

A Suggested Decision Model

The type of analysis required in a particular situation necessarily depends on the question being asked and the desired output of the analysis. Generally, the type of question confronting the manager in the case of a health- or safety-related program will be of the nonroutine type for which no generic decision model exists. In addition, there may be only a general or ill-defined cost

3. James E. Miller, "Asbestos Disease: Law and Medicine," letter to the editor, *Wall Street Journal*, September 22, 1982.

4. "Manville's Costs Could Exceed $5 Billion in Asbestos Suits."

5. "Manville Tries to Fight Wave of Problems Including Costly Rise in Asbestos Lawsuits," *Wall Street Journal*, June 9, 1982: 31.

objective ("to improve employee well-being") and, at best, only indirect methods available for measuring the effectiveness of the anticipated expenditures.

Cost-benefit analysis (CBA) provides a methodology which allows for the balanced evaluation of the costs and benefits of nonroutine decisions. Traditional CBA has as its basic output the discounted dollar value of the net of these expected future costs and expected future benefits. An assumption of the traditional form of CBA is that dollar values can be attached to all of the project variables. On the expenditure side, the need to attach dollar values creates no problems beyond those inherent in any estimation of future costs. The real trouble begins on the benefit side, however, when it becomes apparent that many of the anticipated benefits of a health or safety program are of the type for which no established market value exists, such as reduced pain and suffering or increased life expectancy. Inclusion of only those items for which a readily quantifiable market value exists will generally lead to a suboptimal decision.

Therefore, I propose a two-step decision analysis as a reasonable approach to health and safety questions. First, all program variables to which dollar values can be attached are analyzed using a traditional CBA framework. In the second step, the intangible and nonquantifiable variables which escaped inclusion in the first step are identified and evaluated vis-a-vis the net dollar figure which emerged from the CBA. Presumably, most of the nonquantifiable program variables will be expected future benefits. Thus, in the final analysis, the decision maker should be addressing the question, "Are these expected remaining benefits worth at least the net quantifiable cost of this project?"

Use of this modified CBA should lead not only to more balanced decision making in the short run, but increased viability for firms in the long run. Although the approach requires a great deal of subjective input, the use of subjective judgment pervades most business decisions and therefore should be familiar to most management teams. The decision maker should avoid the temptation to evaluate only the costs and benefits which are readily quantifiable. As Michael Biancardi is careful to note, "The many social and political factors to which dollars cannot be assigned may well be the factors that should have the greatest significance to the decision maker."[6]

To provide a brief illustration of the steps outlined above and to identify the types of variables which could conceivably enter into an analysis, the following section focuses on a simple, contrived example of the type of dilemma which could easily be faced by any number of manufacturing firms.

Sample Use of Model

XYZ company is engaged in the manufacture of a product that requires as one of its raw material inputs substance X which has been linked to cancer in laboratory animals. At the present time, there are no specific OSHA regulations concerning exposure limits to substance X although the company has made every effort to provide educational posters in the workplace and to label appropriately all containers of the substance. In addition to substance X, the company uses various other chemicals and compounds, none of which has any proven link with human health problems.

The company presently maintains a small medical staff housed in a couple of rooms in the factory building. Although the staff and facilities are available and prepared to handle medical emergencies or acute health problems, there is currently no ongoing program of active health maintenance or surveillance. The director of the medical staff has recently read a number of different accounts of how other companies have set up in-house occupational health surveillance programs and realized substantial benefits in doing so. She has also read of at least two companies that incurred extremely high legal fees (among other costs) in attempting to prove in court that they should not be held liable for certain illnesses contracted by their employees. Apparently, if there had been appropriate documentation of the health status of the workers at the time they had first been hired, there would have been very little debate on the issue of liability in the cases.

On the basis of these observations, the director approaches management with a proposal to expand the current health care program to provide for physical examinations and complete documentation of the medical histories of all employees at the time of initial employment. In addition, the expansion plan would allow for a more active approach to worker health maintenance by encouraging employees to become actively involved in monitoring their own health. Part of this approach would involve periodic physicals performed by the staff.

Preliminary analysis by the director indicated that the program would require hiring additional personnel, purchasing various types of testing and medical equipment, and converting an unused portion of the corporate office building into more office space. The director's main selling points in attempting to justify these expenditures to management are the observed successes of other companies and the potential for large cost savings in the future for such things as legal fees and uninsured medical costs.

Management was reluctant to commit the needed funds without a

6. Michael Biancardi, "The Cost/Benefit Factor in Safety Decisions," *Professional Safety*, November 1978: 493.

"The benefits which could reasonably be expected to accrue to the company and employees . . . range from direct tangible benefits (such as reduction in worker's compensation insurance premiums) to indirect tangible ones (such as better relations with governmental agencies)."

more detailed financial study. In pointing out that there is keen competition for corporate capital, management concluded that the director would have to show how and to what extent the proposed program would "pay for itself."

Step 1: Quantifying Variables

For purposes of the analysis, it is important to choose some time frame within which to evaluate the program variables. Normally, a reasonable choice would run from the program's inception to a point when additional capital expenditures would be required. Although the cost factors considered would be limited to this time period, many of the benefits resulting from the program may actually be realized many years after the costs have been incurred. Thus the benefit stream may extend well beyond the limits of the time frame chosen. This fact should clearly indicate the need for a discounted cash-flow approach to quantifying the costs and benefits.

Identification of the costs involved in the program presents no real problem. For the most part, these will consist of the capital expenditures required for the renovations and equipment and the incremental annual operating costs of the program in future years. These latter costs would include medical staff salaries, support staff salaries, supplies, overhead, and wages paid to workers participating in the program (for lost production time).

The identification of the benefits to be realized from the program presents a somewhat more challenging task. The benefits which could reasonably be expected to accrue to the company and employees in the present example range from direct tangible benefits (such as reduction in worker's compensation insurance premiums) to indirect intangible ones (such as better relations with governmental agencies). The following list includes those benefits which are more likely to be quantifiable and therefore included in this part of the analysis:

- Reduction in casualty and workmen's compensation insurance premiums,
- Increased worker productivity (efficiency),
- Improved absenteeism rate,
- Reduction in the number of "troubled employee" problems, (alcohol, drugs, emotional),
- Decreased labor turnover,
- Future savings of attorneys' fees related to litigation between the company and employees,
- Avoidance of the opportunity costs of management and other personnel becoming involved in extensive litigation proceedings, and
- Avoidance of the following indirect costs:[7]

—wages paid for time lost by the sick or injured worker,

—overtime necessitated by unproductive workers due to health problems,

—cost of learning period of new worker,

—uninsured medical costs borne by the company, and

—time spent by higher supervision and clerical workers on investigations or in processing of compensation forms.

After the identification of the quantifiable costs and benefits is complete, dollar values must be attached to each factor. While this presents no new problem for the costs, a determination of the dollar value of some of the benefits may require some research. The use of historical information can help in estimating future benefits since many of the benefits are avoidable costs. In addition, government agencies and labor and industry groups all publish large quantities of data which should prove useful. In the event of the total lack of published or historical data, simple good judgment can provide sound estimates for inclusion in the analysis.

Since tax considerations may be quite significant to the overall evaluation of the project, they should be factored in as either a reduction in costs or as additional benefits in the form of positive cash flows. Included in the category of tax factors are the investment tax

7. National Commission on State Workmen's Compensation Laws, *Compendium on Workmen's Compensation*, *GPD* Document No. 496-632, 1973: 6.

"Society, through the actions of the legislature, the courts, and various governmental agencies, has let it be known that industry will be held accountable for the health and safety of its employees. Thus, expenditures for employee health and safety, which once may have been viewed as discretionary, have now become non-discretionary if individual firms are going to survive in the long run."

credit, the tax shield created by the deductibility of depreciation on the equipment and renovations, and the deductibility of the annual operating cost. It is important to express both costs and benefits on an after-tax basis since the existence of the income tax will have the effect of decreasing both the costs associated with the program and the benefits to be derived from it.

After dollar values have been assigned to the quantifiable program variables, these values should be discounted to their present values using an appropriate discount rate. The resulting present value of the benefit stream may now be compared directly to the present value of the expenditure stream. The figure which results from the netting of these two present values is the net quantifiable present value of the proposed program. This figure enters the final analysis of the program evaluation.

Step 2: The Final Analysis

Now that the quantitative analysis is complete, it is imperative that the intangible or nonquantifiable program benefits be identified and weighed against the net dollar figure calculated above. In the unlikely case that the net figure is positive, indicating a net benefit, identification of the nonquantifiable benefits would not be crucial since they would only reinforce the results of the CBA. In the more likely case that the quantifiable variables yield a net negative result, this part of the evaluation could easily be the most important. Among the more significant factors that may affect the decision are the following:

- Improved corporate image,
- Increased market value of stock,[8]
- Improvement of employee morale, job satisfaction, and job attitude,[9]
- Increased attractiveness of the company to prospective employees,
- Reduced pain and suffering by employees and their families,[10] and
- Improved relations with governmental agencies.

As previously discussed, the question under examination in this final analysis is whether the intangible and nonquantifiable expected future benefits of the proposed program are worth *at least* the net dollar cost calculated in the quantitative analysis.

8. John C. Anderson and Alan W. Frankle, "Voluntary Social Reporting: an Iso-beta Portfolio Analysis," *The Accounting Review*, July 1980: 467-479. The authors found a positive relationship between a company's fulfillment and disclosure of its social responsibility (such as protecting the welfare of employees) and the stock market's evaluation of the company's stock.

9. Judy H. Bernhardt, "Anticipated Benefits from an Effective Occupational Health Program," *Occupational Health Nursing*, September 1976: 12.

10. Bernhardt.

Variations on the Model

Although the above analysis is designed primarily for a situation where a specific project or program is being evaluated, the basic CBA framework may be incorporated into different decision situations as well. For example, an analysis may be used to compare a number of different projects which may each necessitate different levels of expenditures and promise different benefits. A *cost-effectiveness analysis* may be very helpful here in deciding which of the projects offers the most benefit for the dollar. After carrying out the steps outlined for the discounting of future costs and benefits, a benefit-cost ratio can be calculated for each project by dividing the present value of the benefit stream by the present value of the cost stream. This procedure then allows the projects to be ranked according to their respective cost effectiveness.

The litigation emanating from the Manville Corporation asbestos cases has resulted in very costly settlements for the firm and the expectation that future lawsuits will bankrupt the company. Consequently, Manville has become the richest firm to ever file for bankruptcy protection under Chapter 11 of the Federal Bankruptcy Code.

The case has serious implications for hundreds of other com-

panies that use materials or manufacturing processes which pose potential health or safety hazards to employees. Society, through the actions of the legislature, the courts, and various government agencies, has let it be known that industry will be held accountable for the health and safety of its employees. Thus, expenditures for employee health and safety, which once may have been viewed as discretionary, have now become nondiscretionary if individual firms are going to survive in the long run.

This methodology for evaluating the desirability of proposed health and safety programs employs a traditional CBA framework for evaluating those factors which are quantifiable, and also includes a second step which brings in the intangible and nonquantifiable elements of a proposed investment. This step is absolutely essential for a balanced evaluation of the nonroutine type of decision usually required in the area of health and safety. The nonquantifiable social, political, and human factors in a given situation may easily be the most important elements in the analysis, and ones which, unfortunately, were often ignored in years past. □

IMPROVING CONSTRUCTION SAFETY PERFORMANCE

A CONSTRUCTION INDUSTRY COST EFFECTIVENESS PROJECT REPORT

Report A-3
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IMPROVING CONSTRUCTION SAFETY PERFORMANCE

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I
SUMMARY

Jobsite accidents have a costly impact on the $300 billion-a-year United States construction industry. Work-related injuries and illnesses, including fatalities, in construction occur at a rate that is 54% higher than the rate for all industries, making it one of the most hazardous occupations.

Data developed for this study indicate that accidents cost $8.9 billion or 6.5% of the $137 billion (1979 dollars) spent annually by users of industrial, utility, and commercial construction. This estimate includes both direct and indirect costs of accidents. These may be loosely defined as insured versus non-insured costs. The direct (insured) costs of accidents include medical costs and premiums for workers' compensation benefits, liability and property losses. Significantly, the indirect (non-insured) costs form the bulk of the total cost. They include such items as reduced productivity, delays in project schedules, administrative time, and damage to equipment and the facility.

Owners have long recognized and honored a moral obligation to provide a safe work environment to minimize injuries. The primary purpose of this study report is to demonstrate that owners have, in addition to their moral commitment, an economic incentive to help reduce the number of accidents that occur on their construction projects. The high cost of accidents gives owners as construction users good reason to concern themselves with the safety efforts of the contractors they hire. Past research has shown that accidents are, to some extent, controllable by all levels of construction management. Reasonable reductions in the frequency and severity of accidents would lower the $8.9 billion cost of accidents by as much as $2.75 billion, or 8% of direct construction labor payroll, a year. So there is ample economic incentive, in addition to humanitarian concerns, for owners to play an important role in construction safety.

One way that an owner can carry out this responsibility is to hire contractors who have a record of good safety performance. This requires attention during the processes of qualifying contractors for bidding work and selecting contractors for a contract award. A prospective contractor with a history of good safety performance is more likely to perform safely in the future than a contractor with a poor, or less-than-average, safety record. Several relatively objective measures of past safety performance are available, notably the experience modification rate which is applied to workers' compensation insurance premiums, and OSHA recordable injury and illness

incidence rates. Both may be obtained from contractors. Both indicate a contractor's accident experience on past work. Contractors who hold their management accountable for accidents, as well as productivity, costs, schedules, and quality generally have the best safety records. Therefore, owners can help themselves in evaluating and selecting safe contractors by investigating contractors' safety attitudes and practices.

Past practice indicates that contractors are seldom awarded contracts solely on the basis of anticipated safety performance. An owner, particularly when employing a contractor with a history of poor safety performance, can and should require the contractor to operate in accordance with acceptable industrial safety practices. Both the contractor and the owner will reap cost savings from better safety performance. Owners can take measures to achieve better safety performance such as:

- Provide safety and health guidelines that the contractor must follow
- Require the use of permit systems for potentially hazardous activities.
- Require the contractor to designate a responsible supervisor to coordinate safety on the site.
- Discuss safety at owner-contractor meetings.
- Conduct safety audits during construction.
- Require prompt reporting and full investigation of accidents.

Owners cannot maintain a completely hands-off policy towards construction activity on the owner's property. The owner is charged with the legal duty to use reasonable care to correct or warn against non-apparent site hazards which may be faced by the construction contractor in the course of his performance. Owners could face third-party lawsuits brought by contractor's employees for injuries caused by the owner's breach of this duty even if the independent contractor status of the construction contractor has been maintained. The owner's duty often extends to unsafe activities by contractors which create dangers for others on the site. Thus, the owner could be liable for injuries to persons on the site caused by apparent unsafe practices of the construction contractor.

Owners should recognize that the principles of management control commonly applied to costs, schedules, quality and productivity are equally applicable to safety and that, if used, will improve safety performance. By showing more concern for construction safety, owners can help reduce injuries and loss of life and the billions of dollars needlessly wasted by construction accidents.

II
STUDY OBJECTIVES

Improved construction safety and the resulting cost benefits require more awareness and understanding by owners of:

- The economic impact of accidents and accident insurance costs on project costs.
- Criteria to be used in the evaluation of contractor safety performance.
- Criteria to be used to enhance contractor safety performance.

To address these needs, the following objectives were established:

1. The assembly and analysis of data to provide economic incentive for owners to work with their construction contractors to improve safety performance. Owners need to know costs of accidents in construction and how safety performance can affect other dimensions of contractor performance, such as adherence to schedules, productivity, quality, absenteeism, and personnel turnover.

2. The development of methods or systems for owners' use in evaluating a contractor's safety performance. Owners need to know how reliable the workers' compensation experience modification rate, or other insurance data, is in measuring past safety performance and what alternate objective measures are available. They need to know which safety-management-auditing procedures will most accurately predict a contractor's future safety performance from his current safety-management procedures.

3. The determination of the elements of a safety program that owners can implement, or require their contractors to implement, to improve safety performance. Owners need to know which safety-management practices and procedures have been shown to improve contractor safety performance and what the owner's optimum role is in managing construction safety. This role generally varies for differing types and sizes of projects.

III
INTRODUCTION

This study calls upon owners to be concerned and involved in construction-contractor safety performance. In addition to the humanitarian reasons for preventing personal injury and loss of life, increased attention to safety and health is essential to the long-term economic health of the construction industry. Costs related to construction accidents are borne by owners, directly or indirectly. An effective construction-safety program will result in lower job costs.

An effective safety program should cost significantly less than the dollar losses in accidents that otherwise are apt to occur. Improvement can be accomplished by hiring contractors with a record of good safety performance or, when the selection is limited, by identifying contractors with mediocre safety performance as targets for owner involvement. Contractor attitudes toward safety range from minimal compliance to total commitment, so concerned owners should consider past safety performance of contractors during the bidding process and when awarding the contract.

The research in this study report was limited to industrial, utility and commercial construction, but the findings make it clear that the recommendations of the study apply to all segments of construction and to contract-maintenance work as well. People who work in construction safety believe that safety performance is an important managerial concern that is often overlooked or given too little attention by contractors and owners.

IV
STUDY APPROACH

This study was conducted by a team of nine men who have responsibility in areas of safety and health and who represent industrial owners, construction contractors, and the insurance industry. They agreed that, in addition to many currently available sources of construction-safety information, new data must be developed. Stanford University's Department of Civil Engineering was selected to do the research for this study. The expertise of personnel in this department's Construction Engineering and Management Center was

extremely valuable to The Business Roundtable team. The methods and systems developed and used, and the data assembled and analyzed by the Stanford research team, form the foundation of this study.[1] The cooperation of, and the information supplied by, member companies of The Business Roundtable, and business associates of those companies, in completing questionnaires and surveys for the study are greatly appreciated.

To develop data providing economic justification for owners' involvement in construction safety, the research team began by examining workers' compensation and other costs of accidents. Then a survey was made of experience modification rates for workers' compensation to indicate the potential percentage variation in the costs of construction accidents. To obtain data on the indirect costs of accidents, a questionnaire was developed and mailed to a number of owners and contractors. Further, data were assembled to permit an estimate of the cost of a construction-safety program.

To develop methods for owners to evaluate a contractor's safety performance, Stanford researchers investigated workers' compensation experience modification rates and OSHA recordable injury and illness incidence rates. A form, Items for Inclusion in Prequalification Form (see Appendix), was developed for use by owners to survey accident experience and to determine the safety attitudes and practices of prospective contractors.

To define the elements of a safety program which owners can put into effect, or require their contractors to adopt, the Stanford researchers investigated what safety management practices and procedures have actually improved contractors' safety performance. Two questionnaires, one for owners and one for construction contractors, were prepared and mailed to selected Business Roundtable member companies and their contractors, respectively. Data from the questionnaires were analyzed to determine the extent to which owners actively participate in construction-safety programs and to identify the practices and procedures those owners use. The data were also analyzed to see whether owners' involvement tends to improve contractors' safety performance.

[1] Stanford University Department of Civil Engineering *Technical Report #260*

V

THE ECONOMIC IMPACT OF CONSTRUCTION ACCIDENTS

FINDINGS

A separate study by the Construction Industry Cost Effectiveness Project determined that construction is a $300 billion per year industry in the United States with industrial, utility and commercial construction accounting for $137 billion of this total.[2] Accident costs account for a significant 6.5% of that $137 billion.

Owners have a direct economic stake in the safety performance of their contractors because accident costs are an expense to the contractor and are passed on, one way or another, to the client. This is obvious in cost-reimbursable contracts, but it also applies to fixed-price contracts.

Owners must consider three kinds of costs when dealing with safety in construction:

- Direct costs of accidents and insurance
- Indirect costs of accidents
- Costs of safety programs

Direct Costs of Accidents and Insurance

Workers' Compensation

Most contractors buy insurance for their workers' compensation (WC) exposure. Those that do not are either self-insured or are covered by insurance carried by their client. The cost of insurance coverage varies with the contractor's accident record, which is based on that contractor's injury costs in a given geographical area, expressed as an experience modification rate (EMR). The other part of the premium formula involves the workers' compensation insurance rate set for a particular type of work (i.e., carpentry, plumbing, steel erection), by a state rating bureau, expressed in dollars per $100 of payroll and based on the injury experience for that type of work in the rating state. The contractor's insurance premium is the product of the state rates multiplied by the contractor's EMR for that state. It is important to note that the work classification rates are constant for all contractors doing similar work in a specific state, so it is a

[2]The Business Roundtable's estimate of the size of the construction industry in 1979.

contractor's EMR that affects his cost. (For a more detailed explanation of EMR, see Section VI.) A survey of national contractors found that their EMR multipliers varied from 50% to 205%. A summary of the WC insurance premiums paid as a function of the contractor's EMR appears below:

TABLE 1
EMR IMPACT ON COST OF WORKERS' COMPENSATION INSURANCE[3]
(per $100 million of project cost)

Percentile	EMR	Cost of WC Insurance
Lowest EMR	Under 50	$1,054,500
10th	67	1,413,030
Median	88	1,855,920
90th	140	2,952,600
Highest	205	4,323,450

Assuming that direct labor is 25% of the project cost, it can be shown from this table that the cost of workers' compensation insurance for a contractor in the 10th percentile would be 5.7% of direct labor payroll.

$$\frac{\$1,413,030}{\$100 \text{ million X } 25\%} = 5.7\%$$

The cost of WC insurance for a contractor in the 90th percentile would be 11.8% of direct labor payroll.

$$\frac{\$2,952,600}{\$100 \text{ million X } 25\%} = 11.8\%$$

The cost of WC insurance for a contractor at the median EMR would be 7.4% of direct labor payroll.

$$\frac{\$1,855,920}{\$100 \text{ million X } 25\%} = 7.4\%$$

The difference in workers' compensation insurance costs between a contractor in the 10th percentile and one in the 90th percentile is $1.5 million, or more than 6% of direct labor payroll.

Next, consider workers' compensation insurance costs per $100 million of project cost for safer versus less safe contractors on a variety of typical industrial projects:

[3]Based on Stanford University Department of Civil Engineering *Technical Report #260*

TABLE 2
COSTS OF WORKERS' COMPENSATION INSURANCE
FOR "TYPICAL" CONSTRUCTION PROJECTS[4]

(per $100 million of total project cost, using California WC type-of-work rates).

Type of Facility \ Contractor Position	Lower Decile	Lower Quartile	Mean	Higher Quartile	Higher Decile
Paint Plant	$ 480,000	$ 620,000	$ 760,000	$ 920,000	$1,060,000
Paper Mill	530,000	680,000	835,000	1,010,000	1,116,000
Chemical Plant	575,000	747,500	920,000	1,115,000	1,276,500
Power Plant (Coal)	1,320,000	1,700,000	2,100,000	2,540,000	2,920,000
Power Plant (Nuclear)	1,360,000	1,750,000	2,160,000	2,610,000	3,000,000

It can be shown from this table that the difference between a contractor in the lower decile and one in the higher decile ranges from 0.6% of project costs for paint plant contractors to 1.6% for nuclear power plant contractors.

Paint Plant: $$\frac{\$1{,}060{,}000 - 480{,}000}{\$100 \text{ million}} = 0.58\%$$

Power Plant (Nuclear): $$\frac{\$3{,}000{,}000 - 1{,}360{,}000}{\$100 \text{ million}} = 1.64\%$$

Liability

Accidents resulting in injury to anyone other than one's own employees or damage to the property of others constitute liability exposures. Coverage for general liability, automobile liability, and completed operations is considered to be a part of liability costs. In addition to the actual insurance premium, other expenses such as deductibles and legal fees should be considered in compiling total costs to the contractor for liability. Published rates exist for liability insurance coverage; however, the cost is relatively insignificant compared to workers' compensation rates. There are certain high risk operations which may command insurance premiums in the range of 15% of direct labor payroll; however, most contractors pay about 1% for liability coverage.

[4]Based on Stanford University Department of Civil Engineering *Technical Report #260*

Property

Real property, such as the facility under construction and construction equipment, provide a potential for accidents and resulting losses. The costs of such insurance as builder's risk, equipment floaters, and installation floaters must be considered. In addition to the insurance premiums, deductibles and the possibility of losses affecting uninsured property should be considered. Accidents in construction work that is underway may bring catastrophic losses, either because of the severity of the accident itself, or because of resulting long delays in completing the work – or both.

Indirect Costs of Accidents

The insurance costs discussed so far are readily identifiable as a specific cost of doing business and may therefore be projected. However, when an accident occurs, not only direct but indirect costs are involved. Indirect costs include:

- Loss of productivity
- Disrupted schedules
- Administrative time for investigations and reports
- Training of replacement personnel
- Wages paid to the injured worker(s) and other workers for time not worked
- Clean up and repair
- Adverse publicity
- Third-party liability claims against the owner
- Equipment damage

Estimates of the ratio between indirect and direct costs have varied from 4 to 1 to 17 to 1. This ratio varies greatly with the magnitude of the accident, however, it is not necessarily linked to the severity of the injury. In other words, an extremely serious and costly accident may occur without any person sustaining injury.

In the Stanford report, data collected for 49 construction accidents were analyzed. None of the accidents included any costs for punitive damages or for third-party liability.

TABLE 3
ANALYSIS OF ACCIDENT COSTS[5]

Range of Benefits Paid	Number of Cases	Average Benefits Paid (Direct Costs)	Average Indirect Cost	Average Ratio - Indirect Cost: Benefits Paid
No lost time:				
$0 to 199	13	$ 125	$ 530	4.2
200 to 399	7	250	1,275	5.1
400 plus	4	940	4,740	5.0
Lost time:				
$0 to 2999	9	869	3,600	4.1
3000 to 4999	8	3,947	6,100	1.6
5000 to 9999	4	6,602	7,900	1.2
10000 plus	4	17,137	19,640	1.1

In the 24 accidents involving no lost time, benefits paid per injured worker varied from $90 to $2,500 (with a median of $135 and a mean of $298); the measurable indirect costs varied from $220 to $11,300 per accident (with a median of $600 and a mean of $1,450).

In the 25 accidents involving lost time, benefits paid per injured worker ranged from $90 to $24,900 (with a median of $3,500 and a mean of $5,380); the measurable indirect costs varied from $460 to $30,600 per accident (with a median of $4,500 and a mean of $7,700).

Analysis of the compiled data shows that the indirect cost ratio (or multiplier) is affected by a great many variables. These variables include the type of project, the diligence of the investigation, the severity of the accident, how critical the affected project is to the construction contractor's clients' activities, and more. So many variables are involved that it is not possible to provide a single multiplier for all construction industry accidents. Still, if the accident data are separated into two general groups, large and small claims, it can be seen that smaller accidents have a larger multiplier. Larger accidents, despite a smaller multiplier, require large benefits to be paid; so the magnitude of the indirect costs is still substantial.

The varied multipliers in Table 3 are believed to be conservatively low; the total indirect costs are apt to be considerably higher.

[5]Based on Stanford Univeristy Department of Civil Engineering *Technical Report #260*

Costs of Safety Programs

Insurance costs, costs of injuries, and the expense of liability suits are easily documented and rather readily available. The cost of establishing and administering a construction safety and health program is somewhat less tangible, but can be estimated with reasonable accuracy. Data collected from a significant sample of contractors working at various construction sites in 1980 indicate that the cost of administering a construction safety and health program usually amounts to about 2.5% of direct labor costs. These costs include:

- Salaries for safety, medical and clerical personnel
- Safety meetings
- Inspections of tools and equipment
- Orientation sessions
- Site inspections
- Personal protective equipment
- Health programs such as respirator-fit tests
- Miscellaneous supplies and equipment

In the most recent four years for which data were available, the OSHA recordable injury incidence rate for the same sample of contractors has been only 36% of the average rate for the construction industry as published by the National Safety Council[6], as shown below:

TABLE 4
OSHA RECORDABLE INJURY INCIDENCE RATES
(per 200,000 hours-per-year worked)

	Incidence Rates for Contractors in Sample Survey	Incidence Rates for Construction Industry (National Safety Council)	Column 1 as a % of Column 2
1980	3.62	12.03	30.1
1979	4.50	12.62	35.7
1978	4.69	11.84	39.6
1977	5.00	13.64	36.7

In 1980, the contractors in this survey had workers' compensation losses averaging 6.1¢ per hour worked. Had these contractors experienced accidents at the national average rate in construction as pub-

[6]National Safety Council: *Accident Facts*

lished by the National Safety Council, it can be assumed that their workers' compensation losses would have increased accordingly. In that case, their total losses for workers' compensation would have reached 16.9¢ per hour, nearly triple their actual loss.

$$\frac{6.1¢}{36\%} = 16.9¢$$

Similarly, the OSHA lost-workday case incidence rate for these same contractors, collectively, has been an outstanding 2.7% of the average rate for the construction industry as published by the National Safety Council, as shown below:

TABLE 5
OSHA LOST-WORKDAY CASE INCIDENCE RATES
(per 200,000 hours-per-year worked)

	Incidence Rates for Contractors in Sample Survey	Incidence Rates for Construction Industry (National Safety Council)	Column 1 as a % of Column 2
1980	0.098	4.29	2.3
1979	0.100	3.89	2.6
1978	0.104	3.98	2.6
1977	0.124	4.07	3.1

As noted earlier, the cost per hour for workers' compensation losses was 6.1¢ for the contractors in this survey. Had these contractors experienced accidents at the published lost-workday cases incidence rates, it can be assumed that their workers' compensation losses would have risen accordingly. If so, the total WC losses would be $2.26 per hour worked, or 37 times as great!

$$\frac{6.1¢}{2.7\%} = \$2.26$$

Together, the two illustrations above offer strong evidence of the magnitude of savings that can be realized from effective safety programs.

CONCLUSIONS

The value of industrial, utility and commercial construction in the United States amounted to $137 billion-a-year in 1979 dollars. Insurance premiums on typical projects cost 1% of direct labor payroll for

liability insurance plus 7% of direct labor payroll for workers' compensation insurance at the median experience modification rate. Labor is usually about 25% of the total cost of a project, so insurance represents 2% of total project cost. Insurance costs to the industry are $2.74 billion annually. [$137 billion X 25% X (1%+7%) = $2.74 billion] Of the $2.74 billion total, 65% is paid for accident losses, the remaining 35% represents administrative costs of the insurance industry. Therefore, accidents cost the construction industry 65% of $2.74 billion or $1.78 billion in direct costs.

Using a conservative figure of 4 as the indirect cost multiplier, the industry absorbs an additional cost of $7.12 billion (4 X $1.78 billion). As a result, accidents cost owners a minimum of $1.78 billion directly plus $7.12 billion indirectly, or a total of $8.9 billion annually, in 1979 dollars.

In the not too distant future, workers' compensation costs can be expected to increase as the construction industry becomes subject to new regulations covering occupational health. The portion of costs attributable to illnesses in this study is quite modest when compared with the projected costs of administering a comprehensive industrial hygiene program. The time is coming when illness problems will be addressed and appropriate funding must be provided.

Workers' compensation benefits have been rising steadily at an ever-increasing rate. During the period from 1975 to 1980, WC benefits increased by 300% in two states, by 200% in eight states, and by 100% in twenty-two states. These increases are partly a response to the National Commission on State Workmen's Compensation Laws which was created to study WC benefits.[7] In its report to the President and Congress in 1972, the Commission recommended a number of changes in state workers' compensation laws to improve the system's effectiveness and broaden protection for work-related injuries and diseases.

For these reasons, 7% of direct labor payroll for workers' compensation insurance premium costs, as used in this study is conservative.

The figure of $8.9 billion for accidents represents a controllable cost in the construction industry; it can and should be reduced. An effective construction safety program, carried out by contractors and monitored by owners, should reduce both the number and severity of accidents. It follows that the workers' compensation losses will be lower and, of course, the OSHA incidence rates for recordable injuries and lost-workday cases will be lower.

[7]Established in response to Section 27, Occupational Safety and Health Act, 1970.

If, because of lower workers' compensation losses, the 65% of insurance costs currently paid for accidents were reduced to 45%, the direct costs of accidents to the industry would fall to 45% of $2.74 billion, or $1.23 billion. Based on the performance of national contractors surveyed, this is an achievable goal. Total costs of accidents, including indirect costs, would therefore decline to $6.15 billion a year ($1.23 billion plus 4 X $1.23 billion). The savings thus achieved ($8.9 billion less $6.15 billion) would be $2.75 billion annually. $2.75 billion is 8% of direct labor payroll - a substantial saving.

$$\frac{\$2.75 \text{ billion}}{\$137 \text{ billion X } 25\%} = 8\%$$

The ratio of savings to the cost of administering safety and health programs would then be 8% : 2.5% or 3.2 to 1.

Owners should take particular note of the magnitude of third party liability costs as one of the indirect costs of accidents. Litigation against a third party has become more common in recent years, and dollar losses in some jurisdictions can be significant for the owner when an employee of a contractor sustains an injury or illness. Agreements of indemnification (hold-harmless clauses) sometimes tend to be ineffectual in protecting owners from either dollar loss or adverse publicity. However, when carefully drafted, such clauses can provide significant protection to owners and should be considered in all contracts.

One cannot, of course, place a dollar value on the humanitarian aspects of a good safety program. Nor is it possible to do so with other intangibles such as adverse publicity and the negative effects of accidents on labor relations. Owners should realize, however, that merely adopting a safety program will not yield the desired results without a serious and persistent management commitment to make the program work.

Both owners and contractors should be concerned with the cost and control of *all* accidents. Small, or minor, accidents have a larger indirect cost multiplier, and a high frequency of accidents is a warning that a severe injury is more likely to occur. In considering whether a construction safety program is justified, the total cost of *all* types of accidents should be measured against the costs of the safety program. Help in developing a meaningful safety program and in determining priorities for attacking major areas of loss is available to both owners and contractors. Sources include insurance carriers or brokers, trade associations, and contractor groups.

VI
SELECTION OF SAFE CONTRACTORS

FINDINGS

This part of the study deals with reducing the number and severity of construction accidents by choosing a safe contractor.

Three sources of information provide ways for owners to evaluate the probable safety performance of prospective contractors:

- Experience modification rates for workers' compensation insurance
- OSHA incidence rates for recordable injuries and illnesses
- Contractor safety attitudes and practices

Experience Modification Rates for Workers' Compensation Insurance

The insurance industry has developed experience rating systems as an equitable means of determining premiums for workers' compensation insurance. These rating systems consider the average workers' compensation losses for a given firm's type of work and amount of payroll and predict the dollar amount of expected losses to be paid by that employer in a designated rating period, usually three years. Rating is based on comparison of firms doing similar types of work, and the employer is rated against the average expected performance in each work classification. Losses incurred by the employer for the rating period are then compared to the expected losses to develop an experience rating.

Workers' compensation insurance premiums for a contractor are adjusted by this rate, which is called the experience modification rate (EMR). Lower rates, meaning that fewer or less severe accidents had occurred than were expected, result in lower insurance costs. A contractor's EMR is adjusted annually by using the rate for the first three of the last four years.

There are three different types of experience rating, none comparable with any of the others:

- Interstate experience modification rating
  This is used in 40 states.

- Intrastate experience modification rating.
  This is used in 4 states (California, Delaware, New Jersey and Pennsylvania).
- Monopolistic state fund.
  This is used in 6 states (Nevada, North Dakota, Ohio, Washington, West Virginia and Wyoming).

Stanford researchers found, in an investigation of interstate and intrastate EMRs,[8] that contractor experience modification rates ranged from a low of 50% to a high of 205%. This remarkable span indicates the difference in WC insurance premium costs between contractors with good accident experience and those with poor accident experience. The data also show a clustering of contractors with EMR's of 80%.

OSHA Incidence Rates

The Occupational Safety and Health Act (1970) requires employers to record and report accident information on Occupational Injuries and Illnesses Annual Survey Form No. 200. The employer must retain completed forms for five years.

Information available from a contractor's OSHA Form No. 200 includes:

- Number of fatalities
- Number of injuries and illnesses involving lost workdays
- Number of injuries and illnesses involving restricted workdays
- Number of days away from work
- Number of days of restricted work activity
- Number of injuries and illnesses without lost workdays

A contractor, having the number of hours his employees worked during the year, can compute incidence rates for any or all of the items above using the following formula:

$$\frac{\text{No. of incidents X 200,000 hours}}{\text{No. of hours worked}} = \text{Incidence Rate}$$

(The 200,000 hours in the formula represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year, and is the standard base for incidence rates.)

[8] Stanford University Department of Civil Engineering *Technical Report #260*

In calculating the OSHA recordable incidence rate, the number of incidents in the formula are the total of the numbers of fatalities, injuries and illnesses involving lost and restricted workdays, and injuries and illness without lost workdays. The Bureau of Labor statistics compiles construction industry incidence-rate averages each year for 14 separate classifications of construction work and various employee size groupings.

Contractor Safety Attitudes and Practices

Management accountability for safety performance is a very important factor in determining a company's safety record. Companies which hold their project management accountable for accidents along with productivity, schedules, quality, etc., are the ones which have the best safety records.[9] Based on the results from the research on the effects of top management on safety in construction, the following five measures of managerial accountability for safety were suggested by Stanford:[10]

1. The recipients of accident reports and frequency distribution of the reports (field superintendent, vice president of construction, president of firm).

2. The frequency of project safety inspections and the degree to which they include project and field superintendents.

3. The frequency of safety meetings for field supervisors.

4. The compilation method for accident records and the frequency of reporting. (Those contractors who subtotal their accidents by superintendent and foreman, rather than just by company, have a more detailed accountability system.)

5. The compilation method for accident costs and the frequency of reporting. (Again, greater accountability comes from a more detailed system, so that individual foremen and superintendents are measured in terms of their accident costs on the job.)

CONCLUSIONS

The experience modification rate is a widely used indicator of a contractor's past safety performance. Owners should request, from

[9] Based on Stanford University Department of Civil Engineering *Technical Report #196*

[10] Based on Stanford University Department of Civil Engineering *Technical Report #260*

prospective contractors, EMRs for the three most recent years, which will show the firm's trend in safety performance. Interstate EMRs, intrastate EMRs and monopolistic state ratings should not be compared with each other because different data bases are used for each system. Interstate EMRs of different contractors can be compared, as can intrastate EMRs of different contractors operating in the same state.

The OSHA incidence rates also show past safety performance. Since these are uniform national statistics, there are no limitations in comparing rates in one part of the country with those in another. Moreover, OSHA incidence rates reflect more recent experience than EMRs. Owners should request, from contractors, OSHA incidence rates for recordable injuries and illnesses for the three most recent years.

The reliability of OSHA incidence rates is solely dependent on judicious reporting by the employer, while the EMRs are established by independent rating bureaus. Although the EMR is a more objective measure than the OSHA incidence rate, there is a correlation between them. Both will indicate past safety performance.

The safety attitudes and practices of a contractor are helpful in evaluating his safety and health capabilities. Owners should look for: management accountability; a qualified staff; written safety and health programs; regular orientation of foremen and new workers; frequent, effective tool-box safety meetings; on-the-job discipline; and management commitment. Past research on effective safety performance in construction indicates that the comparative measures, such as the experience modification rate and OSHA incidence rate, are more reliable and objective than the management accountability items.

A questionnaire for the use of owners in obtaining safety information from prospective contractors was developed for the task force by Stanford University (See Appendix). Use of the questionnaire will give owners a way to evaluate safety as they consider contractor qualification and selection.

VII

THE OWNER'S INFLUENCE ON CONTRACTOR SAFETY PROGRAMS

FINDINGS

This part of the study considers what a concerned owner can do to improve the on-the-job safety performance of construction contractors.

Questionnaires to owners and contractors were used by Stanford University[11] to determine what safety requirements owners placed on construction contractors. The responses are arranged in decreasing order of use by the respondents.

1. Require use of a system of permits for potentially hazardous activities.
2. Require the contractor to designate a responsible supervisor for safety coordination on the job site.
3. Provide the contractor with safety guidelines that must be followed.
4. Discuss safety at owner-contractor meetings.
5. Discuss safety audits of the contractor during construction.
6. Require immediate reporting of contractor accidents.
7. Stress safety as part of the contract during pre-bid walk-arounds.
8. Investigate contractor's accidents.
9. Maintain statistics of contractor's accidents.
10. Conduct periodic safety inspections.
11. Set goals for construction safety.
12. Consider safety in prequalifying contractors to bid.
13. Set up a construction safety department to monitor contractor safety.
14. Set safety guidelines in the body of the contract.
15. Be involved in orientation sessions alerting workers to safety hazards on the job.

[11] Stanford University Department of Civil Engineering, *Technical Report #260*

None of the owners responding to the survey used all 15 of the above elements; about two-thirds of the owners used 6 to 8 of the elements in their programs; and a few used only 2.

OSHA incidence rates of contractors were averaged for each owner, and owners were grouped into two categories — those with construction accident rates below the industry average, and those with rates higher than the industry average. Information from owners about the specific content of their contractor safety programs was then correlated with the group to which the owner belonged according to the frequency of accidents. The findings:

- All owners with better-than-average construction safety records require contractors to obtain work permits for specific activities. Owners in the other group either do not require work permits or allow permits to remain in effect for extended periods of time.
- All the safer owners either consider the contractor's safety record or actually use safety statistics in awarding negotiated contracts. Half of the owners in the other group give no consideration to previous safety records before awarding contracts.
- All the owners in the safer group conduct formal site inspections, and about 60% of them regularly audit contractors' safety practices. Owners in the other group take a more "hands-off" approach to site safety and take action only when imminent danger appears.
- All of the owners in the group with better safety statistics use some form of goal setting for contractors to reduce accidents. Only 15% of the owners in the other group set goals.
- About 75% of the safer owners keep statistics separately by contractor; more than 60% of the other group do not maintain any type of construction accident statistics.
- Seventy-five percent of the safer group have established construction safety departments to monitor and confer with contractors on job-site safety. Only one-third of the owners with higher accident rates have a construction safety manager.
- By a ratio of about 2 to 1, the owners with better safety records stress safety as a necessary part of the job during pre-bid activities and site visits.
- The contract specifications of most safe owners (60%) go beyond requiring compliance with OSHA regulations or

broad corporate safety policies and further specify that contractors are to observe more detailed plant safety rules.

- More than half of the safer owners are involved in training sessions about plant hazards and safety procedures for construction site supervisors and workers. Only 10% of the owners in the other group are involved in any safety training.
- Practices that appear to be common to both groups are:
  - Delegating safety coordination to on-site contractor personnel.
  - Issuing construction safety guidelines.
  - Discussing safety during owner-contractor meetings.
  - Requiring contractors to provide accident reports. (However, safer owners tend to use the reports to analyze jobsite problems, whereas owners in the other group tend to require the reports merely for legal reasons.)
  - Participating with contractors in investigating serious accidents.

Specific programs and steps used by conscientious owners can be classified under several broad principles that underlie good safety performance. These include:

- Management emphasis on good safety performance (i.e., previous statistics, goal setting, contract safety specifications and pre-bid safety discussions).
- Job and safety training (job orientation).
- Audit (site inspection/audit, separate contractor statistics, owner safety people).

Further, three additional basic principles were recognized:

- Acceptance of responsibility for safety performance by the line organization (project engineer, construction superintendent and foreman).
- Use of safe equipment.
- Maintenance of safety awareness.

These principles for improved safety performance are the same principles that managements use to achieve effective cost control, quality control, productivity, etc. It is not surprising that many companies have found a good safety record to be directly related to improved cost performance.

CONCLUSIONS

Construction job safety can be successfully influenced by owners. The degree to which owners should involve themselves in this process should be based on the costs, benefits and risks involved. All owners have a legal and moral responsibility to use reasonable care to correct or warn contractors of any non-apparent hazards present on the site which could affect the safe performance of the construction and to use reasonable care to prevent contractors from injuring others on the site. Owners must make sure that contractors recognize their contractual responsibility to perform safely.

Beyond essentials such as these, the owner has considerable flexibility to adjust the degree of involvement and control to each situation. The incentives for increased involvement are lower costs, quality work, improved productivity, adherence to schedule, reduced exposure to bad publicity, and minimal disruption of the owner's employees and facilities.

On the other hand, increased owner involvement, if not handled adroitly, can interfere with the contractor's productivity and may cause ill will between an owner and the contractor. Each situation should be considered separately by management, and a decision should be made regarding the appropriate degree of involvement. (Obviously, the involvement would be less for a totally new construction site than for a job close to the owner's operating facilities.)

Once this decision is made, the success of the program will depend on good owner-contractor communications. These communications should include the owner's safety expectations, understanding of the contractor's safety program, and effective dialogue at all levels throughout the life of a project.

Owners can be successful in their efforts to improve job safety on construction projects. Comments from contractors indicate positive support for such owner programs. Proper management by owners of this phase of their business can make a significant contribution to a reduction of injuries in construction and to a reduction of construction costs.

VIII
RECOMMENDATIONS

It is fully recognized by The Business Roundtable that contractors have the primary responsibility for execution of onsite safety. Nothing in this report is intended to change this. Rather, the recommendations of the report are intended to establish the supportive role required of owners in the effort to improve construction safety performance.

Qwners should:

1. Become familiar with the high cost of construction accidents to reinforce their moral commitments to provide a safe work environment.
2. Be prepared to financially support contractors' efforts to insure an effective safety program.
3. Realize that merely adopting a safety program will not yield the desired results without a serious and persistent management commitment.
4. Recognize that the principles of management control commonly applied to cost, schedule, quality and productivity are equally applicable to safety and that, when used, they will improve safety performance.
5. Make safety an important consideration in the selection of contractors for bidding on their construction projects, including evaluation of contractors' past safety performance, safety attitude, and present programs and practices.
6. Explain to the contractor prior to the bidding process what is expected regarding safety performance.
7. Evaluate in the bid analysis the ability of the contractor to achieve expected safety performance and from this determine the degree of owner involvement required to meet safety objectives.
8. Become more directly involved in the safety activities of their construction projects and take proper measures to achieve better safety performance, such as:

   - Provide safety and health guidelines that the contractor must follow.
   - Require a formal site safety program.

- Require the use of permit systems for potentially hazardous activities.
- Require the contractor to designate the responsible supervisor to coordinate safety on the site.
- Discuss safety at owner-contractor meetings.
- Conduct safety audits during construction.
- Require prompt reporting and full investigation of accidents.

9. Function with the contractor as a cohesive safety team during the planning and execution of a construction project.
10. Establish with the contractor lines of communication at all levels so that safe work practices are understood by both parties.

APPENDIX

ITEMS FOR INCLUSION IN CONTRACTOR PRE-QUALIFICATION AND QUALIFICATION FORMS

1. List your firm's Interstate Experience Modification Rate for the three most recent years.

   19___ _____

   19___ _____

   19___ _____

2. Please use your last year's OSHA No. 200 Log to fill in: Number of injuries and Illnesses:

   a) Number of lost workday cases_____

   b) Number of restricted workday cases_____

   c) Number of cases with medical attention only_____

   d) Number of fatalities_____

3. Employee hours worked last year (do not include any nonwork time, even though paid).

   _____

4. Check your type of work:

   Non Residential Building _____

   Heavy (Non Highway) Construction _____

   Plumbing, Heating and Air Cond. _____

   Other _____

5. Are accident reports (OSHA 200) and report summaries sent to the following? How often?

	No	Yes	Monthly	Quarterly	Annually
Field Superintendent	___	___	_____	_____	_____
Vice President of Construction	___	___	_____	_____	_____
President of Firm	___	___	_____	_____	_____

6. Do you hold site safety meetings for field supervisors?

Yes_____ No_____

How often?

Weekly_____

Bi-weekly _____

Monthly _____

Less often, as needed. _____

7. Do you conduct project safety inspections? Yes____ No____

If yes, who conducts this inspection (title)? _____

_____ And how often?_____

8. How are accident records and accident summaries kept? How often are they reported?

	No	Yes	Monthly	Annually
Accidents totaled for the entire company	___	___	_____	_____
Accidents totaled by project	___	___	_____	_____
– Subtotaled by superintendent	___	___	_____	_____
– Subtotaled by foreman	___	___	_____	_____

9. How are the costs of individual accidents kept? How often are they reported?

	No	Yes	Monthly	Annually
Costs totaled for entire company	___	___	_____	_____
Costs totaled by project	___	___	_____	_____
– Subtotaled by superintendent	___	___	_____	_____
– Subtotaled by foreman	___	___	_____	_____

10. List key personnel planned for this project. Please list names, expected positions and safety performance on last three projects worked on.

_____

_____

_____

11. Do you have a written safety program? Yes_____ No_____

12. Do you have an orientation program for new hires? Yes___ No___

If yes, does it include instruction on the following?

	Yes	No
a. Head protection	_____	_____
b. Eye protection	_____	_____
c. Hearing protection	_____	_____
d. Respiratory protection	_____	_____
e. Safety belts and lifeline	_____	_____
f. Scaffolding	_____	_____
g. Perimeter guarding	_____	_____
h. Housekeeping	_____	_____
i. Fire protection	_____	_____
j. First aid facilities	_____	_____
k. Emergency procedures	_____	_____
l. Toxic substances	_____	_____
m. Trenching and excavation	_____	_____
n. Signs, barricades, flagging	_____	_____
o. Electrical safety	_____	_____
p. Rigging and crane safety	_____	_____

13. Do you have a program for newly hired or promoted foremen?

No._____ Yes_____

If yes, does it include instruction on the following?

	Yes	No
a. Safe work practices	_____	_____
b. Safety supervision	_____	_____
c. Toolbox meetings	_____	_____
d. Emergency procedures	_____	_____
e. First aid procedures	_____	_____
f. Accident investigation	_____	_____
g. Fire protection and prevention	_____	_____
h. New worker orientation	_____	_____

14. Do you hold craft "toolbox" safety meetings? Yes____ No____

How often?

Weekly ____

Bi-weekly_____

Monthly_____

Less often, as needed _____

NOTES

CONSTRUCTION INDUSTRY COST EFFECTIVENESS PROJECT

This Project is a long-range, four-phase effort to develop a comprehensive definition of the fundamental problems in the construction industry and an accompanying program for resolution of those problems leading to an improvement of cost effectiveness in the industry. It is focused primarily on improvement in the industrial, utility, and commercial segments of the industry and has been developed from the point of view of owners or users of construction. Efforts by all segments of the industry, however, are vitally necessary if major improvement is to result.

This report is one of a series of reports from study teams researching individual problem areas. The report series includes:

Project Management – Study Area A
- A-1 Construction Productivity Measurement
- A-2 Construction Labor Motivation
- A-3 Improving Construction Safety Performance
- A-4 First and Second Line Supervisory Training
- A-5 Project Management Education and Academic Relations
- A-6 Application of Modern Management Systems
- A-7 Contractual Arrangements

Construction Technology – Study Area B
- B-1 Integrating Construction Resources and Technology into the Engineering Process
- B-2 Technology Advancement in the Construction Industry
- B-3 Construction Technology Needs and Priorities

Labor Effectiveness – Study Area C
- C-1 Exclusive Jurisdiction in Construction
- C-2 Scheduled Overtime Effect on Construction Projects
- C-3 Contractor Supervision in Unionized Construction
- C-4 Constraints Imposed by Collective Bargaining Agreements
- C-5 Local Labor Practices
- C-6 Absenteeism and Turnover
- C-7 Impact of Local Union Politics

Labor Supply and Training – Study Area D
- D-1 Use of Subjourneymen in the Union Sector
- D-2 Government Limitations on Training Innovations
- D-3 Utilization of Vocational Education in Construction Training
- D-4 Training Problems in Open Shop Construction
- D-5 Labor Supply Information

Regulations and Codes – Study Area E
- E-1 Administration and Enforcement of Building Codes and Regulations

SECTION VI

OTHER PERSPECTIVES ON OCCUPATIONAL HEALTH AND SAFETY

VI. OTHER PERSPECTIVES ON OCCUPATIONAL HEALTH AND SAFETY

Health and safety can be viewed from many perspectives. Almost all of the readings in the first three sections of this book were selected because they presented management's perspective on health and safety problems. The papers included in this section were selected to present a historical survey of the development of occupational health and safety in the United States and to expose readers to a broader view of the rights and desires of workers to work in an environment which is not unnecessarily hazardous to their health.

The first article in this section provides a historical perspective on health and safety in the U.S. from the view of an occupational physician. A more detailed review of the progress of occupational health during the 1970's is provided in the article by Magnuson (1978).

In the second paper an industrial hygienist examines the changing attitudes toward occupational health in the U.S. since 1900. For a more radical view of attitudes toward occupational health, read the article by Navarro (1976).

The author of the third article which is printed in this section examines work related accidents and occupational illnesses from the perspective of an economist.

The fourth article provides a brief summery of workers' rights as seen from the legal point of view. Readers who are interested in a more detailed review of employee health and safety rights should read the excellent article by Newcom (1981) in the July 1981 issue of *Labor Law Review*. The article by Barth (1976) provides a good discussion of the proposed changes in the worker's compensation laws.

The fifth article examines occupational health and accidents from labor's perspective. Other articles in the bibliography which present labor's point of view on various health and safety issues include: Kerr (1971), Miller (1975), Mastromatteo (1976), Alaimo (1978), Steinfurth (1979) and Levinson (1979).

The sixth article describes a national project stimulated by the National Institute for Occupational Safety and Health to encourage schools of business to teach safety and health management principles and concepts in the classroom.

As a whole, these articles will provide the reader with a comprehensive view of occupational health and safety in the United States.

VI. OTHER PERSPECTIVES ON OCCUPATIONAL HEALTH AND SAFETY

1. 200 Years of Occupational Medicine in the U.S.
   Jean Spencer Felton
   Journal of Occupational Medicine
   December, 1976

2. Historical Aspects of Industrial Hygiene — I: Changing Attitudes Toward Occupational Health
   Jacqueline Karnell Corn
   American Industrial Hygiene Association Journal
   September, 1978

3. Occupational Safety and Health
   Monroe Berkowitz
   The Annals of The American Academy of Political and Social Science
   May, 1979

4. Workers Have New Rights to Health and Safety
   John J. Hoover
   Personnel Administrator
   April, 1983

5. We'd Really Rather Stay Healthy
   Peter Bommarito
   Viewpoint
   March, 1978

6. Health and Safety in the Workplace: A New Challenge for Business Schools
   David S. Thelen, Donna E. Ledgerwood and Charles F. Walters
   Personnel Administrator
   October, 1985

200 Years of Occupational Medicine in the U.S.

Jean Spencer Felton, M.D.

"A knowledge of the past prepares us for the crisis of the present and the challenge of the future."
— John F. Kennedy[1]

At the time of America's strong declaration of separation, absolving the States from allegiance to the Crown, agriculture was the base of the new nation's economy. Industry, with the diverse technologies needed to make it flourish, was yet to lead the freshly conceived United States to its position of global eminence. With the conclusion of a dedicated, bloody, hand-to-hand, and lengthy conflict, the nearly 3 million colonials looked forward to economic independence. But with the establishment and early successful growth of the systems of production, there was little awareness of the human injury to accrue from the expansive industrialization about to begin.

Industry is Born

The story of occupational medicine from 1776 on can be told only with a parallel delineation of the strong emergence of commerce and manufacturing from constrained beginnings in the 13 colonies. To offer a review of a bicentennium, there must be certain abbreviation and condensing. However, the highlights of this remarkable history of change are sufficiently striking as to depict the conversion from nearly indentured servitude to the supportive respect for the worker provided by occupational medicine.

The signers of the Declaration — among whom were four physicians — fared badly after the creation of Jefferson's document, for nine died of wounds or hardship, five were captured as traitors, 12 had their homes ransacked or burned, and others lost their sons by death or capture. The beginnings of freedom were hazardous.[2]

With the Protestant work ethic deeply etched into the psyches of the nationalists, industry was soon to appear as the core of a changing economy. Samuel Slater, a one-time worker in Arkwright's British mills, recalled from memory the design of the equipment developed in England, and was able by 1789 to reproduce complete cotton-making machinery in a mill in Pawtucket, Rhode Island. Within 20 years, hundreds of spinning mills appeared in New England.

The early experiment which attracted much observation and comment in the United States and abroad was conducted at Lowell, Massachusetts, incorporated in 1836, where innumerable young girls came to work, much as their brothers put in initial stints at sea. The average stay was 4-1/2 years, during which time the young women were given all the "advantages" of lectures, educational and religious programs, and were promised utopia in this new work setting. Accuracy in collecting morbidity data was not possible because many of the girls returned home when ill, thus invalidating available statistics.[3] Although allegedly a showplace, the work day duplicated the sunup-to-sundown span of the farm, with 14 hours required each day. After the deduction of costs for board and lodging, the girls' take home pay at week's end was $2.

Even Charles Dickens[4] wrote glowingly after his inspections of the Lowell factories:

> These girls ... were all well dressed: and that phrase necessarily includes extreme cleanliness. They had serviceable bonnets, good warm cloaks, and shawls; and were not above clogs and pattens. Moreover, there were places in the mill in which they could deposit these things without injury; and there were conveniences for washing. They were healthy in appearance, many of them remarkably so, and had the manners and deportment of young women: not of degraded brutes of burden.

He described also the hospital at Lowell, the periodical, the *Lowell Offering*, which published original writings of the young girls, and the general well-being of the employed daughters of small farmers.

In time, the logical demands for increased pay and shorter hours were voiced, and by the 1840's the idealism of the experiment was sacrificed as immigrants from the early waves out of Europe replaced the female staff.

Legislation

The late 18th century did see expression of concern for the welfare of certain workers, for in 1797 Congress created an early form of workers' compensation in providing partial pay to any personnel of the Navy who were wounded or disabled in line of duty.[5] The following year the Marine Hospital Service, the progenitor of the Public Health Service, was established, to provide medical care for seamen, the costs being borne through deduction of 20c from the wages of each person so employed.[6] This scheme of collection explains the placement of the Public Health Service for so many years within the Department of the Treasury.

By 1836, the first child-labor law was enacted in Massachusetts which required that every child under 15 years of age be given three months of schooling during the work year.[7] In 1842, an amendment to the Act forbade children less than 12 years old from working more than 10 hours daily in manufacturing establishments.[8]

First Writings

With the United States already 60 years past its birth, no paper as yet had appeared relating to the diseases of work. In 1835, the Medical Society of the State of New York offered a $50 prize and awarded it to the 23-year-old Dr. Benjamin McCready, who, although drawing heavily on Britain's Thackrah and that country's data, produced a 60-page essay "On the Influence of Trades, Professions, and Occupations in the United States, in the Production of Disease."[9] In that century's fourth decade, the percentage of employees changing from agriculture workers to craftsmen and factory operatives was increasing, and McCready was to warn against child labor, long hours, and poor ventilation. Further, he discussed the illness of sailors, and the dermatoses noted among plant workers. Later, he helped establish Bellevue Hospital Medical

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College and was its first Professor of Materia Medica and Therapeutics. Although granted this primacy in writing, McCord has termed McCready "the overly-crowned first American industrial physician."

Not too many years following, J. Addison Freeman[10] of New Jersey published a thoughtful writing on mercurialism among hatters.

Further Legislation

The century moved on. The arduous penetration of the western frontier allowed spirited citizens to alter occupations, to hazard the dangers of Conestoga wagon travel over a modestly charted, hostile terrain, and to begin new lives in a land one day to gush oil, to produce food, or to initiate new shipping lines. The restiveness of Europe, the famine of Ireland, and oppressiveness of monarchial governments began to push freedom-seekers onto the Eastern shore. These immigrants — 10 million arriving in the second half of the 19th century — populated the cities, and soon were to be found clustered around the iron and steel centers of America, the factories of New England, and the farms and flour mills of the upper Mississippi Valley.

But a divisive war intervened in the formative years, putting women back into the munitions factories, establishing an early role for them in production. Other forces were at work. Cotton required processing, so the inventive Eli Whitney conceived of the cotton gin, speeding the separation of seed and fiber. From this one piece of equipment he moved on to the most significant change in manufacturing seen in the 1800's. New to factories was the concept of "uniformity." Proposing to the federal government that he produce muskets at $13.40, he contracted to deliver 10,000 within two years. At first year's end, 500 were finished; it took eight years to meet the terms of the initial agreement. But in 1811, a second batch of 15,000 was completed within two years in Whitneyville, Conn. Characterizing the system of fabrication were the principles of precision manufacturing, interchangeability of parts, and uniformity of production. Each worker had an assigned sub-task, contributing his part to the finished whole. This method was the beginning of the fractionation of work — the division of labor — and the creation of the first fixed assembly line, with its dehumanization of the worker.

With the growth of the cities and their manufacturing centers, the face of transportation began to change from sail to rail, and the need for faster cross-country moving led to the building of the transcontinental railroad completed in 1868 with the joining of the Central and Union Pacific Railroads just west of Ogden, Utah. For a labor force, innumerable Chinese were imported, their presence leading later to some infamous exclusion laws and long-continuing fractured inter-racial relations.

The new form of transport brought considerable morbidity in its path; in one year to come, over 3600 persons would be killed and nearly 68,000 injured. Trainmen engaged in coupling cars by dropping a pin into the tongue at the end of a moving train would be crushed. The manipulation of individual wheel brakes killed others. The invention of the automatic coupling device and the development of the engineer-controlled air brake did much to lower the loss from these work-caused injuries.

Other Laws

Of importance in the alteration of working conditions was the passage of the 1847 New Hampshire law which established the first 10-hour work day.[12] The following year, Pennsylvania prohibited the work of children under 12 years of age in textile plants,[13] and a year later, the age was raised to 14.[14]

In keeping with the new awareness of protection for the wage earner, Massachusetts, already a leader in social legislation, put into law in 1852 the first safety regulations, in this case applying to the operation of steam engines.[15] The power of closure was included in the legislative language. Fifteen years later, another state act was passed which provided a special deputy to enforce the law prohibiting the employment of children younger than ten years of age in manufacturing establishments.[16]

Finally, in 1868, the first federal law was enacted which limited the hours of work to eight per day for those persons employed by or on behalf of the United States Government.[17] Enforcement through similar legislation was provided subsequently in both 1892 and 1912.

Once again, Massachusetts legislated a new concept in occupational health and safety by passing in 1869, under some pressure from Labor, the first law calling for a State Bureau of Labor Statistics, appropriating $5,250 for this purpose.[18] This bureau and others to be created similarly, were the predecessors of today's State Departments of Labor. In the same state, in 1874, minors under 18 years of age and women over that age were prohibited from working more than 10-hours daily or 60 hours weekly in any manufacturing establishment.[19] Three years later the same state enacted legislation requiring safeguards in factories, such as the guarding of belting and shafting, the precluding of cleaning of machinery that was running, the inclusion of safety devices around hatchways, the provision of fire escapes, and the requirement that all main doors open outward.[20]

A "Hygiene" of Occupations

Concern began to appear regarding the morbidity and mortality of workers, and commentators published data covering the illness experience of various occupational groups, without correlating the morbid states with specific hazardous exposures. Early chapters in monographs earned such titles as "Diseases Incident to Some Occupations," and "Hygiene of the Laboring Classes."[21]

Rohé pointed to the average age at death of stone-cutters at 40.90 years, and comedians at 37.31 years. Soldiers, he cited, lived to 28.37 years, and physicians were longest lived at 54.99 years. Further, he identified the presence of mercurialism in hatters, silicosis in needle grinders, and phosphorus poisoning in match factory operatives.[22]

Hoffman,[23] an actuary, pointed up the high mortality from tuberculosis ("consumption") in persons whose occupations involved exposure to municipal dust, such as street cleaners, drivers, cabmen, and the like. He indicated that although the exposure to general organic dust was less serious than that to metallic and mineral dusts, attention should be given to dust removal and prevention. He wrote, "all the employments included in this inquiry are occupations indispensable to human welfare and daily needs, and the ample protection of health and life in these industries is, therefore, a matter of humanitarian obligation on the part of the employer, as well as a question of self-interest on the part of the employee."

The sense of joint responsibility was given further emphasis by Ireland,[24] when he indicated that the interests of the employer and employees were identical, and that each worker shared in the responsibility for his own welfare and that of his shop-mates.

Hazards of Construction

With the growth of railroads and the transportation revolution, bridges were needed. John A. Roebling, an engineer who successfully had erected suspension bridges in Niagara and Cincinnati,

began construction of the Brooklyn Bridge. However, he became a victim of an industrial injury when his foot was caught between two rows of piles impacted by a boat coming alongside.[25] His toes were traumatically amputated, and he died of tetanus within two weeks of his injury, his son, Washington A. Roebling, succeeding him in 1869 as supervisor of construction. He likewise sustained a work-related disorder when in 1870, during one of his numerous visits into the caissons, he developed decompression illness which was rather a mystery to the physicians of that day. Because of the paralysis which followed, he conducted all business from an apartment overlooking the bridge site, orders being carried out with the assistance of his wife.[26]

To further compound the tragedy of the bridge project, when the structure was eventually opened in 1883, there were 50,000 visitors, of whom 12 were killed and 80 injured because of panic.

In a second bridge construction, James Eads, who had installed effective levees on the lower Mississippi river, was given the task of erecting a bridge to cross that river at St. Louis. The activity was soon plagued by caisson disease and a physician was sought to provide medical support. One can only point up the long-persisting method of obtaining industrial health support by quoting from the official report:

> Dr. Al Jaminet, a regular practitioner in the city, and *Mr. Ead's family physician* [italics are mine] was engaged to take charge of all the men at work in the airchamber, and to establish such regulations as in his judgment the well-being of the men demanded.[27]

During the many years of construction, there were 91 cases of decompression illness, well documented, with three deaths. The bridge was opened in 1874, and like that in Brooklyn, still stands.

Immigration and Labor

Beginning with the famine of 1846 in Ireland, Europeans began to migrate to the United States, families establishing footholds in piecemeal fashion on the Atlantic seaboard, until such time as all relatives could be transplanted. These newly-arrived persons, nonEnglish-speaking, crowded into the cities, filling tenements which were being built to house these "teeming masses," creating ghettos and slums which would remain for well over half-a-century before replacement. Between 1820 and 1974, nearly 47 million new people came to the United States. In the decade of 1901 to 1910 alone, almost 9 million made the trip to the new land.[28] The presence of this available labor pool made for considerable exploitation in the growing industries of the day, particularly oil and steel.

It was at this time that Alice Hamilton, then a disciple of Ludwig Hektoen in Chicago, was living in Hull House, associated with Jane Addams. Early on, she became aware of the problems faced by these workers in an alien country, and of their acquisition of occupationally incurred disease. Through the influence of sociologist Charles Henderson of the University of Chicago, Governor Charles S. Deneen of Illinois appointed in 1908 a Commission on Industrial Diseases, under the direction of Dr. Hamilton, thus moving her into the area of occupational health. The special segment of her inquiry was lead-induced disease, fellow commissioners investigating other work hazards. The report stemming from this thoughtful study appeared in 1911, and Dr. Hamilton went on to conduct many investigations for the Department of Labor. The interest in worker health persisted throughout her Harvard career, her period of retirement, and until her death in late 1970 at the age of 101-1/2 years. It was through her efforts that a research project was endowed at Harvard on the action of lead in the human body. The distinguished studies funded by industry, were conducted by Dr. Joseph C. Aub.[29]

The presence of immigrants in the American labor scene and the incredible number of injuries sustained by this uncomprehending work force led to the famous Pittsburgh Study. Crystal Eastman,[30] in her monograph, *Work — Accidents and the Law*, studied the injuries sustained in industry in that area, citing the tremendous numbers of traumatic misadventures and deaths incurred. In one month, in a single county, there were 50 on-the-job fatalities.

During this period, concern was rising regarding a system of compensation of workers who were injured, particularly as a law had been passed in Chancellor Bismarck's Germany in 1884, to provide for just this kind of social insurance. Some of the states passed employers' liability acts but, in the main, they were unsuccessful in helping the ill or injured workman. State commissions were formed to study the issues and, finally, a group went abroad to view the underwriting scheme on site.[31]

Simultaneous with the ferment in workmen's compensation was a tragedy which took place in a building which still stands behind New York University's library near Washington Square. Early on a Saturday afternoon, March 25, 1911, just at closing time in the Triangle Shirtwaist Company, a fire broke out on the ninth floor, trapping the workers in this loft factory which had been inspected for fire egress and put on notice. At the end of the melee of ineffective escapes, arm-in-arm jumps from the building, and trapping of employees in adjacent floors, 146 workers, mostly young immigrant women, died.

The same day, there was reported the action taken regarding New York State Workmen's Compensation law — it was declared unconstitutional! The opinion of the jurist ran, in part, as follows:

> "The statute, judged by our common-law standards, is plainly revolutionary," and . . . violates private right by taking the property of one and giving it to another without due process of law . . ."[32]

When the public and the labor unions became aware of this juxtaposition of events, the reaction, the indignation, the anger were extreme. In the meantime, in that same year, Wisconsin passed the first workmen's compensation legislation, and by 1948, with Mississippi's late passage of a comparable law, all states provided such protection to employed persons. In 1911, California enacted the first law providing coverage for occupational disease.

Child Labor

Early in the 19th century, children were placed under masters for apprenticeship training. As noted previously, the hours were long and life was short, and the opportunities for schooling were extremely limited. Children were placed in mines, in factories, and in textile mills, and they were engaged in day and night selling on the streets; keen photo documentation was undertaken of youngsters so engaged by such social viewers as Lewis Hine.[33] In 1903, Illinois passed a law demanding an eight-hour day for children under 16 years of age, and by 1915 a similar standard existed in 15 jurisdictions. The year 1904 saw the formation of the National Child Labor Committee which was to act as a clearing house for information on child labor, to investigate, to educate the public, and to promote legislation.[34] One of the common sites for child workers was in the mines where, serving as breaker boys, they were seated on slanted frames under which coal slid down, so that pieces of slate and other noncombustibles could be picked out by hand. The conscience of the 19th and early 20th centuries

insofar as children were concerned was economically oriented, and even as late as 1916 control legislation was declared unconstitutional. By the acts of 1911-1912 (Chapter 73), though, a Children's Bureau was established in the then U.S. Department of Commerce and Labor, and included among the many charges given were the investigation of, and reporting on, dangerous occupations, accidents and diseases of children, and employment.[35]

Bloodshed in the Labor Movement

In the 1880's, the fight for an eight-hour work day began. But even before this struggle, workers began to organize, in secret because of fear of reprisals, and one of the first associations to be established was the Knights of Labor, whose seal bore the inscription, "That is the most perfect government in which an injury to one is the concern of all." In the organization's Declaration of Principles, addressed to the public, it demanded at the hands of the state, among other actions, "The adoption of measures providing for the health and safety of those engaged in mining and manufacturing, building industries, and for indemnification to those engaged therein for injuries received through lack of necessary safeguards."[36]

The movement for local unions, national unions, and federations of unions continued, and bloody strikes against the coal, iron, and railroad magnates led to consolidation of efforts. Under the leadership of Samuel Gompers, the Federation of Organized Trades and Labor Unions of the United States and Canada was created in 1881, five years later to be reorganized as the American Federation of Labor.[37] The history of the Molly Maguires in the Pennsylvania coal fields was dotted by violent murders and executions, and by the involvement of the Pinkerton Agency in labor spying.

On May 1, 1886, demonstrations for the eight-hour day were held in many of the larger cities. Two days later, violence took place in a bitter strike following a lockout at the McCormick Harvesting Works, and on May 4, a protest meeting was called at the Haymarket Square in Chicago. During a confrontation of labor leaders and police, a bomb was thrown, killing 11 persons and injuring scores. The press confused the action with anarchy and revolution, and the subsequent trial and sentences destroyed the eight-hour movement.

At the Homestead, Pa., plant of the Carnegie Steel Company, there were 3800 employees working for excessively low wages in an extremely hazardous environment. On the heels of wage cuts and plant closure, a "small army of Pinkerton detectives, armed with guns," came down the Monongahela River in barges, to replace the locked-out workers. Following the exchange of fire between armed workers and the Pinkerton men, 13 persons were killed. The strike went on, and work was transferred elsewhere; because of the use of strikebreakers and the loss of jobs, the union was eliminated at Homestead.*

Strikes and violence continued into the 1930's and 1940's, until new legislation provided means of negotiation and arbitration. Consistently present among demands were statements regarding improvement in working health and safety.

Occupational Injury and Disease — Organizational Concern

At century's end, movements toward worker protection continued to grow. Because of mine explosions and cave-ins with a great attendant loss of life, the U.S. Bureau of Mines was created in 1910, with Joseph A. Holmes as its first director. Drs. Anthony J. Lanza and Royd R. Sayers were later to be identified with the Bureau's health studies. The U.S. Public Health Service, by 1912, had gradually become, through legislative changes, the federal health agency. Its establishment in 1798 was aimed at protecting the health of, and providing medical care for, American seamen, then possibly our most important group of industrial workers. Subsequently, many studies were conducted relating to occupational health hazards and the examination of large groups of workers, so that it was logical in 1914 that the Office of Industrial Hygiene and Sanitation be established in the Division of Scientific Research. It was organized under the direction of Dr. Joseph W. Schereschewsky, whose publication "Trachoma in Steel Mill Workers,"[38] was the first of many to appear under the aegis of the new office.

In 1928, the Office of Dermatoses Investigation was created and in 1937 it was combined with the Office of Industrial Hygiene to become the Division of Industrial Hygiene, a Division of the National Institute of Health. It was renamed subsequently the Division of Occupational Health, later the Bureau of Occupational Safety and Health, and finally with the 1970 legislation, the National Institute of Occupational Safety and Health.

The appearance of phosphorus necrosis of the mandible among workers in the match industry was brought to light primarily by Dr. John B. Andrews, Secretary of the American Association for Labor Legislation (AALL), a branch of a similar international association. The findings relating to "phossy jaw" appeared in 1910, and finally, after many hearings and considerable educational campaigning, on April 9, 1912, President Taft signed the Esch Act authorizing the use of the government's taxing power for the protection of industrial workers. The bill provided for a tax on each box of matches made from white phosphorus, and thus made their production economically infeasible. This action, brought about by Andrews, an economist, represented the first instance in the United States of the use of taxation for reform instead of for politics. The manufacturers subsequently substituted the innocuous sesquisulfide for the white phosphorus.†

The American Labor Legislation Review underwent some 52 published issues, and the Association promoted the first National Conference on Industrial Diseases, in Chicago in June 1910. The Association's total emphasis was on occupational hygiene, as it was called, and reports were prepared on lead, mercury, anthrax, compressed-air illness, methyl alcohol, and arsenic.[39] In 1913, a joint meeting with the American Medical Association was held, the first time in 66 years that the AMA programmed any topic relating to occupational disease. The AALL also presented to President Taft a Memorial on Occupational Diseases in 1911, and in 1912 published Dr. Gilman Thompson's "Classification of Occupational Diseases."

Other organizations began to form. In Milwaukee, in September 1912, the first National Safety Congress was organized, as a joint action of the Association of Iron and Steel Electrical Engineers and the Cooperative Safety Congress. In 1914, the organization became the National Safety Council. The American Public Health Association at its 1914 Florida meeting, after being in existence for 42 years, instituted a section on Industrial Hygiene, later to be redesignated the Section on Occupational Health.

Physicians employed in industry were seeking a forum for exchange, so that in 1914 the Conference Board of Physicians in Industrial Practice was formed in the eastern states, and several volumes of its transactions were published in the years ahead. The following year the Section on Preventive Medicine of the AMA held a symposium on Industrial Hygiene and on June 12, 1916, a new medical group known as the American Association of In-

dustrial Physicians and Surgeons (AAIPS) was organized in Detroit, with nearly 200 members present.[40] It is to be noted that the charge made for the Association's banquet by the Hotel Cadillac was $2 per person.[41] The AAIPS became the Industrial Medical Association, and more recently the American Occupational Medical Association (AOMA). The nurses in industry formed the American Association of Industrial Nurses in 1942, and in 1946 the American Academy of Occupational Medicine was created. In 1955, after considerable effort, much on the part of Dr. Adolph G. Kammer, the American Board of Preventive Medicine's new specialty in Occupational Medicine was added to the list of recognized specialized areas.

By 1935, the AMA had a section devoted to Industrial Health, and the association's Council on Industrial Health was established in 1937, only to disappear decades later as a result of budgetary constraints. The American Industrial Hygiene Association was organized in 1939. By 1943, Industrial Hygiene units were functioning in 38 states, one territory, and in the Tennessee Valley Authority.

Problems in Employment

While Rosen[42] has described insightfully the origins of contemporary public health as stemming from social inefficiency and the harmful insinuation of industrial technology into the lives of workers, he did not point specifically to obsolescence in work as a cause of occupationally related dis-ease. The change in product, the substitution of new raw materials, the altered work process have led to unemployment, downgrading of employees,† and difficult re-adjustment.

In the mid-nineteenth century, a whaling fleet numbered 400 ships. By 1882, kerosene, natural gas, and electricity had replaced whale oil for lighting, and paraffin and stearine were being used in place of spermaceti for candles. The whaling port of New Bedford was virtually dead, for the men of the ships were now working alongside their wives and children in the textile mills.[43]

The disappearance of the horse from urban streets led to the change of solid to particulate exhaust, and the whitewing of the century's turn put away his broom and barrel. The conversion of a worker's individual fabrication of a product to assembly line manufacture created a dull, uninspiring, repetitive, brutalizing, yet almost soporific manner of earning a wage.¶

The arrival of scientific management — time and motion studies — as extolled by Frank Gilbreath and Frederick M. Taylor, went further in dehumanizing work and freeing it of the last remnants of pride.

Fortunately, contemporary personnel methods have altered the system of hire practiced in former days when crew members needed for sailing vessels would be shanghaied from saloon to ship after the administration of varied quantities of chloral hydrate.

Shakespeare[44] expressed it well when he gave Shylock these words:

> Nay, take my life and all; pardon not that: You take my house, when you do take the prop that doth sustain my house; you take my life, When you do take the means whereby I live.

The Growth of "The Literature"

The progress made by a social institution is recorded by historians, so that a written legacy comes to those persons concerned with events just past. In the situation germane to occupational medicine, articles, reports of surveys, and descriptions of industrial disease began to appear when America's social protest was just gaining momentum. In 1903, Dr. C. F. L. Doehring conducted, and published the results of, the first official industrial hygiene survey. Five years later Dr. George M. Kober produced a monograph on industrial health. Dr. Alice Hamilton's reports appeared in the second decade of the twentieth century, and her text, the first American work on industrial toxicology, *Industrial Poisons in the United States,* was published in 1925. The monographic contributions of Drs. William C. Hanson (1913), Josephine Goldmark (1912), George M. Price (1914), W. Gilman Thompson (1914), and Kober and Hanson (1916) were significant additions to the growing body of knowledge. An important work was Harry E. Mock's 1919 volume, *Industrial Medicine and Surgery.*

The August 1916 *Modern Hospital* was a special issue on industrial health edited by Dr. S. S. Goldwater. Four papers comprised a discussion of occupational diseases at the New York Academy of Medicine on January 4, 1912. The need for data collection was pointed up by Hoffman in 1911, when he commented that, "The actual and relative extent of industrial diseases in America cannot be stated with even approximate accuracy at the present time." He believed that the situation in the United States was in marked contrast to the annual reports of factory inspection in European countries.

The need for American periodicals was felt concurrently, and to meet this need the first issue of the *Journal of Industrial Hygiene* appeared in May 1919. After many name changes and mergers, the *Journal* appears today as the *Archives of Environmental Health,* a much smaller version of the seminal issue of 57 years ago. *Industrial Medicine,* today the *Journal of Occupational Health and Safety,* began publication in 1932. The *Journal of Occupational Medicine,* the official organ of the AOMA, had its first issue in 1959, and is now in its eighteenth volume.

Noteworthy series of articles have been prepared in the past. Dr. Robert T. Legge[45] wrote on the history of occupational medicine from early antiquity to the Great Depression of the 1930's; Dr. Carey P. McCord[46] turned out a seven-part series on lead poisoning, and an historical series on scurvy;[47] and Felton wrote in 1964 a three-section series on the Organization and Operation of an Occupational Health Program,[48] which has recently been revised and updated by Dr. Henry F. Howe.[49] A good bibliography[50] and a complete reference list appeared in 1975.[51] Most recent of definitive texts is that edited by Dr. Carl Zenz, *Occupational Medicine.*[52]

Programs in Occupational Medicine

The ante-bellum southern plantations, termed by some as agricultural factories, employed physicians on retainers to treat the slaves. In 1868, the first hospital devoted to the care of one company's employees was opened in Sacramento, Calif., but was to move to San Francisco after fire destroyed the structure. The Cambria Iron Company in Johnstown, Pa., opened its hospital in 1887, with a bed capacity for 12 patients, and a dispensary service for ambulatory care. Claim is also given this company for initiating the use of a nurse in industry.[53] However, for years the Vermont Marble Works was credited for having the first industrially employed nurse in the United States (1895); more recently, a Ms. Betty Moulder, who trained at Philadelphia's Blockley Hospital has been cited as the first of company-based practitioners (1888).[54]

Eminent retail stores and other establishments were among the first to have programs staffed by nurses. In the East there were John Wanamaker (1897), Frederick Laeser's (1899), Plymouth Cordage Co. (1901), National Cash Register Co. (1901), Gimbel Brothers (1902), Halle Brothers (1903), Filene's (1904), Carson, Pirie

and Scott (1904), and Hotel Astor (1905). On the west coast activity was seen at The Emporium (1900), Anaconda Mining Co. (1901), The Broadway (1902), and Bullock's (1906).[55]

Clarence Selby, remembered more as General Motors' Corporate Medical Director, while with the U.S. Public Health Service, visited 170 establishments in 1918, and reported on his findings in a collectors' item Public Health Bulletin.[56]

It is difficult, because of the lack of documentation, to identify early physician-staffed medical departments in industry. While normally a good vein for mining, business biographies rarely have included comment on plant medical activities.[57] The organizations represented by the founders of the AAIPS and other early company participants included the Crane Company, Chicago; McCloud River Lumber Company, northern California; Norton Grinding Company, Worcester; Youngstown Sheet and Tube Company; Cincinnati Milling Machine Company; People's Gas Company, Chicago; Avery Company, Peoria; E. I. duPont de Nemours & Company, Wilmington; Ford Motor Company, Detroit; Pullman Company, Chicago; Colorado Fuel and Iron Company; Republic Rubber Company, Youngstown; Eastman Kodak Company, Rochester, New York; and Pere Marquette Railroad, Grand Rapids.

In reference to the duPont organization, it is fascinating to note that Dr. Pierre Didier, who came to the United States in 1794 at age 53, became acquainted with the duPonts through the French community of Wilmington. From 1803-1826, he was associated with the company, and received retainers from both the family and the company. Care given persons sustaining casualties while at work was paid for by the employer, but for medical attention because of illness, the worker would be billed separately. It is not known if he visited the mills on regular days; he would be summoned, however, for emergencies. Presumably Dr. Didier represents the first physician-plant relationship in the United States.[58]

Occupational disease clinics were established early: Dr. Thompson in connection with the Cornell University Medical College in New York in 1910, the clinic lasting until 1916; Sprague Memorial Institute of the University of Chicago, a clinic in connection with the Rush Medical College in 1911; Massachusetts General Hospital, 1916; University of Pennsylvania Hospital, 1914; New York City Health Department, Dr. S. S. Goldwater, 1915; and the Medical College of Ohio State University, 1915.[59]

Industry Moves

In the transition of work methods, mechanization replaced hand labor, and automation to a great extent was inserted as a more efficient operational mode than mechanically run equipment. Wars came, and demanded production plants required staffing, bringing into manufacturing, women, the elderly, and the handicapped. World War I saw an increase in the medical personnel utilized in production activities, and they remained on between the two global events.

World War II changed the employment pattern accustoming Americans to the utilization of women in a multiplicity of non-traditional work roles. The Great Depression just before saw jobs drop in level — in railroad stations in the '30's the Redcap positions were filled by Caucasians. Suicides and unemployment ran high. The 1918 influenza Epidemic attacked 20 million Americans, and 500,000 died. No data are available as to the effect on the industrial population or on war production.

The Depression, heightened by the aridity of the Dust Bowl, brought thousands from the Great Plains to California, for work and resettlement. Social legislation created new governmental agencies intent on creating public works and individual security.

The second World War re-peopled plants converting from peacetime products to war materiel. Southern labor went to Detroit and the California shipyards and, for the first time — along with the building of the armed forces — cultures were mixed, and few went back home after V-J Day.

Radiation

But prior to the WW II effort, a letter was sent by Albert Einstein to President Roosevelt, dated August 2, 1939, which read as follows:

Sir:

Some recent work communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future . . . Certain aspects of the situation which has arisen seem to call for watchfulness and, if necessary, quick action on the part of the Administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendations: . . ."

The United States had had experience with ionizing radiation before. One year after Roentgen's discovery of the x-ray, the first case of radiation injury was reported, and in five years, 107 cases were on record. During World War I, wrist watches, which had just become popular, and which were being issued to our armed service personnel, required luminous dials. Many young women were required to apply the paint — zinc sulphide became luminous when mixed with 20% radium and 80% mesothorium — and did so by tipping their brushes between their lips. Considerable material was absorbed and in December 1925, Dr. Harrison S. Martland reported cases of osteogenic sarcoma and other radiation-induced diseases.[60]

Roosevelt directed a small fund for exploration in response to Einstein's letter, and in December 1942, the first nuclear reactor went into operation at the University of Chicago, in a laboratory at the old Stagg Field. Production plants in Tennessee, New Mexico, and Washington were erected, demanding a practice of occupational medicine not seen before, and one carried out programs in close cooperation with members of the new specialty of health-physics or radiological health. Deaths from excessive exposure to ionizing radiation were to take place, and the effects of the World War II-ending Hiroshima and Nagasaki bombs were to be studied for decades.

Other Events

Notable actions in occupational medicine were taking place around the wars. The early 1930's brought to light the "Gauley Bridge Disaster,"[61] named after a small community in West Virginia. A large hydroelectric tunneling project was undertaken through three miles of sandstone and shale. Although no true data resulted to summarize the actual or alleged prevalence of occupational lung disease, the claims were numerous and costly, and from the activity sprang the so-called "silicosis racket." The events did bring more focus onto work-generated lung disease.

In an 18-square-mile area of a zinc and lead mining field embracing the contiguous corners of Oklahoma, Missouri, and Kansas, ore minerals were intermixed with such highly siliceous materials as chert and jasperoid, so that at the working face of the mines there was 88% free silica.[62] In 1937 there were nearly 1500 men employed, and because of complaints of work-related illness and considerable newspaper publicity, the Secretary of Labor called a National Silicosis Conference, with the final committee reports emerging in 1938. High levels of pulmonary tuberculosis morbidity and mortality persisted in that area for years. Following

the Tri-State Silicosis episode, the Air Hygiene Foundation, later the Industrial Hygiene Foundation, was formed.

Copper smelters were spewing out materials destructive to surrounding vegetation, waste areas of luxurious greenery, such as that at Copperhill, Tennessee. As early as 1911, Hoffman[63] pointed out that, "Industrial Processes are often injurious not only to the health of the people employed therein, but occasionally to the surrounding population, and the vegetation of the nearby country within a radius of several miles." Eventually, capture of effluents, production of sulfuric acid, and reforestation restored the burned land.

A milestone in the eradication of an industrial hazard was the elimination in 1941 of mercury from the hatting industry, through joint agreement of the manufacturers, the unions, the U.S. Public Health Service, and state health officials. A PHS study had revealed 59 cases of chronic mercurialism in 534 hatters.

The Role of Women

Amelia Bloomer, after whom the singularly unattractive garment was named, initiated activity toward the liberation of women. Susan B. Anthony, a suffragist of the late nineteenth century, gave impetus to the concept of consumerism, and through the Working Women's Protective Association, as an example, brought to light the sewing machine swindle. As long ago as 1910, there was the first "aviatrix" to gain recognition, and World Wars I and II brought great numbers of women into unusual roles in both industry and the armed forces.

The Century's Second Half

Our emergence from the global conflict of the 1940's brought certain tragedies to workers. McCarthyism, until the eponymic source died in 1957, ended the careers of many in the sciences and in the entertainment industry through blacklisting. Union violence led to the acid-blinding of Victor Reisel, a labor/racket-busting journalist.

In Texas City, industrial plants were razed by the explosion of fertilizer-laden ships, and company personnel sought workers and bodies for days. Automation began to replace mechanization, and great numbers of workers feared replacement by card-and-tape-controlled assembly and production equipment. Soon, nuclear weapons were no longer solely possessed by the United States.

The Korean War and later the action in Vietnam brought many men and women back into service and production plants turned out munitions. The arrival of the jet age meant considerable retraining and readjustment of piston-craft pilots, and brought on studies of the effects of stress on traffic controllers. Apollo 11 took man to the Moon, the effort in subsequent years to be blemished by the collapse of the aerospace industry, and the joblessness of much skilled engineering talent, as noted previously.

Environmentalists picked up the cause of pollution control, and noise, inner city decay, land destruction from strip mining, and oil spills consumed the attention of the industrialist, the politician, and the homeowner.

Mental Health

Although much of occupational health has concerned the genesis, identification, and prevention of work-caused physical disease, concerned observers began to devote attention to the behavioral problems paralleling employment. Dr. C. C. Burlingame,[64] working in 1915 in the Cheney Silk Mills, reported in 1945 some of his conclusions, and Southard,[65] in 1920, backed by the Engineering Foundation of New York City, commented that 62% of 4,000 persons were discharged from employment because of social, rather than occupational, incompetence. He wrote, nearly 60 years ago, "Industrial medicine exists. Industrial Psychiatry ought to exist." Anderson,[66] who conducted studies at the R. H. Macy Company of New York, summarized his findings in a solid monograph, *Psychiatry in Industry*, in 1928. Levinson[67] and McLean[68] were later to publish extensively in the area of the mental health of workers at all levels, including executives.

In addition, programs in alcoholism rehabilitation appeared in industry, proving themselves to be highly successful in leading to the retention of skilled employees who were able to undergo recovery and manifest continuing sobriety. Physically and emotionally limited persons were finding their places at work through the efforts of the President's, the Governors', and the Mayors' Committees on Employment of the Handicapped. The surfacing of drug problems in the 1960's led to some efforts at screening applicants for jobs.[69]

The classical studies conducted at the Hawthorne Works of the Western Electric Company by Harvard Business School personnel, Elton Mayo and others, have been described by McLean[70] as demonstrating "the tremendous importance of human interaction as an integral part of the work situation, and that dissatisfactions arising in or out of the plant become entwined, influencing each other and affecting work production."

Early efforts in employee counseling were given such designations as "social engineering,"[71] "hygiene," or "welfare work," or were placed in units called the "Sociological Department" (Colorado Fuel and Iron Company), or were in the hands of the "social secretary," or the "welfare secretary."

Legislation

Without the solidity of a body of laws, little is accomplished through humanitarian or paternalistic motivation. The Public Contracts Act (Walsh Healey) of 1936, PL 74-846, developed labor standards in government contracts, but never proved to be forceful legislation.[72] The Fair Labor Standards Act of 1938 defined the principles of maximum hours and minimum wages as applied to all workers of industries engaged in interstate commerce. The Bureau of Mines was given power of investigation through the 1941 Federal Mine Inspection Act, and PL 658, the Federal Employees Health Service Act, authorized federal agencies to institute limited occupational health programs, but the law was permissive. The passage of the Coal Mine Safety Act took place in 1952, but the significant bill was PL 91-173, the Federal Coal Mine Health and Safety Act of 1969. On signing the bill, President Johnson stated that 181 deaths and 12,000 injuries in one year in the mines covered by the Act could not be written off as an "occupational hazard." He felt that no man "should have to pay with his life or his health for a right to earn a living." Or, as Ramazzini[73] put it, workers, as far as possible, should "work at their chosen calling without loss of health."

In 1972, the Black Lung Benefits Act, PL 92-303, came into being after much research had resulted from the federally supported program (1969) in Appalachia. After an abortive attempt to pass the O'Hara Bill in 1968, the Occupational Safety and Health Act of 1970 was successfully introduced by Sen. Harrison A. Williams, Jr. (D-N.J.) and Cong. William A. Steiger (R-Wisc.), being signed into law December 29, 1970, to become effective April 28, 1971.

This landmark legislation incorporated many previous related Acts, and placed responsibility for compliance with the Secretaries of Labor and Health, Education, and Welfare. The Occupational Safety and Health Administration was created in the first depart-

ment, and the National Institute of Occupational Safety and Health (NIOSH) in the second. The Assistant Secretary of Labor (OSHA) is currently Dr. Morton Corn, and heading NIOSH is Dr. John F. Finklea.

Of importance to nearly 3 million federal employees was Executive Order 11708, signed September 28, 1974, which directed the establishment of occupational health programs for federal workers.

Untouched Areas

In the retelling of two centuries of activity in any area of human enterprise, not all elements can be highlighted. There has been no discussion of the recent concerns based on the hazards of asbestos, vinyl chloride, and kepone. Educational programs have not been discussed, and no time was devoted to the older worker or to occupational aging — as demonstrated by the older professional baseball player or the ecdysiast. The weighty contributions of industrial hygiene and occupational health nursing have not been touched at length, because the review has been pointed to occupational medicine in perhaps a more parochial sense. Writings elsewhere have touched on the need for group or team accomplishment in occupational health. The early work of the PHS in silicosis, programing, surveillance, and the effects of specific hazardous substances such as mercury, lead, and uranium, among others, has not been alluded to. Pending legislation regarding further control of dangerous chemicals, the importance of rehabilitation for the ill or injured worker, and multiphasic testing, have not been described. Only space precludes inclusion of these issues.

The Future

What lies ahead? Possibly as Dr. Corn sees it, more consultation and education from official agencies, in place of penalizing actions. As more epidemiologists are attracted to the study of occupational disease, more positive correlations between work exposure and morbidity will result, with demonstration of the role of work and of the absorption of dangerous substances in the process of aging.

A unification of philosophy, benefits, and administrative practices among the many workers' compensation systems and jurisdictions must come, and also down the road is the question of national health insurance — not so much as to its actual configuration, but as to its relationship to presently established in-plant occupational health programs. Safety programs must be strengthened to eliminate the present carnage in our heavy industries.

The nature of work will change, as Bell[74] has observed, for in our postindustrial society, manufacturing will diminish, and there will be an increase in the service economy. Today 64 of 100 workers are in services, and by 1980, Bell predicts 70 in 100. Most of the workers needed in services will be in state and local government agencies. Warshaw,[75] from the view of the insuring giants of the private sector, believes that "... the scope of proper concern of the occupational physician has expanded quite far beyond his involvement with occupational injuries and disease. It now extends to the nonoccupational health problems of the worker and his dependents, and the ways in which the health services they require are organized, delivered and paid for." More significantly is the growing schism, as Bell[76] sees it, between the Industrial First World and the Third and Fourth and Fifth Worlds, the consequences of which are most difficult to foretell.

The occupational medical world has moved from trauma to toxicology to a composite of behavior/chemicals/laws. Our systems of communication still need improvement, the philosophy we create for industry's managers must have a strong cost-effective planking, and we and our programming skills must retain flexibility to meet the legislative constraints of the decades ahead and a willingness to "live with ambiguities rather than attempt to come up with clean-cut solutions to every problem everywhere."[77]

The past is but preamble to an exciting future, in our hands, of human conservation and realization.

*George A. Spencer, M.D., President, American Occupational Medical Association, has shared with the author a medal of the Pennsylvania National Guard worn by his grandfather which bears as a metal campaign "ribbon," confirmation of participation of the Guard in the battle at "Homestead 1892."

†That phosphorus poisoning has not disappeared has been given testimony recently in the description of cases of ingestion of phosphorous-containing rodenticides. The poisoning was given the descriptive eponym of the "Smoking Stool Syndrome." See Simon FA, and Pickering LK: Acute Yellow Phosphorous Poisoning. *JAMA* **235**:1343-1344 (Mar 29), 1976.

‡To wit, the ceaseless search for psychically rewarding work by the terminated aerospace engineer in southern California.

¶For vivid descriptions of work on the "clanking, impersonal" automobile assembly lines, see Swados H: *On the Line*. Boston, Little, Brown & Co., 1957.

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Historical aspects of industrial hygiene —I: changing attitudes toward occupational health

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The concept of risk to health and safety associated with occupation has undergone profound change in the twentieth century. The idea that accidents and diseases are unavoidable by-products of work has been slowly replaced with the concept that prevention and control of hazards on the job can minimize and even eliminate risk.

The accelerated process of technological change and ecomonic growth that characterize twentieth century America created a number of environmental problems. In general, historians have focused upon the evil consequences of slums, inadequate methods of waste disposal, and air and water pollution. However, the work conditions that led to an inordinate number of occupational accidents and diseases and efforts to alleviate those conditions should also be considered an integral part of environmental history.

The purpose of this presentation is to outline the changing attitude toward the work environment in twentieth century America, and to demonstrate that a combination of social and technological factors contributed to effect a change in attitude toward health and safety on the job. It should be recognized that even today the concept of legislation and implementation of occupational safety and health programs is in great flux in the United States as attitudes and knowledge continue to develop.

The goal of occupational health and safety programs is to prevent industrial disease and to control recognized hazards on the job. Occupational health and safety in the nineteen seventies is related to questions of social welfare and politics; it utilizes the disciplines of medicine, engineering, chemistry, toxicology, sociology, and epidemiology to achieve the goal of preventing disease and eliminating industrial safety hazards.

Thus, in order to interpret in-plant environmental changes related to health and safety and to place them in historical perspective, one must assess progress over the past seventy years as it relates to advanced scientific understanding of disease, improved methods of detection and control of hazards, better diagnostic and curative techniques in medicine, improved epidemiological methodology, changes in social attitudes and the assumption of responsibility for worker well-being by labor, government and management.

Changes in concepts of occupational health cannot be viewed detached from the economic and technological revolution which occurred in the late nineteenth and early twentieth centuries. Mining and manufacturing expanded greatly, making the United States the leading industrial nation of the world. Industrial expansion, technological innovations and exploitation of the environment created an industrial collossus. The growth of monopoly, consolidation of industries and the genesis of industrial giants created a new set of social problems, among them the unsafe work settings which were largely ignored. An inordinate number of occupational exposures dangerous to health occurred as industry grew, but were largely ignored because meager social legislation existed in an America dominated by a philosophy of Social Darwinism and a business ethic of competitiveness. Workers exposed to extensive hazards, aware of those hazards and the relationship of work to disease and injury contended with more pressing problems, low wages and long arduous hours of work. The need to organize was primary; the obstacles to organization were many. Therefore, grievances of factory workers and miners did not manifest themselves in agitation for healthful and safe working conditions.

In the nineteenth century only a few American documents related to occupational health existed.[1] By 1900 there was hardly a body of statistics or factual data upon which to base and develop factory and health legisation, but events

1. American documents related to occupational health were as follows:
   a. *The Influence of Trades, Professions and Occupations in the United States in the Production of Disease*, by Dr. Benjamin W. McCready (1837).
   b. Dr. Nelson Green advocated a reduction of hours of labor in 1846 at a meeting of the Massachusetts Medical Society where he delivered an address on "The Factory System in Its Hygienic Relations."
   c. *The Sanitary Conditions of the Laboring Population of New*

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gave rise to the need for the states and the private sector to change the health situation in factories and mines.

Hazards to health and safety were many, primitive in nature and large in magnitude. Occupational diseases long known but little understood, such as silicosis, plumbism, phosphorous poisoning and mercurialism, occurred frequently in work places which lacked adequate ventilation and sanitary facilities. Long and burdensome hours of work prevailed. The description and definition of hazards by means of industrial surveys and scientific studies and education of the general public would have to take place in order to alleviate the evils of the workplace.

The impetus for change came not from labor or management but from the humanitarian segment of the Progressive movement, which sought protective labor legislation for American workers. The safety movement and the movement for workmen's compensation occurred simultaneously in the first decade of the twentieth century. Industrial accidents could no longer be ignored during the first decade of the twentieth century. Unprecedented acceleration of industrial activity, lack of an organized safety effort and the prevalent long work day partially account for the rise in deaths. Progressive Americans responded to this challenge with action to minimize occupational injuries, which took the form of a safety movement to prevent occupational accidents, and an occupational hygiene movement to control occupational diseases. Progressives also sought workmen's compensation laws to ameliorate the plight of injured workers and their dependents or survivors by assuring at least partial compensation for lost wages.

Crystal Eastman undertook the first systematic investigation of accidents occurring in a representative period (1906-1907), in a representative district (Allegheny County, Pennsylvania) as a part of the Pittsburgh Survey. She began her report stating the problem by using four case studies of injured workers to illustrate her point. She then stated her purpose, " . . . to determine in cases studied (1) what are the indications as to responsibility? (2) What material loss and privation, if any, resulted to the injured workmen and their families?"[2] The study considered responsibility for work related accidents and its bearing on the just determination of ecomonic loss. According to the study, from July 1, 1906 to June 30, 1907, five hundred twenty-six men were killed by work accidents in Allegheny County, Pennsylvania. Eighty-four percent of the men killed were forty years old or under. Fifty-eight percent of the men were not yet over thirty.[3] Crystal Eastman sought enactment of workmen's compensation laws because responsibility for accidents were due, as her study proved, to circumstances beyond the control of the workers and survivors usually received little or no compensation. She urged consideration of the devastating human as well as economic results of industrial accidents.

The prevalent attitude toward injured workers was that employers had no more responsibility toward employees than they wished to assume. If an employee or his survivors sought compensation in court, the common law defenses stacked the odds in favor of the employer. They were: 1. Fellow servant, i.e., if an injury was the result of another worker's negligence the injured employee could not collect from the employer; 2. Assumption of risk, i.e., the employee must assume the risk of an inherent hazard of a job that he knew or should have known about; 3. Contributory negligence, i.e., if the employee was negligent in any way himself, he could collect nothing regardless of the employer's negligence.

Dr. Alice Hamilton, a pioneer in the unexplored field of industrial medicine, did much to implement change in the health status of the American worker. At the time perhaps her most valuable contributions were the descriptions of the extent of industrial disease in the United States. She said in her autobiography that in the early twentieth century the literature on the subject of industrial disease was European. "In those countries industrial medicine was a recognized branch of medical sciences; in my own country it did not exist. When I talked to medical friends about the strange silence on the subject in American medical magazines and textbooks, I gained the impression that here was a subject

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York with Suggestions for Its Improvement, by Dr. John H. Griscom (1845).

d. *Disease Incident to Some Occupations,* Dr. J. T. Wilson (1880).

e. *Hygiene of the Laboring Class,* William J. Scott (1881).

f. *Hygiene of Occupations,* Dr. George H. Roke (1884).

g. *The Preventable Causes of Disease, Injury and Death in American Manufacture and Workshops and the Best Means for Preventing and Avoiding Them,* Dr. J. H. Ireland (1886).

2. Eastman, Crystal. *Work Accidents and the Law.* The Pittsburgh Survey. Russel Sage Foundation, New York, 1916. p. 5.

3. Eastman. *Work Accidents and the Law.* p. 13.

tainted with socialism or with feminine sentimentality for the poor. The American Medical Association had never had a meeting dedicated to this subject, and except for a few surgeons attached to large companies operating steel mills, or railways, or coal mines, there were no medical men in the State of Illinois who specialized in the field of industrial medicine."[4] In 1910, Governor Deneen of Illinois appointed an Occupational Disease Commission to inquire into the extent of industrial disease in that state, the first such survey undertaken in the United States. The commission included Alice Hamilton, whose investigations centered upon lead hazard. In 1912 she undertook a similar survey for the United States government.

Thus, in the Progressive period surveys and scientific studies helped to define and describe the problems of occupational hazards.[5] "Industrial Accident Statistics," a publication of the United States Department of Labor, documented as far as possible, industrial accident statistics.[6] Its author, Frederick L. Hoffman, noted the hitherto lack of trustworthy industrial accident statistics in the United States due to the absence of uniform requirements in various states for reporting accidents. Prior to enactment of workmen's compensation laws, no state received reports of accidents in its industries.

The same period saw publication of the first modern American texts concerning occupational health, such as "The Modern Factory" by Dr. W.G. Thompson, "Diseases of Occupation and Vocational Hygiene" edited by Dr. George H. Kober and Dr. William C. Hanson and "Industrial Medicine" by Dr. Harry E. Mock.

The United States government created agencies concerned with workers' health; the Department of Labor (1913), United States Bureau of Mines in the Department of Interior (1910), and United States Children's Bureau (1912), Office of Industrial Hygiene and Sanitation (later the Division of Occupational Health) established in the Division of Scientific Research of the United States Public Health Service (1914).

In the private sector in 1906 the American Association of Labor Legislation organized to conduct investigations, hold national conferences, publish reports, draft bills, and secure enactment into law of progressive standards. In 1910 it held its first National Conference on Industrial Disease. In 1913 the National Council for Industrial Safety (later called the National Safety Council) came into existence. A section of Industrial Hygiene, part of the American Public Health Association, was organized in 1914. The next year the Conference Board of Physicians in Industry was established to advise the National Industrial Conference Board and in 1915 the American Medical Association held its first symposium on Industrial Hygiene and Medicine. In the same year the American Association of Physicians and Surgeons was organized.

In this progressive era minimal legislation affecting worker health was passed by state governments, some declared unconstitutional. The list includes: (1) 1902 Maryland passed the first legislation for benefits to workmen injured in the course of employment (declared unconstitutional 1904), (2) Illinois enacted an eight hour day for children under sixteen, (3) Washington was the first state to pass a compulsory Workmen's compensation law in 1911 followed by California, Nevada, Illinois, Ohio, Wisconsin, Kansas, Massachusetts, New Hampshire and New York, (4) New York and Ohio established in 1913 the first state industrial hygiene agencies staffed by physicians and engineers.

Other advances included the first instruction in industrial hygiene in the Department of Biology and Public Health at Massachusetts Institute of Technology; the Medical Department of the University emphasized industrial hygiene; the first occupational disease clinic established at Cornell Medical School Outpatient Department in New York City; and a clinic started at Ohio State College of Medicine to study occupational disease. In

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4. Hamilton, Alice. *Exploring the Dangerous Trades.* Little, Brown and Company. Boston, 1943. p. 115.

5. For example: a) 1905 the Massachusetts State Board of Health issued a report on conditions affecting the health and safety of employees in factories in that state. It was supplemented in 1907 by a study made by Dr. William C. Hanson of the dusty trades. b) 1908 the State of Illinois appointed a Commission on Occupational Disease which published its report in 1911. c) 1911 Dr. George M. Kober submitted a report on *Industrial and Personal Hygiene.* d) *Mortality and Consumption in the Dusty Trades* by Frederick L. Hoffman was published by the Bureau of Labor. e) 1910 The Bureau of Labor issued a report on *Phosphorus Poisoning in the Match Industry in the United States* by John B. Andrews. f) New York established a Factory Commission to direct health studies. g) 1914 *Pulmonary Diseases in Mines in Joplin, Missouri,* the first of a series of United States Public Health Service studies was made. h) 1914 The United States Department of Labor published a document, *Health of Garment Workers.*

6. **Hoffman, Frederick L.:** *Industrial Accident Statistics.* United States Department of Labor Bulletin #157. Government Printing Office. Washington, D.C. 1915.

1918 Harvard University established a course of instruction and research leading to a degree in industrial hygiene.

The first union sponsored type of medical care plan was started by the International Ladies Garment Worker Union in 1913 and in 1917 the Union Health Center was incorporated.

It can be seen from this list of state, federal, union and private activities that the beginnings of an industrial health policy occurred in the Progressive era. All activities point to a new, if limited change in concept toward industrial health. It was the beginning of a long, difficult, and significant change in both social and scientific attitudes toward industrial health and the assumption by government of a role in industrial health.

During World War I and the ensuing period of prosperity, activity followed the pattern previously established. Activity did not accelerate. Indeed, although the war stimulated American productive capacity, the period of the 1920's is conspicuous for its lack of industrial health activity commensurate with the expansion of industry.

The advances in social legislation of the New Deal period spilled into the field of occupational health. The new legislation renewed interest in occupational health. In part this new attitude was created by the growth of unions. The battle for health and labor legislation to create more salubrious working conditions gained impetus from the contributions of a new body of technical and scientific knowledge about industrial disease, knowledge about the prevalence of industrial hazards and experimental and statistical evidence. Goverment action stimulated industrial medicine, scientific and technical research, new engineering control concepts and social legislation. The growth of labor organizations is also responsible for some of the health activity.

New federal laws affecting workers' health were passed, for example: (1) National Industrial Recovery Act (declared unconstitutional in 1935) made industrial codes for fair competition which included the regulation of hours and safe and healthful working conditions, (2) the Division of Labor Standards established in the United States Department of Labor, (3) the Social Security Act of 1935 included provisions to make federal funds available to the United States Public Health Service for research, and grants-in-aid to states for public health work including industrial hygiene, (4) in 1936 Congress passed the Public Contracts Act (Walsh-Healey) which established labor standards on government contracts including requirements for the safety and health of workers, (5) in 1937 Industrial Hygiene was established as a Division of the National Institutes of Health in the Public Health Service, (6) in the same year, the Fair Labor Standards Act contained the principle of maximum hours and minimum wages for all workers in interstate commerce, (7) in 1941 Congress passed the Federal Mine Inspection Act which authorized the Bureau of mines to make investigations and recommendations relative to health and safety conditions in the Mines, (8) in 1948 the National Labor Relations Board ruled that pension, health and welfare plans were within the scope of collective bargaining. It should be noted that in 1936, with the use of funds made available by the Social Security Act of 1935, seminars were instituted by the Office of Industrial Hygiene and Sanitation of the United States Public Health Service to train personnel for state industrial hygiene units. Before 1936 seven industrial hygiene divisions existed in six states and one city health department. By the mid 1940's there were forty-seven units in thirty-eight states, seven cities and two counties.

During the New Deal era, state and national conferences met and new professional organizations were founded. The Council on Industrial Health established within the American Medical Association in 1937 sponsored its First Annual Congress on Industrial Health in 1939. In 1938 the American Conference of Governmental Industrial Hygienists was organized. In 1939, the American Industrial Hygiene Association was founded. In the same year the American Industrial Hygiene Nurses Association was organized, and in 1946 the Academy of Occupational Medicine was founded.

In 1946 the interest of unions broadened to include health and the United Mine Workers established labor's first big health and welfare fund. Industry created the Air Health Foundation (later the Industrial Hygiene Foundation) in 1936.

Another significant event occurred when Mississippi enacted Workmen's Compensation laws in 1948 making that state the last state in the union to enact such legislation.

The activities recorded above continued during the period of the 1950's and 1960's and were similar to early developments. There were occurrences in the period which I have omitted not because they are insignificant, but because they were similar to the preceding events and followed the same pattern. But it should be noted that events culminated with two major Federal laws, the Coal Mine Health and Safety Act of 1969 and

the Occupational Safety and Health Act of 1970. As I have stated before the conferences, government and state agencies, unionization and public opinion were all factors leading to these federal laws. Technology which created the ability to make better and more accurate measurements was also a factor.

Thus, the factors which accounted for the changed view toward workers' health and safety were: (1) increased industrial activity, (2) pressure exerted by certain progressive elements in American society, (3) new scientific and technical knowledge, (4) more data relative to the incidence of hazard and industrial disease, and (5) changed social attitudes toward responsibility for accidents and diseases which occurred at the workplace. Efforts in the field of industrial medicine and hygiene, social legislation, including Workmen's Compensation laws and engineering devices had tended to "clean up" the industrial environment. Many of the obvious evils of excessive industrial hazards had become a thing of the past.

Yet in 1968 the American public learned that many factories and mines still remained perilous places. Testimony and evidence given before committee hearings in 1968 and 1970 prior to enactment of federal occupational health and safety legislation showed that although the relationship between incidence of occupational disease and workers in asbestos, lead, coal mining, cotton textile and pesticide industries, to name a few, were well known and although there was enough knowledge to control the work environment to prevent silicosis, plumbism, mercurial poisoning and other occupational injuries, the knowledge had not been translated into effective preventive action.[7]

Safety and health laws, historically left to the states, were piecemeal, varied in quality and often unenforced. Every state had Workmen's Compensation laws and many had some type of occupational safety and health law, but the pattern of coverage by a jumble of state and federal agencies was inadequate. Statistics and testimony at the committee hearings in 1969 and 1970, for Federal Occupational Safety and Health legislation showed an increasing pattern of injury on the job. Public pressure, public knowledge, and scientific expertise all showed the need to move beyond Workmen's Compensation laws and individual state responsibility to a more comprehensive national policy of preventing accidents and unhealthy work situations. It reflected both a need and a new attitude toward occupational health and safety. The complexity of American industry, its use of sophisticated processes and new chemicals also pointed to the need for research, reporting of statistics on a nationwide basis, and federal legislation to protect the American worker. It was the consensus that these needs could be met only by federal legislation.

In 1970 the United States Congress passed the Occupational Safety and Health Act, "To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the states in their efforts to assure safe and healthful working conditions; by providing for research, information, education and training in the field of occupational safety and health; and for other purposes."[8]

Basic to the Occupational Safety and Health Act is the idea that in-plant health and safety is the responsibility of the employer. The legislation appears to be the culmination of sixty or more years of agitation for a safe, hazard-free, workplace. The legislation also reflected a change from the old common law principles that the burden of responsibility in cases of injury was upon the employee.

The above briefly outlines the background against which progress in prevention and control was made in a wide spectrum of specific hazards associated with health and safety on the job. It is an ongoing effort. In a series of future articles I will trace progress made in the understanding, prevention and control of selected hazards to worker health and safety on the job. This has already been accomplished with respect to the changing attitudes toward lead, a classical toxic substance to which workers in a wide variety of industries are routinely exposed.[9]

S. Government Printing Office, Washington, D.C. 1970.

8. *Guidebook to Occupational Safety and Health — 1974 Edition.* Commerce Clearing House, Inc. Chicago, Illinois. 1974. p. 327.

9. **Corn, Jacqueline K.**: "Historical Perspective to a Current Controversy on the Clinical Spectrum of Lead." *Milbank Memorial Fund Quarterly — Health and Society.* Winter 1975.

7. *Hearings Before the Subcommittee on Labor,* Committee on Labor and Public Welfare. U. S. Senate. 90th Congress, S2864. Occupational Safety and Health Act of 1968. Feb. 15, June 12, 19, 24, 28 and July 2, 1968. U. S. Government Printing Office, Washington, D.C. 1968 **and** *Hearings Before the Subcommittee on Labor.* Committee on Labor and Public Welfare in the United States Senate. 91st Congress, S2193 and S2788. Occupational Safety and Health Act, 1970. Sept. 30, Nov. 4, 21, 24, 26, 1969, March 7, April 10, 28, 1970. U.

Occupational Safety and Health

By MONROE BERKOWITZ

ABSTRACT: Work accidents became a matter of societal concern in the Progressive era of Woodrow Wilson. When other contingencies of modern life were brought under social security in the New Deal reforms of the 1930s, work accident legislation remained separate. One possible reason was that work accidents can be controlled within industrial and chance limits. But control does not imply elimination since a risk-free environment would paralyze production. In spite of imperfections caused by low benefits and imperfect insurance arrangements, the workers' compensation legislation does help internalize the costs of accidents, but internalization of costs is only one remedy. Regulation and a much broader community responsibility are others. It is argued that regulation poses greater problems and that broader community responsibility may evade the issues involved in choosing the appropriate tradeoff point between production and health which will maximize social welfare.

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WORK accidents and occupational illnesses are different from accidents and illnesses that arise outside the work relationship. The work environment is different from the home or the highway. Workers perform their activities under the direction of management; in a sense accidents are a by-product of the production process. What is intriguing is that the same motivations that bring both management and labor to the workplace might be used to decrease the number of these unwanted events.

Society's responsibility for work accidents was recognized long before risks from other causes became a matter of community concern. It took the depression and the reforms of the New Deal to alter societal perceptions as to the treatment of the risks of unemployment, disability, old age, and premature death. But the workplace has been the subject of regulation since the mid-nineteenth century, and modern workers' compensation statutes date back to 1911. Since work accident legislation came earlier in time, it has a different character than the later legislation. Workers' compensation partakes of the atmosphere, delineated in Woodrow Wilson's Progressive era, of the mutual responsibilities shared by the individual and society.

Protection from the risks of unemployment, old age, and general disability borrows from Franklin Roosevelt's New Deal era when we were confident that the state could solve these pressing social problems. What is interesting is that in spite of the newer social security legislation, work-related accidents remain the province of special state programs administered quite separately from the federal acts.

In this paper, we look at the nature of risks of modern life in general, particularly those at the workplace, and concentrate on how the workplace might be different. We note that societal assumption of risks has meant not only the payment of benefits but has extended concern to ways and means to optimize the number of accidents. Unless safety is a consideration, there would seem to be no good reason to separate out work-related accidents from the other risks of modern life. One could pay accident benefits as part of a general social security scheme. The only reason to separate them would be if there were some way to control these events to a degree that is not feasible in the event of old age and death, unemployment, and nonwork accidents.

Risks of Personal Injury

All of us are at risk. We run the danger of crossing the street and being struck by an automobile, being injured in an earthquake, an elephant stampede, or falling down the stairs in our homes. Yet, we still cross streets, live in San Francisco, visit game parks in Africa, and build two-story homes.

Some people are more risk averse than others. They would just as soon not get involved, even if somebody offered a fair gambling bet where the odds have been scientifically chosen. Such risk averse people cross the streets at intersections, live in earthquake-proof homes if they are located near the San Andreas fault, stay in vehicles in game parks in Africa, and take care to see that handrails are installed on stairs. Others show a higher preference for risk. If the odds are pretty good, they would just as soon take a chance. These people delight in hanggliding

on weekends, climbing mountains, and driving at 70 miles an hour on country roads.

Is it fair to say that if we fall into the risk preference category, we value the thrills of the sport or the savings in time more than we fear the increased risk of personal injury? At any rate it seems quite obvious that the chances of being injured depend on exposure to risk and that the chances can be reduced by avoidance of that risk, or by making modifications in the environment. Whether we avoid the activity or modify the environment, obviously, will be influenced by the cost of avoidance or modification as contrasted to the benefits derived from the activity.

In dealing with accidents, however, we must recognize that chance is an important variable. Running through the thread of countless definitions of what is meant by the term "accident" is the notion of an unplanned, uncontrolled and unexpected event.[1] I may avoid hanggliding and sit at home by the television set and be electrocuted by a faulty home-wired connection. Alternatively, I may indulge in hanggliding or even Russian roulette and emerge safe and unscathed. Chance is important. Accidents which result in personal injuries are random events and, it should be said, comparatively rare events in the work environment. Fortunately, we know something about the distribution that mere chance can bring about, and in that sense, we can take account of these random chance variations. What gives cause for worry is when the number of accidents that occur under particularly defined circumstances is greater than is expected by pure chance variations.

The opportunity we have to do something about work accidents is based on the notion that we can calculate the number of expected accidents and determine whether the number of observed accidents is different than the number that is expected.

Occupational safety and health legislation, workers' compensation legislation, or any other type of employer liability arrangements are not going to do very much to alter the laws of chance. What we hope to do by effective regulation or other type of legislation designed to stimulate management to adopt safe and healthful work conditions is reduce the averages of the distributions which chance brings about. But it is always a reduction from what might be *expected*, given the type of industry activity and the type of people that are involved. In order to take a look at this more closely, we note the basic regularities that we find in the data relating to accidents in general and to work accidents in particular.

Regularities in the Data

Trends in deaths and serious injuries

No matter which country's data we look at we find a long-term decline in accidental deaths and serious injuries in the work environment. Where we have such data, as in the coal mines of Great Britain, the trends are most easily discernible, although similar patterns are found in the United States. In the 1850s

1. An excellent survey of various definitions of an accident can be found in *Review of Industrial Accident Literature* (London: National Institute of Industrial Psychology, 1972), published as one of the research papers prepared for the Committee on Safety and Health at Work in Great Britain, Lord Robens, Chairman.

fatal injuries in the coal mines in Great Britain were running at a rate of nearly four per thousand employees each year. By 1970 they had declined to less than one per thousand employees. Serious reportable nonfatal injuries per thousand employees declined more than 50 percent over the three-quarters of a century since 1908. What is true of coal mining is also true of industry in general. The Robens Committee in Great Britain found that in the decade 1961 to 1970, the fatality rate in factories (the annual rate of fatal accidents per 100,000 employees averaged over a 10 year period) was 4.5, whereas the comparable figure for the first decade of the century was 17.5.

At the same time we must note that there is no such comforting trend in less serious injuries. Trends in less serious injuries are influenced by the type of reporting system and the compensation system in effect.[2] The tendency is not to report less serious injuries unless there are benefits to be claimed. The higher the compensation benefits, the greater the incentive to claim these benefits and hence to report the injuries.

Home versus work

Safety people argue about the comparative safety of home versus work, and in part the argument is about what exposure base ought to be used. It is clear, however, that motor vehicles come first as a major cause of accidental deaths. Nonfatal injuries, however, are different. Although possibly one-third of them occur at work, two-thirds of them do not. Home injuries account for approximately one third of the total and if we add to the home injuries those caused by defective and faulty goods and services we account for more than half of the injuries. The workplace is certainly by no means the most dangerous place to be.[3]

Young versus old

Another regularity in the data has to do with the age of employees. It is the propensity of the young, and particularly young males to injure themselves by accidents. Unfortunately, the same holds true of fatal accidents. A high percentage of industrial accidents occur among male workers under 21 years of age.

Business cycles

There is some 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. The reasons for this are fairly obvious. In periods of prosperity the increased press of work brings additional stress but, just as important, it brings younger more inexperienced workers into the work force. Accident rates tend to fluctuate not only with age of workers, but with time and experience on the job.

Industry rankings

We have unambiguous data relating to the relative stability of industry rankings of accident frequency rates. Certain industries consistently rank at the top as accident producers and others are usually found at the

2. *Safety and Health at Work*, Report of the Committee, 1970–1972, Chairman Lord Robens (London: HMSO), p. 3.

3. An interesting comparative survey of these types of injuries in Great Britain can be found in the *Report of the Royal Commission on Civil Liabilities, and Compensation for Personal Injury*, Chairman Lord Pearson (London: HMSO, 1978); the survey of comparative accidents is in Volume II, "Statistics and Costings," Part III.

bottom. Within manufacturing, for example, timber and wood products, fabricated metal products, rubber and plastic products will rank near the top with the highest frequency rates and apparel and textile near the bottom. When we look at all industrial subdivisions, finance, insurance, real estate, and other largely clerical occupations have relatively few accidents whereas the meat packing, logging, timbering, and coal mining have a great many. Such consistent differences stem from the varying innate or inherent risks in each of the industries.[4]

The same consistency in rankings is true of minor subdivisions within an industry. Within the construction industry, the heavy construction, or tunneling divisions consistently have higher accident rates than say the painting and decorating sections of the industry. These consistencies in rankings show that something more than chance is at work. It suggests that accidents are based on something more than random occurrences.[5]

Size of plant

Accident rates are not independent of the size of the plant. The largest size and the smallest plants have the lowest accident frequency rates as compared to the mid-size firms.[6] Whether this is due to personal relationships in the smaller plants or the existence of organized safety in the larger size plants cannot be proven, but such an explanation is intuitively plausible.

4. U.S. Bureau of the Census, *Statistical Abstract of the United States*, 98th ed. (Washington, DC: USGPO, 1977), Table 687, "Occupational Injury and Illness Incidence Rates by Industry, 1973–1975," p. 423.

5. C. L. Wong and H. J. Hilaski, "The Safety and Health Record in the Construction Industry," *Monthly Labor Review* vol. 101, no. 3 (1978), p. 5.

6. U.S. Bureau of the Census, *Statistical Abstract of the United States*, 98th Edition (Washington, DC: USGPO, 1977), Table 686, "Occupational Injury Rates in Private Industry by Employee Size, Class, Industry Group, 1974 and 1975," p. 422.

Conclusions about the Stability of Data

It is reassuring to note these regularities in accident data. We see a decline over time in serious disabling injuries and fatalities, but note the sensitivity of the trends in less serious accidents to reporting requirements and amounts of benefits available. These are long term trends. We cannot discern these declines in the shorter term such as over the period of the last decade or so. Industry rankings in terms of measures of accidents remain surprisingly stable from year to year. That would indicate that factors other than mere chance are at work, and gives some underpinning to the notion of the efficacy of accident prevention efforts. Something more than chance is at work.

Intervention in the Work Accident Area

If we wish to analyze the effects on society of changes in responsibility for work-related accidents and occupational diseases, we have to note that these first changes took place long ago, in the latter part of the nineteenth century, with the passage of employer liability laws. Society's objectives were rather narrow and designed to change aspects of the common law governing the master servant relationships. Under the common law, the worker was compelled to negotiate with his employer to recover damages as a result of an industrial accident, and

if he could not receive a satisfactory adjustment, then his only recourse was to sue in a court of law. The employer had the advantages that accrued to him by reason of his position, and in addition was aided by several judicial interpretations of common law doctrines. The negligence of a fellow servant or the employee himself could interfere with his recovery. In addition, if it could be shown that the employee knew about the job dangers and, therefore, could be said to have assumed the risks of the occupation, that might defeat his claim.[7]

We can only guess about the developments that may have taken place had the common law been allowed to evolve into the twentieth century with this social outlook. Suffice it to say that the employer liability laws passed by several states did soften these defenses and did allow the employee to recover damages without having to overcome what was thought then to be these rather unfair defenses.

As we look about us today and see what is happening to court judgments in the area of medical malpractice and recoveries for personal injury due to motor vehicle accidents, we might speculate the same liberalizing trends would have occurred in the area of industrial accidents. But as noted above, such developments never matured. Beginning in 1911, New Jersey, Wisconsin, and a number of other states passed workers' compensation statutes. These statutes were modeled generally after those prevailing in England, whose Parliament in turn had copied from the pioneering efforts of Bismarck in Germany. In effect, these statutes abolished the notion of negligence and fault in the area of industrial accidents. Any employee involved in an accident that arose "out of and in the course of" employment, was entitled to benefits.

Neither the courts nor the newly established administrative tribunals under the workers' compensation acts were to inquire into fault or negligence. These recoveries were not to be in the nature of payment for damages but rather payment of compensation based upon wage loss. Since all accidents were to be compensated regardless of fault, the theory was that the compensation should be at a percentage of wages paid, usually two-thirds of the normal weekly wage. In addition, payments were to be made in the event of permanent disability or death, but no recovery was to be had for pain or suffering or other psychic consequences.

Financing the liability

The obligation to pay these specified amounts were set forth in the statute. Certain states, principally in the far West, set up exclusive state agencies to finance the new program, and other states, New York and California, for example, set up competitive state funds to write insurance. However, most states required the employer to secure his liability by purchasing insurance from a private carrier, or in the event the employer could show financial responsibility, he might be allowed to self-insure.[8]

The employer paid an insurance premium based on his industrial

7. Harry Weiss, "Employers' Liability and Workmen's Compensation," Chapter VI, Section III, in John R. Commons, *History of Labor in the United States 1896–1932* (New York: Macmillan, 1935), vol. 3, pp. 565–69.

8. National Commission on State Workmen's Compensation Laws, *Compendium on Workmen's Compensation*, "Security Requirements and Arrangements" (Washington, DC: USGPO, 1973), pp. 243–65.

classification and if he were large enough he might be experience rated. If his experience proved better than expected, he would receive a lower rate, and if worse than expected, he would receive a higher rate than the average for his industrial classification. Thus, some safety incentives were built into the program from the outset. The employer paid a classification rate based upon the average expected number of accidents for employers who were similarly situated. Thus the meat packing industry would pay one rate, the logging industry, another. If the business employed largely clerical workers, it would pay a much lower rate than if it were engaged in metal fabrication where the inherent hazards were higher. Even within those classifications, however, provided the employer was large enough so that his experience was credible, he could receive a differential rate based upon his tested accident experience during the current period.

It is worthwhile to note that this type of intervention on the part of the government was not far-reaching or intrusive. It is fair to say that it was designed to remedy what many perceived to be an obvious evil. Under the common law procedures, some workers received fairly large settlements by reason of their industrial accidents, others nothing, and how much a worker received depended on circumstances that many felt were extraneous to the main problem. Employees involved in industrial injuries suffered losses. The workers' compensation statutes set forth a particular method of sharing these losses. Workers involved in accidents received some continuing stream of income for some period of time. The amounts may not have been as much as they would receive had they been successful at common law, but there was the assurance that they would receive something regardless of fault.

As the laws developed, they did not lose sight of the notion that the employer's activities could influence the number of accidents within limits defined by chance and the innate hazards associated with his industry. It was acknowledged that the employer was able to modify his environment and thereby reduce the number of accidents. In order to provide incentive for him to undertake such activities, he was subject to both classification and experience rating.

Possibly one reason why this contingency was not brought into the social security fold was the conviction that accidents can be controlled in both number and type. The system of workers' compensation, with its private insurance financing and experience rating, presumably was designed to give these incentives to employers to provide safe and healthful working conditions.

Safety technology

Assuming that there exists some sort of safety technology which is effective in controlling accidents, that it costs the firm money and presumably that it affects the level of safety, the question then becomes how much of this safety technology should be adopted? If a slower speed of production will reduce accidents, the slower the speed, the fewer the number of accidents. But slower speed means less production and probably a higher cost for each item. If the firm is rational (interested in its profit picture at the end of the year), then it may find it wise to invest in safety technology until the last dol-

lar spent results in a dollar saved in accident costs.

Granted that these accident costs are shared and that motivations are blunted by insurance and the pooling of risks, yet some type of classification and insurance system at least points in the direction of imposing costs of these accidents on management. Imposition of these costs should influence management to adopt a type and level of safety technology so as to reduce these charges. Increases in the amount spent for safety should result in lower accidents and consequently lower insurance rates.

Benefit levels

Although theory demands imposition of full costs upon management, the laws always provided for some cost sharing; yet, over the years the laws became outmoded. Benefits fell behind increases in costs of living and wages. The results were inequitable from the workers' point of view and since full costs were not met by management, the safety incentives were dulled. The villain in the piece was largely the weekly maximum rate written into the law which made a mockery out of the requirement that two-thirds of wages be paid in compensation benefits.

Fortunately, many of the states have now modernized their laws, largely under the impact of the recommendations of the National Commission on State Workmen's Compensation Laws. The Commission recommended that benefits be two-thirds of wages and that the weekly maximum be set so that the worker who makes at least the average wage would receive the statutory benefits.[9] Unhappily, not all states have responded to the challenge thus making federal intervention in the area of minimum standards a possibility.[10]

Is social security disability legislation the road for workers' compensation legislation to travel? Would it be simpler to have the federal government administer the entire program and pay benefits to workers in accordance with some uniform national standard and to finance the costs out of general taxation?

The answer has to be affirmative if one is willing to give up whatever advantages accrue to society by reason of incentives that workers' compensation gives firms to minimize the number of accidents.

Community Responsibility

It may be, however, that a different analysis ought to be applied to this situation. In one sense, accidents are caused by individuals working in particular environments, some of which can be made safer than others. However, if we look at the philosophy of a man such as Sir Owen Woodhouse, author of New Zealand's Royal Commission report, which produced its comprehensive accident compensation statute:

> It is society itself that has built up and encouraged the heavily risk laden activities that exact a known and expected cost of life and limb. I speak of the use that we all make of motor transport on the one hand and the essential nature of industrial production on the other.[11]

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9. National Commission on State Workmen's Compensation Laws, *Report of the National Commission on State Workmen's Compensation Laws* (Washington, DC: USGPO, 1972), pp. 56–57.

10. Statement of John F. Burton, Jr., on S.3060, the "National Workers' Compensation Standards Act of 1978," Before the Labor Subcommittee of the Senate Committee on Human Resources, 22 September 1978.

11. Sir Owen Woodhouse, "National Compensation and the Insurance Industry," an address delivered, Panang, 19 August 1977, mimeo.

Woodhouse speaks of "statistically inevitable" victims of accidents and the heavy responsibility upon the community to share in some way the burden that falls upon those that become the random casualties. In his view, once society as a whole has accepted the need to support certain groups of injured persons, it cannot be right to exclude others with equal problems who, like their fellow citizens, have been contributing to the general funds. "The notion of community responsibility carries with it as a natural collinear the principle of comprehensive entitlement."[12]

Underlying the whole of the Woodhouse report is the notion of benefits and entitlement as a matter of right, and community responsibility as the key to the development of a modern system of social welfare. Woodhouse argues that the private insurance industry is bound to face problems with escalating costs and increasing claims. He sees complete disengagement as the only sensible commercial course for the industry to pursue. Escalating requirements for premium income will cause the system to break down under its own weight, precipitated no doubt by rebellion on behalf of those who are expected to provide the premiums. In his view, despite the evident problems of transition, the future destiny of the insurance industry is surely not in the field of social welfare.

Societal Responsibility and the Market

Conceding the indictment that has been made and the problems which have been identified, the question is whether a public enterprise would be better prepared to deal with them. Should an increasing portion of the tax dollar go for these particular benefits? The identification of very real unanswered problems in the private sector does not necessarily mean that solutions will be forthcoming quite magically once the state assumes responsibility. Difficult questions of social choice are involved in any accident compensation scheme and they may be by-passed but not solved by the recommendation that the state assume full responsibility.

The questions remain: How many accidents is society prepared to absorb? How many resources should go into safety and prevention? As Gaskin notes, at one time it was thought that the state could supply the answer, but because of the difficulties many academic writers began to feel that the market is ideally suited to answer these questions. He believes that perhaps now the circle has turned again as a number of doubts are being raised about market solutions and economic approaches.[13]

What seems to be ignored in these analyses which contrast market responsibility and state responsibility are the inherent differences between the workplace and the highway or the home. There is no readily available way to bring market forces to bear on the number of accidents on the highway or in the home. On the other hand we do have a chance to allow market tactics to function in the work environment. We have a chance of internalizing the costs of the accidents to the employer and thereby at least approaching an answer as to how many accidents to have and how many of the nation's

12. Ibid., p. 5.

13. Richard Gaskin, "The Option in Tort Law Reform: A Survey," in Jane C. Kronick, project director, *Community Responsibility: The New Zealand Accident Compensation Act as a Value of Response to Technological Development*, U.S. National Science Foundation Report, 20 January 1978, pp. 21–29.

resources ought to be devoted to preventing them.

The evidence of the variability in accident frequency rates among firms within an industry, as well as the evidence of stability in differentials between industries, argue that such a safety technology is available. It could be utilized, provided the appropriate incentives were given to firms to make decisions which will be optimal from their point of view. It also depends on costs being internalized so that the individual firms' decisions are optimal from the point of view of society as a whole.

The Sensitivity of Claims to the Benefit Levels

Old age is a matter of chronology as far as the social welfare system is concerned. Retirement may come at age 65, or before, and obviously the number and type of these retirements will be sensitive to the benefits that are paid. Death, of course, is a contingency which comes to us all and, problems of suicide aside, poses few problems in the way of moral hazard.

The number of work accidents, however, are subject to the effects of safety technology on one hand and quite sensitive to benefit levels on the other. The latter sensitivity cannot be understood as a matter of malingering or dishonesty on the part of the workers. It is simply confirmation of the fact that the number of claims that will be filed for less serious injuries is not independent of the rate of compensation benefits for those injuries. If workers suffer little monetary loss by being off work, one should expect to see an increase in the number of claims that are filed. In part, this stems from the difficulties of defining a state of disability and, in part, from the fact that in the case of some minor injuries, the worker could or could not continue working depending upon his subjective evaluation of the severity of the injury, and his evaluation of his alternatives.

Administrative problems

In short, there is a real need for competent administration of these claims for benefits. The effects on society arising from the assumption of the responsibility for work injuries cannot be discussed independently of the nature of the administration of whatever benefit program is set up. It so happens that work accident legislation is a rather difficult program to administer. The early state laws were fairly clever (realistic) in this respect in that they did not expect state administrators to do very much in the way of administration. Administration was left largely in the hands of the private insurance carriers and the assumption was that a type of adversary relationship might aid in the administration of these claims.[14]

According to investigators of the program, things may have gone too far. The assumption of a self administering system bumped into the difficulties involved in evaluating the nature and extent of permanent disabilities, and obviously there is room for a great deal of reform in this area. Whether privately administered or administered by a federal agency, the problem is the same. No one has yet discovered the ideal way to relate a physical impairment or a state of disability to a finite sum of money. At least the present system in the United States workers' compensation systems has the advantage of

14. Monroe Berkowitz, "The Processing of Workmen's Compensation Cases," Department of Labor, Bureau of Labor Standards, Bulletin 310 (1967), p. 4.

pluralism with some 50 odd different solutions. But we may be paying too high a price in terms of the inequalities suffered by workers in terms of differences in benefits for identical injuries in the several states.

Another unsolved problem has to do with occupational illnesses. Newspapers carry daily reminders of the deadly effect of industrial carcinogens. We do not yet have an adequate data base to evaluate the long term effects of working with various toxic substances. Yet it becomes increasingly evident that the effects of working with asbestos or lead can be debilitating even though the diseases may not manifest themselves until 10 or 20 years after initial exposure. There are grave doubts that a private system of workers' compensation, with its characteristic of assigning responsibility to a particular employer's experience of a particular year, can accommodate to the phenomena of slowly developing occupational illnesses. Given the long latency periods and the confusion as to etiology, a system which depends upon fixing responsibility on a particular employer's account may not survive. Yet solutions are not immediately obvious. To change to a system of benefits paid under a philosophy of broad community responsibility will not solve the problems of causation. If causation is deemed to be irrelevant, then of course we are into an entirely different area where we must face the issue not only of a general health insurance but income benefits to those who are ill due to nonoccupational as well as occupational causes.

Regulation

At this point the worker can be excused for impatience if he feels that the world is being made too complicated. Why should any industry be allowed to use toxic materials which shorten the life of those exposed to them? Why should any machine go unguarded? Why should not all the safety technology that engineers can dream of be installed forthwith?

The matter can be pushed too far. Obviously, the safest work environment may not be productive enough to survive. Regardless of how the matter is stated (trade unions tend to talk about cannibalizing the worker and management people about benefit-cost margins), all recognize that some tradeoffs are involved.

It is not only possible but quite usual and traditional for the state to regulate safety and health at the workplace. Massachusetts enacted a law requiring the safeguarding of machinery, hoists and elevators as early as 1877, with New York passing similar legislation a decade later. When the seventh annual conference of the International Association of Factory Inspectors was held in Chicago in 1893, there were 14 states and provinces with factory laws and 110 inspectors.[15]

Health

The maintenance of health as well as safety became a matter of state government concern quite early. The first report on occupational health hazards appears to have been written in 1837, and by 1910 the American Association for Labor Legislation called the First National Conference on Industrial Disease.[16]

Those of us who follow the controversies about lack of enforcement of standards promulgated by the administrators of the 1970 Occupa-

15. Don D. Lescohier, "The Campaign for Health and Safety in Industry," Chap. 19, in *History of Labor in the United States 1896–1932*, pp. 359–70.

16. Ibid., p. 361.

tional Safety and Health Act (OSHA) can be forgiven for believing that industrial hazards are a new concern at the federal level. But President Taft recommended use of the federal taxing mechanism to outlaw, in effect, the production of phosphorous matches after their deleterious effects were dramatized in a report by John Andrews.[17]

It would be foolish to contend that direct regulation has no role to play in safety and health at the workplace. But we must also recognize the problems and the limits of such regulation. OSHA was ushered in with high hopes that federal intervention would solve many of the pressing problems and bring a safe and healthful workplace into being. But the problems proved formidable.

Each employer is required to comply with standards promulgated by the Occupational Safety and Health Administration and has a general duty to furnish employees a job "free from recognized hazards that are causing or likely to cause death or serious harm." The type of standards to be set has plagued the administrators who have been criticized for being too stringent at times and too lenient at other times.

The bulk of OSHA's safety rules were adopted in 1971, a few months after the agency was created. For the most part these were based on the voluntary job safety standards adopted by industry known as consensus standards. OSHA now admits many of these were unsuited for governmental administration and were slated for discard. Newer standards are to be based on eliminating "real causes" of accidents; they are to be simpler and easier to understand, administer and meet.[18]

No one can quarrel with these objectives and only the future can tell the extent to which they can be met. The problems are technical and difficult. They involve tension among groups with widely different attitudes; they involve tension between creating some ideal environment and what is feasible from an engineering point of view (relatively non-controversial); and also what is desirable from an economic viewpoint (very controversial).

The Industrial Union Department of the AFL-CIO criticizes an economics approach. "Since it is generally cheaper to let easily replaceable workers die than to reduce risk below unnecessary levels, when methods of cost-benefit analysis are used, the worker's life is sacrificed. . . ."[19]

Yet the IUD admits that there is no such thing as a "risk-free environment" and when OSHA determines a standard it must somehow arrive at specific levels of substances that satisfy both sides, that allow industry to operate and products to be produced at price levels which consumers find attractive.

Under the OSHA 1978 lead standards, industries are given from one to three years to reach an interim standard of 100 microgram level of lead per cubic meter of air, averaged over an eight-hour day and from one to ten years to reach 50 micrograms. The new standard provides for examinations of exposed workers to determine blood lead levels and for the removal—without

17. U.S. Bureau of Labor, *Phosphorus Poisoning in the Match Industry in the United States*, Bulletin No. 86 (January 1910), pp. 31–144.

18. Eula Bingham, "OSHA Wants Your Ideas," in *IUD Spotlight on Health and Safety*, Fourth Quarter (1978), vol. 7, no. 4, p. 3.

19. *IUD Spotlight on Health and Safety*, Fourth Quarter (1978), vol. 7, no. 4, p. 2.

loss of seniority, status or pay—of workers with elevated blood levels.

The controversial nature of such standards is illustrated by the fact that the Lead Industries Association and the United Steelworkers union rushed to be the first to contest the standards in the courts. The Association protested the stringency of the standards and the union filed suit to tighten them.

But controversy is to be expected and is not in and of itself undesirable. The real vice may be inherent in any standard-setting approach, which is necessarily rather rigid, applicable to all firms regardless of position and dependent upon a sophisticated inspection effort which most regulatory agencies do not seem capable of sustaining for long periods of time. Robert Stewart Smith argues that government should seek to provide that amount of safety and health which workers would provide for themselves if they did not have an employer standing between them and what we have called the safety technology.[20]

A Concluding Note

Societal systems for dealing with work accidents and illnesses remain quite separate from the general social security mechanism. One reason for separate treatment is that economic motivations can be used to control the number and type of accidents which occur at the workplace.

If we can choose, within limits, the number of accidents we wish to experience, then any system, public or private, cannot evade the difficult matter of choosing the tradeoff point between production and safety. Maintaining a separate work accident system keeps alive the possibility that economic motivations, implicit in our industrial organization, can be used to make such claims.

Of course there are alternatives in the form of increased regulation or broader community responsibility. We have traveled far down the road of regulation. OSHA standards, of necessity, are controversial, rigid, difficult, and expensive to enforce. The mood of the nation in the 1980s may not be conducive to more regulation, and that may reemphasize the benefits to be gained by making work accidents and illnesses expensive enough to the employer so that he chooses to have fewer of them.

The problems of choosing the tradeoff point between production and health will not disappear by waving the magic wand of regulation or legislation. The politicians may have to learn to say publicly what all parties concede privately. We cannot live in a risk-free environment and continue to enjoy the fruits of a dynamic economy. We must take advantage of the systems now in place which are capable of maximizing social welfare by deciding on the optimal amounts of resources which should be devoted to safeguarding the working environment.

20. Robert Stewart Smith, *The Occupational Safety and Health Act: Its Goals and Achievements* (Washington, DC: American Enterprise Institute for Public Policy Research, 1976), p. 3.

Workers have new rights to health and safety

Front-line supervisors must learn the latest rules

by John J. Hoover

There is an emerging area of conflict that grievance procedures may do little to resolve—conflicts involving occupational safety and health disputes. While grievance procedures usually are found in unionized firms, the problem of safety and health disputes is broader in scope and also encompasses non-union firms.

In recent years, the importance of working in a safe and healthful environment has increased significantly. Unionized and non-unionized workers have refused to work when subjected to unsafe working conditions.[1] In unionized firms, such strikes have occurred during the term of valid collective bargaining contracts that contained no-strike and grievance/arbitration clauses.[2]

Superficially, these walk-outs may appear to be illegal. But in a number of situations they are quite legal, and the incidence of safety and health walk-outs is likely to increase. Here are some reasons why:

- Labor's strong negative reaction to the Reagan Administration's proposals to relax occupational safety and health standards;[3]
- The Supreme Court's decision in *Marshall* v. *Barlow*,[4] which limited the Occupational Safety and Health Administration's power to inspect the work place;
- The Supreme Court's ruling in *Whirlpool Corp.* v. *Marshall*,[5] which legitimized the limited right of employees to refuse unsafe work;
- The existence of a rather intricate body of case law that applies Section 502 of the Labor Management Relation's Act to safety and health walk-outs, and protects workers' rights in this regard if certain criteria are met.

So, it has become particularly important for managers to understand which conditions give workers a right to walk off the job or refuse to work.

According to the Supreme Court, there are three sections of law under which workers' right to walk off the job in safety disputes is protected: 1) Section 502 of the Labor Management Relations Act (LMRA); 2) Section 7 of the same law; and 3) Section 660(C) 1 of the Occupational Safety and Health Act (OSHA). What follows is an analysis of law cases pertaining to the precise circumstances under which workers have this right. In the interest of brevity and clarity, only the most significant facts of each case will be discussed.

Legal precedents

Title V, Section 502 of the Labor Management Relations Act (1947) states:

> ...nor shall the quitting of labor by an employee or employees in good faith because of abnormally dangerous conditions for work at the place of employment of such employee or employees be deemed a strike under this Act.[6]

The first significant case dealing with the interpretation of Section 502 in relation to a refusal to work in an unsafe environment was the *National Labor Relations Board* v. *Knight Morley Corp.*[7] Knight Morley provides the foundation for subsequent decisions, which only modify the ruling in this case. It also pro-

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vides insights into the conditions which, the courts feel, justify a safety walk-out.

A fire destroyed a switchbox that controlled a blower in the buffing room in a Knight Morley plant. When in operation, the blower removed dirt and other abrasives that were thrown into the air by the buffing process. When the new switchbox was installed, the wires were crossed, causing the fan to run in reverse. Employees working the second shift informed their shop steward and union president that the fan was blowing dirt and other abrasives in their faces.

The union officers brought the complaint to the attention of the buffing room foreman and the company president. The president made a cursory examination of the buffing room, noting that the smoke from his cigar was being drawn toward the fan. Based on this inspection, he concluded that the fan was operating properly.

The buffers, through their union representatives, asked permission to leave work. The request was denied, and the workers were informed that anyone who left the plant would be fired.

If a good-faith belief is not supported by objective evidence, employees who walk off the job are subject to employer disciplinary action.

Workers win

Despite the warning, all of the individuals working in the buffing room walked out. It should be noted that the collective bargaining contract did contain a no-strike clause. The company's president subsequently examined the blower, discovered that the wires were crossed, and corrected the situation. When the buffers reported to work, they were told they were terminated. The union filed an unfair practice charge with the National Labor Relations Board. The Board ruled that the employees' conduct was protected by Section 502, since they had left work in good faith due to the presence of abnormally dangerous working conditions, and that under these circumstances the "no strike" clause was immaterial.[8] The Board's opinion was upheld by the Circuit Court of Appeals, which found that:

- A walk-out under Section 502 is legal, even if there is a no-strike clause in the collective bargaining agreement;
- It is an unfair labor practice to interfere with the right to walk out;
- All that is necessary to justify a walk-out under Section 502 is a good-faith belief by the affected employees that working conditions are abnormally dangerous;
- Employees are competent to testify as to the physical conditions they observe;
- Industrial hygienists are competent to testify pertaining to the etiology of disease.[9]

Thus, *Knight Morley* established a precedent protecting workers' right to walk out under certain conditions when health is endangered.

The effects spread

That ruling was strengthened by the decision of the Supreme Court in *NLRB* v. *Washington Aluminum Co.*,[10] which dealt with the application of Section 7 of LMRA to safety disputes. This section of the Act states that: "Employees shall have the right...to engage in other concerted activities for the purpose of collective bargaining or other mutual aid and protection..."

This decision calls attention to a misconception that many managers have, that the LMRA applies only to union-management relations. On the contrary, this portion of Section 7 provides protection to all employees who engage in concerted activities for their mutual aid and protection, whether or not a union is involved.

Non-union employees of Washington Aluminum Co. walked off the job, claiming that it was too cold to work. The central heating system was broken and the temperature outside ranged from 18 degrees to 22 degrees F. Each employee who left work was terminated for violation of a company rule forbidding employees to leave the plant without prior permission of the foreman.

The employees filed an unfair labor practice complaint, and the NLRB ruled that their conduct was justified under Section 7—and that the company had committed an unfair labor practice for interfering with this right. The Fourth Circuit Court overturned the Board's findings because, since the walk-out was a direct violation of a company rule, it was not protected under Section 7. On appeal, the Supreme Court upheld the Board's decision, using the identical rationale that the NLRB had used.

Although the primary significance of this case is that it pertained to a non-union company, the Supreme Court upheld two of the legal points established by *Knight Morley*: that

employees have a right to walk off the job when unsafe working conditions exist, and that it is an unfair labor practice for an employer to interfere with this right.

Since the Court decided the case based on the testimony of employees concerning the physical conditions in the plant, it implicitly upheld their competency to testify in this regard. The other legal points established by *Knight Morley* were not involved in *Washington Aluminum*.

Arbitration v. walk-outs

The question of arbitrability v. a walk-out in face of unsafe working conditions was specifically addressed for the first time in the case of *Philadelphia Marine Trade Association (PMTA)* v. *National Labor Relations Board.*[12]

Members of a longshoremen's local refused to unload cargo using pallets rather than slings because they thought it was dangerous. These employees were subsequently locked out. Two weeks later, the employer ended the lock-out and agreed to submit the dispute to arbitration. The arbitrator observed the unloading process and ruled that it was dangerous. The union filed an unfair labor practice charge, claiming that the locked-out workers should receive back pay.

Both the NLRB and the Circuit Court of Appeals awarded back pay, and indicated that the walk-out was protected by Section 502 despite the existence of an arbitration clause. Thus, a seventh legal point can be added to the six previously developed by the board and the courts in the interpretation of Sections 502 and Section 7 of the LMRA. That is, that employees' rights to legally walk out are not modified by the existence of an arbitration clause.

Good faith v. objective evidence

The first Circuit Court of Appeals case to depart from the interpretation that a good-faith belief is all that is needed to justify a walk-out, is that of *NLRB* v. *Frunin-Colnon Construction Co.*[13] In this case, miners walked off of a job under a good-faith belief that working conditions were abnormally unsafe. But testimony before the First Circuit Court of Appeals revealed that their belief was not true.

Frunin-Colnon replaced the "good-faith belief" doctrine with that of "objective physical evidence". The court pointed out that employees who walk out under Section 502 run the risk of being discharged if their good faith belief is not supported by the physical facts.[14] In addition, the court called attention to the lack of expert testimony in establishing the degree of danger present. Thus, the Eighth Circuit Court of Appeals changed two of the previously established precedents:

- A "good faith belief" must be supported by "objective physical evidence".
- Although employees are competent to testify as to the physical conditions they observe, expert testimony is of critical importance in establishing the existence of "abnormally dangerous working conditions".

The most recent case dealing with the application of Section 502 is that of *Gateway Coal Co.* v. *The United Mine Workers of America.*[15] As a result of foremen making false entries in their logs, the accumulation of gas significantly increased the probability of an explosion. The union called a meeting, at which the members voted unanimously to refuse to work under those foremen. The next day, the foremen in question were suspended, but subsequently returned to work despite the fact that criminal charges were pending against them.

It is an unfair labor practice for an employer to interfere with activity protected under Section 502.

The miners immediately walked off of the job. The company offered to submit the dispute to arbitration and the union refused. An injunction was issued, ordering the miners to return to work and submit the dispute to arbitration. The employees honored the injunction and the case was submitted. The arbitrator ruled that retention of the foremen did not represent a health hazard.

The union appealed the issuance of the injunction to the Third Circuit Court of Appeals. The Court reasoned that if employees believe dangerous conditions exist, there is no sound reason for them to subordinate their judgment to that of an arbitrator. The Court emphasized that, regardless of the degree of impartiality of the arbitrator, the arbitrator is not staking his life on the decision.

Gateway Coal appealed to the Supreme Court, which found that a work stoppage that is called to protect workers from "immediate danger" is authorized by Section 502. The Court decreed that such a work stoppage is not enjoinable, even when employees have agreed to a comprehensive no-strike clause.[16]

The Supreme Court upheld the decision of the Circuit Court in *Knight Morley* case by ruling that in order to justify a contractually prohibited work stoppage, Section 502 requires that "ascertainable objective evidence" must be presented to support the conclusion that "abnormally dangerous" working conditions exist.[17]

Citing *Philadelphia Marine Trade Association*,[18] the Supreme Court indicated that if " ascertainable objective evidence" does exist, a walk-out is a protected activity under Section 502, despite the fact that the collective bargaining contract contains an arbitration clause.[19]

Since *Gateway Coal* is the most recent Supreme Court case dealing with walk-outs in safety and health disputes, the precedents currently in force in this regard are:

- "Ascertainable objective evidence" must be presented to support the contention that abnormally dangerous working conditions exist.
- If "ascertainable objective evidence" is presented, a walk-out under Section 502 is legal regardless of the existence of a no-strike and/or an arbitration clause.
- It is an unfair labor practice for an employer to interfere with activity protected under Section 502.
- Expert testimony is critically important in establishing the presence of abnormally dangerous working conditions.
- Industrial hygienists are competent expert witnesses in establishing the existence of abnormally dangerous working conditions.
- If a good-faith belief is not supported by objective evidence, employees who walk off the job are subject to employer disciplinary action.

Rights under OSHA

Section 660(C)1 of OSHA provides protection for employees who file complaints with OSHA. Secretary of Labor Ray Marshall issued a directive interpreting this section as protecting employees who refuse to work in dangerous conditions from being discharged. According to the secretary's directive, a refusal to work is legal if:

1) The employee's fear is objectively reasonable;
2) The employee sought correction of the dangerous condition;
3) Resorting to normal enforcement procedures is inadequate.

In *Whirlpool Corp. v. Marshall*,[20] the Supreme Court upheld Marshall's interpretation of 660(C)1. The Court reasoned that, on occasion, employees may justifiably believe that the statute does not sufficiently protect them from death or serious injury. The *Whirlpool* decision relied heavily on the preventive orientation of OSHA by indicating that it would be anomalous to interpret the Act as prohibiting an employee, with no reasonable alternative, from withdrawing from a work environment he reasonably believes to be dangerous.[21] As in the case of walk-outs under Section 502, the Court specified that an employee runs the risk of discharge or reprimand if he acts in reliance on the regulation and it is subsequently determined that he acted unreasonably or in bad faith.[22]

Know the rules

Managers of unionized firms must be made aware of the fact that the existence of a collective bargaining contract that contains both no-strike and grievance-arbitration clauses does not provide protection against a safety walk-out, if there is objective evidence that abnormally dangerous working conditions exist.

Managers of non-union firms must be cognizant of the fact that their workers' right to walk out in the face of hazardous working conditions is protected by the LMRA as "other concerted activity for mutual aid and protection." Whether the firm is unionized or non-unionized, to interfere with employees' rights in this regard is an unfair labor practice.

Since supervisors usually will be the first level of management involved in a safety and health dispute, it's important they are aware of the circumstances under which safety and health walk-outs are legal. It's advisable to provide training for front-line supervisors in this regard. This is particularly true in the unionized setting.

Supervisors are used to handling complaints through the grievance procedure and are likely to believe that, given a no-strike clause, all walk-outs during the term of the collective bargaining contract would be illegal.

The role and status of safety and health specialists within personnel departments should be upgraded. In order for walk-outs to be legal under either Section 502 or Secretary Marshall's directive, the working conditions must be objectively dangerous. It is the safety and health specialists who are in the best position to make this determination. If the firm operates on more than one shift, such a specialist should be present for each shift. If this is not possible, he should be on call to handle emergency situations.

And if workers walk out walk out when, in the view of the health and safety specialist, working conditions are not abnormally dangerous, his testimony will be given great credence in court.□

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2. *Gateway Coal Co. v. The United Mine Workers of America*. 94 S. Ct. 641.
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WE'D REALLY RATHER STAY HEALTHY

Workers are smart enough to care about a safe job environment, no matter what the bosses say.

by Peter Bommarito
President, United Rubber, Cork, Linoleum and Plastic Workers

When the late Sen. Hubert Humphrey introduced a bill to create a federal safety program in 1949, he was responding to a very deep-seated need which was long felt by workers: safe working conditions. Two decades later, when the labor movement finally achieved passage of the Occupational Safety and Health Act, that was the attainment of only the latest stage of a bitter struggle often ignored or historically misstated, a struggle that is the key to job satisfaction.

The key argument of management in the current controversy over OSHA proposals to control cancer-causing chemicals in the workplace—for example—rewrites this history. Often quoted is Dr. William Lowrance, whose concept of "acceptable risk" summarizes the position of the employers:

> It has traditionally been accepted that pursuing one's trade will almost inevitably bring a peculiar set of risks, and further, that such risks *may allowably be greater than for nonoccupational activities.* This attitude has strong historical momentum . . . Although people have always tried to reduce their work hazards, systematic effort has been made only in recent years and even then in a few prosperous countries . . . A remarkable change in attitude. . . .

Lowrance goes on to state that it is "generally agreed" most industrial accidents (and even a large number of illnesses) are precipitated by *"ignorance, absentmindedness, negligence and foolhardiness."*

In a nutshell, Dr. Lowrance is arguing that workers are satisfied with the levels of risk found in the past and that these risks are acceptable to the worker now, a thesis supposedly proven by the persistence of the hazards and his belief as to their primary cause: the workers' own behavior.

The facts are that there was never historical acceptance of most workplace risks. Workers have always understood and distinguished between different levels of risk made necessary by their varying ability to recognize and control hazards at any one time. There has, indeed been a change of attitude, but not in acceptance. The change has been decreased apathy and inaction as workers slowly increased their ability to recognize and control hazards, many of which they have always faced. While these hazards do indeed have a behavioral element, it is not an element explained by the fable, perpetuated by management, of the stupid, accident-prone worker.

William Tarrants, president of the American Society of Safety Engineers, rejects Lowrance's absurdity in no uncertain terms: "Instead, I would say that it is generally agreed that most accidents are associated with *multiple* causal factors, some relating to the actions of people."

On the causes of occupational illnesses, whether we are speaking of asbestos or welding fumes, I would add my own observation that in the workplace the primary cause is widespread ignorance in labor, management, government and academia compounded by negligence (often criminal).

The attitudes that do persist historically are highlighted when one seeks the historical roots of management's behavior and the concept of workers' risks acceptable to management. It was summarized in 1930 by H. W. Heinrich: "undesirable traits of character . . . passed along through inheritance."

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Management believed then, and apparently now, that a factor in accidents is a worker's ancestry and social environment.

This is an attitude generated in workers' compensation cases. Even before the time when Heinrich wrote, real scientists had pinpointed the problem.

Writing in 1910 in *Work Accidents and the Law,* Crystal Eastman explained the normal tendency of the time in cases of fatal industrial accidents:

> The witnesses are employees of the company, including almost always the superior of the man killed. It is to his interest first to clear himself of all implication; second to clear his employer. The easiest and safest way of accomplishing these ends is to blame the dead man.

Eastman went on to explain what she considered to be the major causes of industrial accidents.

> . . . in the condition and environment of those in "dangerous occupations," there are often influences working to weaken the power of attention. The speed and intensity of the work, the heat and noise of the place, the weariness of the workers—all these things tend to numb the faculties most needed for protection. . . .

William Green, in 1926, speaking for the AFL, summed up the reality of the times very well: "Both (accidents and industrial diseases) are due to work environment. Both result in disability, differing only in rapidity of development."

Nothing much has changed either in the real-life situation or in employer attitudes since the early days of the American industrial enterprise. The Insurance Company of North America, in an advertisement in the *Wall Street Journal* of May 12—written to sell compensation insurance—spouts the same old line: "problem employees," "human error." That is the message employers want to hear. It's a message that sells insurance. But attempting to control the worker, rather than the work environment, inevitably means the generation of psychological and social stresses that destroy the possibility of meaningful satisfaction on the job.

A survey of working conditions as they are related to job satisfaction by the University of Michigan and the Department of Labor in 1970 (while the OSHAct was being passed tells something about the perception workers have of the workplace. The investigators studied 19 areas of concern to workers. Economics, psychological, discriminatory and physical problems were ranked by workers themselves in terms of what they wanted solved on the job.

Consistently with the entire history of work, the investigators found that becoming ill or injured on the job was regarded as most important, followed by concern for economic hardships that result from job-related illness or injury. Unpleasant working conditions ranked ninth. Wages and fringe benefits were secondary. Working under "pleasant" conditions was less important in terms of job satisfaction than having a supervisor who cared about his employees and provided assistance in solving problems on the job (the chief of which was safety).

In a study that could have been done in the United States with similar results, health problems were spotlighted by workers in Bremen, Germany, as the greatest strains imposed on them at work. Based on a survey conducted by Bremen University, German workers rank boredom and monotony below noise, heat, dust and other problems related to lifting and posture. This data is consistent with studies in Sweden. There is nothing unique, then, in the American worker's understanding of the problem.

How does the worker's perception of the workplace fit the reality? In 1970, about 11 million on-the-job episodes occurred in which someone was injured. About 12,000 deaths resulted from these injuries. About 100,000 "excess deaths" from work-related chronic disease occurred. Most of those deaths from disease resulted from exposures to toxic chemicals and physical agents that began or occurred in the early 1940's. We are just now beginning to see the effects of exposures in the late '40's and early '50's. Informal government estimates now calculate that the estimated "excess deaths" from occupational disease may be doubling.

As tragic and supportive of worker's perception of the workplace as these figures may seem, they don't describe the whole picture. They describe the injuries and diseases (explosions, cave-ins, cancer) that are most obvious to the scientists, but they tend to discount cases of sickness and death that, because they are easily confused with emotional problems and with the aging process, are seldom studied.

Just in the last few years, we have witnessed many workplace episodes that started with emotional problems of workers—such as concern over miscarriages, impotence, lack of sleep, co-ordination, forgetfulness—only to find that they were related to solvents, lead, mercury, pesticides and chemicals used in plastics manufacture. These were not problems solved by the introduction of muzak or fun and games at lunch time. They were solved by ventilation, substitution of less hazardous materials, and safer practices.

Problems associated with the aging process may be the most devastating of all: job-related nerve-muscle-bone disease that reduce the ability of the worker to work safely at the same time that they slowly but surely create permanent disability.

In these days of anti-inflationary screeching, mostly aimed at the labor movement, it is important to understand the economic impact of preventable "neuromusculoskeletal" diseases.

One of the nation's leading scientists in this field, Dr. Erwin Tichauer, estimates that the annual cost of these diseases is $19 billion to $39 billion, an amount equivalent to 5 to 15% of our national budget. More important, it is the price our industrial enterprise pays for poor design (not counting the incalculable suffering and shortened lives of workers).

In a little-noticed paper delivered to the National Safety Council in 1975, Dr. Richard Addison calculated that each year 700,000 workers lose time from back injuries alone, at a cost to us of $1 billion.

If, as a society, we really wanted to control inflation, we would focus on the costs of inefficiency, costs such as these. If we really wanted American products to be competitive with foreign goods, we would not relax our workplace standards—as is suggested by the Department of Commerce and the Council on Wage Price Stability—we would tighten them.

In a recent plant investigation, Dr. Tichauer found that an electronics firm with 500 employees—at a cost of more than $8 million—decided to fully automate their labor-intense operation in response to rising (50%) medical costs and dropping production. The problem was that the basic operation (involving the hands) was resulting in painful inflamation of the tendons and muscles of the hand and wrist and an extremely painful and disabling condition called carpal tunnel syndrome. (This one disease, nationally, accounts for 40% of all diseases of the hand.)

The investment didn't pay off. The response of the workers to the inflexibility of the new machinery only reduced productivity further. Sales continued to drop as costs and prices rose.

When Dr. Tichauer arrived on the scene he was told to look at the new automated process. Instead he looked at the job that had to be done. The consequence was that he re-designed the old hand operation. Some of the changes were amazingly simple; adjusting chair heights and changing work practices so that the wrist of the worker did not have to be bent downwards.

Bending the wrist down while twisting it outwards against resistance while using pliers for only a few minutes each day creates little harm. On the assembly line, where this was being done to loop wire, disease was being generated.

Having followed through on that suggestion, the company found stress decreased while production increased. The automated equipment was replaced by people and put under dust covers. Production, and profit, have put the company in the black. This was a case in which it was healthier for the worker and the company to design an operation to be labor intensive, rather than technologically intensive, provided that the process is designed around the worker.

In another earlier study of a similar problem in another electronics plant, Dr. Tichauer's solution was to bend the pliers, not the wrist.

Similar case studies, ranging from the effect of vibration on typists' accuracy, to the reduction of pilot performance by poor seat design, to assembly line slow-downs resulting from the poor position of material being assembled relate safety to health to efficiency to profits.

As productive as this approach to the workplace appears to be, it remains largely unrecognized. It comes as no surprise then, that Tichauer estimates the aging of as many as four million people with arthritis is accelerated by the way in which their work is performed.

The real problems of job satisfaction are irretrievably found with the fact that, by 1980, 22 million workers may have some work-related disability. The social-psychological stress that results from this growing problem overwhelms the perception of the worker. He knows what the real problems are. The trouble is that we are not speaking loud enough on his behalf. The result is that we have failed to gain the attention of the professions and the Congress.

The budget of the National Institute of Occupational Safety and Health—the agency charged with the responsibility for research in this area—is a symptom. We need help in the design of new technologies that built in the human factor and therefore reduce the potential for inducing disease and injury. Safety and health research should be integrated for this purpose because in this area they overlap—as in the neuro-musculoskeletal stresses that we have described. We want an integrated mechanical behavioral and physiological approach. In the NIOSH safety program, for example, the Administration is asking for only $100,000 each for "human factors" and "ergonomic characteristics" research for high risk groups. They need $1 million immediately to be spent jointly with the "health side" of the agency—and they need engineers and physiologists to do this work. We made this plea to the Congress for fiscal year 1978 and will make it again in 1979. We haven't asked for more because more can't be spent effectively until we build our resources in this area.

Growing older faster and with more pain than other people because of the work we do may be acceptable to society as a whole, at least as indicated by the lack of attention in the press, government research priorities and even the training of engineers and physicians; it is not acceptable to the worker. Rather than permit the quiet process of cannibalization that is taking place, the labor movement must do something about the recognition and treatment of these diseases. We must also do something about their cause! Forcing the human body to fit tools, machines, processes—an artificial work environment—that seldom are designed with care for human beings as humans, rather than as living machines, must stop. When we understand what workers understand, unnecessary risks will end.

Because the human is used in the industrial setting as if he were a disposable robot to be discarded when broken, new diseases are being created faster than we can find names in English for them. Who cares about broken robots? The robots do!

Health and safety in the workplace: A new challenge for business schools

The story of Project Minerva

David S. Thelen, Donna E. Ledgerwood and Charles F. Walters

Is it possible for a large corporation with assets totaling $2.2 billion, net worth of $1.2 billion, a very healthy cash flow position and an annual income potential of $150 million to file for bankruptcy under Chapter 11? Yes, and this type of action is occurring with increasing frequency due to a very important problem: Safety and health in the workplace.

The safety and health problem has been reduced continually since 1936, a year in which 35,000 deaths were reported. Most professionals agree that with current technology we can and must continue to reduce occupational safety and health problems. In 1970, at the time the Occupational Safety and Health Act was being formulated, an estimated 14,200 American workers died on the job, 2.2 million suffered disabilities, and another 300,000 to 500,000 suffered from occupationally induced illnesses.

Considerable progress has been made in reducing death, injury and illness at the worksite since the passage of the Occupational Safety and Health Act of 1970, but the progress has been painfully slow and the cost of accidents remains staggering. National Safety Council data for calendar year 1983, 12 years after the enactment of the Act, showed 11,200 work-related accidental deaths, approximately 1.9 million disabling work-related injuries and a total work accident cost of at least $32.1 billion.[1]

In addition to the often intense personal suffering and financial loss to the injured worker and family, worker injuries add greatly to worker's compensation costs. Employee injuries on or off the job disrupt productivity, increase downtime, disrupt production schedules and add to hiring, scheduling 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 a firm in the community and on the open market. Today, management is open to scrutiny not only from superiors but also from the work force, competitors, governmental agencies, the public, special interest groups and the media. Literally, there is no place to hide when it comes to employee health-related issues.

Since 1971, the National Institute for Occupational Safety and Health has invested approximately $70 million through its training grant program to help ensure an adequate supply of safety and health professionals needed to protect the American worker. NIOSH has expanded its manpower development activities to extend beyond the traditional training of engineers, physicians, nurses and other occupational safety and health professionals to include education for future managers in specialized areas of occupational safety and health.

Managers who make major resource allocation decisions need to be knowledgeable in areas of safety and health. Many technical safety and health professionals say that safety and health is frequently a "hard sell" item to upper management, despite the fact that such training invariably

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pays high dividends to the safety-minded manager. One reason for ignoring health and safety-related issues is the American manager's emphasis on short-term profits and the "bottom line." A second reason is the lack of academic exposure to health and safety issues. This lack of preparation often leads to poor decision-making regarding health, safety and security issues. These types of decisions can ultimately result in loss of advantage in a competitive market, litigation and possible bankruptcy.

Some of the nation's largest corporations have achieved outstanding occupational safety and health records by, among other things, involving all levels of management in their safety and health training programs. The commitment to safety and health must begin at the top of the corporate ladder and pervade the entire organizational hierarchy. Performance appraisals and promotions should incorporate safety and health experience directly into those decisions affecting all managerial and nonmanagerial employees. As noted by Lester A. Hudson, CEO for Dan River, Inc., "Management must be committed absolutely and positively! Safety and health must come from the very top of the organization. The commitment must be sincere, genuine and serious...It must be given equal billing with other manufacturing (line) objectives, such as quality and efficiency, and labor turnover. Safety effectiveness must become part of the criteria by which we measure supervision."[2]

Another safety and health advocate, Bruce W. Karrh, MD, vice president for safety and environmental affairs for E.I. duPont de Nemours and Co. (an acknowledged industrial leader in corporate safety and health programs) has said that the duPont reputation was earned because of a "commitment to safety and health from top management on down through the organization structure..."[3] Russell DeReamer, former corporate safety manager for IBM, adds: "There should be no argument that the same management principles and concepts that are applied to quality, cost, and production, must also be applied to safety."[4]

In a recent article in *Business Horizons*, Professor Herbert G. Hunt III, assistant professor of accounting at Pennsylvania State University, listed seven tangible and six intangible benefits of a well-managed safety and health program.[5] The following benefits were detailed in Hunt's classifications:

Tangible benefits of a well-managed OS&H program

- Reduction in casualty and worker's compensation premiums
- Increased worker productivity (efficiency)
- Improved absenteeism rate
- Reduction in the number of employee problems
- Decreased labor turnover
- Future savings of attorney's fees related to employee/employer litigation
- Avoidance of the following indirect costs: (1) wages paid for lost time; (2) cost of training new workers; (3) uninsured medical costs; and (4) overtime necessitated by unproductive workers due to health problems.

Intangible benefits of a well-managed OS&H program

- Improved corporate image
- Increased market value of stock[6]
- Improvement of employee morale, job satisfaction and job attitude[7]
- Increased attractiveness of the company to prospective employees
- Reduced pain and suffering by employees and their families
- Improved relations with governmental agencies.

Hunt insists that we consider the intangibles as absolutely essential for a balanced evaluation of the nonroutine type of decision usually required in health and safety. He concludes: "The nonquantifiable social, political and human factors in a given situation may easily be the most important elements in the analysis, and ones which, unfortunately, were often ignored in years past."

As with any program, the safety and health function of any company or corporation must be managed effectively and efficiently. One of the reasons why many of this nation's business establishments have not been more successful in reducing injury and illness-producing incidents may be found in the lack of application of management principles and concepts to the safety and health function within the organization. The reasons for this may be traced both to management and to the occupational safety and health

specialist. Whether they relate to marketing, operations, personnel, finance, accounting, information systems or safety and health, the problems of business will respond to the timely and intelligent application of the principles of sound management. However, frequently this is not done.

In 1979 NIOSH reported the findings from its study of safety practices observed in five industrial plants that had excellent safety records. From this study, NIOSH identified specific factors which distinguished successful safety program practices.[8] Three of these factors were:

- Managerial commitment to safety
- Managerial efficiency with respect to safety
- Education and training of *all* employees, not just those in high-risk jobs.

Considerable progress has been made in reducing death, injury and illness at the worksite since the passage of the Occupational Safety and Health Act of 1970, but the progress has been painfully slow and the cost of accidents remains staggering.

"Management efficiency" was defined as "the anticipation of potential safety problems, adequate planning to overcome these problems and evaluation of the efficiency of management and employees toward overcoming the identified problems." The results of this study indicated that the identification, elimination and control of safety risks are activities that call not only for expertise and deployment of specialist skills and services, but that they also are essential parts of every manager's job—from the first-line supervisor through upper management to the CEO. Such safety and health skill and knowledge is not intuitive, however. The development of both knowledge and skills must be taught not only to existing managers but to aspiring future managers—who presently are business majors in our nation's colleges of business.

What is Project Minerva?

The seeds leading to the inception of Project Minerva were planted about 10 years ago, when NIOSH received a call from a professor at a prestigious business school who asked for occupational safety and health training material suitable for use in the classroom. When asked why this material was needed, the professor replied, "Upon graduation, our MBA graduates are being interviewed for jobs, and during the course of the interview, they are asked: '...in the event you are hired, you will be responsible for worker safety and health. Do you feel qualified to carry out these responsibilities?' Most of these graduates then reply: 'What's that?' "

NIOSH thought that an accredited college of business should include in its core body of knowledge some exposure to issues related to employee safety and health.

The strategy of Project Minerva is consistent with the U.S. Department of Health and Human Services' objectives for the nation in occupational safety and health, one of which states: "By 1990, all managers of industrial firms should be fully informed about the importance of, and methods for, controlling human exposure to the important toxic agents in their work environments." Project Minerva is designed to encourage this nation's schools of business to integrate the management of safety and health principles and concepts into their existing curricula. Sixteen schools of business have been targeted by NIOSH for special assistance. By the turn of the century, it is hoped that all accredited colleges of business will graduate bachelor and master degree students who have been trained to appreciate the impact of safety and health on all phases of their business curricula.

How is NIOSH implementing Project Minerva?

NIOSH is implementing Project Minerva through a three-phase effort. The initial phase is to alert schools of business to the need for students to receive information and instruction in occupational safety and health. The second phase includes NIOSH efforts to energize and facilitate these schools to provide the necessary information and instruction concerning safety and health issues. The third and final stage of Project Minerva is to provide participating schools with instructional materials and other resources suitable for incorporation into existing curricula or for development of new courses.

The first phase, alerting schools of business to the need for students to receive information and

instruction in occupational safety and health, is a challenging task in itself. Presently, input is being obtained from business, industry, government and academia to determine an optimal strategy for implementation. Numerous planning sessions have been held with representatives from these groups, and plans have been formulated for a methodology to contact potential business schools. Efforts to date have ranged from workshops for business school faculty to broad promotional efforts. These efforts have resulted in hundreds of requests for information and endorsements of the project, which have come not only from schools of business but from industry as well. NIOSH has worked closely with the Academy of Management, the National Safety Council, the National Safety Management Society, the Occupational Safety and Health Administration and representatives from the American Assembly of Collegiate Schools of Business.

Literally, there is no place to hide when it comes to employee health-related problems.

Phase Two, energizing schools of business to provide information and instruction on occupational safety and health, is being done through personal contacts with selected schools of business. Sixteen schools presently participating in a pilot study to incorporate resource material into their curricula include:

- Eastern Illinois University
- Georgia State University
- Harvard University
- Miami University of Ohio
- University of North Carolina
- University of Kansas
- Johns Hopkins University
- University of Hawaii
- North Texas State University
- University of Oregon
- University of Utah
- University of Washington
- Xavier University
- University of South Florida
- University of Southern Mississippi
- Virginia Tech.

The concept of Project Minerva has been well received in every business school visited to date. However, NIOSH has discovered that although the business schools are enthusiastic about the integration of occupational safety and health content, they lack the time and expertise to develop the necessary course materials. Phase Three of Project Minerva can help in this regard.

Phase Three provides participating schools with safety and health resource materials suitable for inclusion into their curricula. The instructional material includes a series of case studies designed to illustrate current safety and health management issues in a classroom setting, as well as lecture modules that can be integrated into courses that are already being taught such as business policy, business law, marketing management, organizational behavior, finance, etc. The latest resources being developed by NIOSH include a book of readings and an annotated bibliography.

Schools of business that have an interest in including all or part of the material into their curricula should contact:

The National Institute for Occupational Safety and Health
Division of Training and Manpower Development
4676 Columbia Parkway
Cincinnati, OH 45226.

A future project planned by NIOSH is a publication that will list suggested occupational safety and health problems suitable for theses and dissertations by graduate students in schools of business. NIOSH also plans to encourge and jointly sponsor a series of workshops throughout the country to which business school faculty and doctoral students will be invited to discuss current and future objectives and goals of Project Minerva. Participants will also receive instruction in how to use the instructional materials.

Many technical safety and health professionals say that safety and health is frequently a "hard sell" to upper management, despite the fact that such training invariably pays high dividends to the safety-minded manager.

Finally, NIOSH is encouraging selected industries to make internships available for faculty of schools of business, so that they may learn firsthand how the occupational safety and health effort is managed in America's top industries and

in their respective cities. It is hoped that these professors will then share their knowledge with peers and students after returning to their respective universities.

Why is there so much interest in Project Minerva?

A major reason why NIOSH is vigorously supporting Project Minerva is related to the results of a study conducted by the National Safety Management Society, which confirmed an earlier hypothesis by the agency that "college educated" managers have received little or no information—much less classroom instruction—on occupational safety and health during their formal academic training. The 1984-1985 academic year thus was targeted as the time to act forcefully to correct this situation.

The second reason Project Minerva is gaining academic support is due to revised assumptions upon which both the theory and practice of management are based. In his book *Technology, Management and Society*, Peter 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'...In the business enterprise, this means that the attainment of the 'quality of of life' increasingly will have to be considered a business opportunity and will have to be converted by management into profitable business."[9] The values of the worker are changing. The workplace is changing. Thus, managers must be attuned to these changes and take them into account during their planning, organizing, directing, staffing and controlling functions. A safe and healthful environment is one of the key ingredients in any effort to improve the quality of life, both in the workplace and at home.

The third catalyst stimulating business schools' interest in Project Minerva is the burgeoning criticism of higher education by the business community and by society at large. More specifically, the curricula of this nation's schools of business, including the curricula of the more prestigious schools, have become too quantitative and too theoretical. Courses often lack the applied orientations that is necessary for managers to make better decisions.[10,11]

A fourth reason for business schools' interest in Project Minerva is the need to share with current and future managers information that correlates the financial status of corporations with well-structured and efficiently managed occupational safety and health programs. DuPont and Procter and Gamble are examples that epitomize how, through safety efforts, corporations can reap enormous savings. In its U.S. plants in 1980, duPont 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, or 3.6 percent of its 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. This is just one example of the huge savings that can be realized when a company manages the occupational safety and health function in the same way it manages other business functions.

The commitment to safety and health must begin at the top of the corporate ladder and pervade the entire organizational hierarchy.

A fifth reason why business schools have expressed interest in Project Minerva is that emphasis on occupational safety and health is shifting dramatically from the "careless worker" to the "careless employer". As in equal employment opportunity regulations, employers must be aware that they are bound by the principle of administrative law. Contrary to civil law, administrative law places the burden on the employer, who is guilty until proven innocent.

Legislation, litigation and arbitration actions have now established sufficient evidence to swing the accident-prevention offensive away from the worker to the employer. Management can no longer operate under the mistaken belief that workers are at fault in any specific percentage of the injuries and illnesses incurred in industry. Any one statistic at any one company may not hold true for other situations. In addition, social responsibility and community pressures are causing management to look for more rational explanations to account for losses within the organization. The focus of management is thus changing from looking at the effects of certain practices (such as

how many accidents per plant location) to the prevention of accidents by identifying the potential sources of such accidents.

W. Edward Deming, an internationally known consultant in statistical methods whose work in Japan helped to create a revolution in quality and economical production, has often stated that poor quality is 85 percent a management problem and 15 percent a worker problem.[12] Much the same could be said for occupational and environmental problems in American industry.

By the turn of the century, it is hoped that all accredited schools of business will graduate...students who have been trained to appreciate the impact of safety and health on all phases of their business curricula.

It is believed that Project Minerva will continue to be well-received. Therefore, NIOSH is planning to stimulate research articles and presentations among such professional organizations as the Academy of Management and the American Society for Personnel Administration. The agency believes that Project Minerva can help to significantly strengthen current business school curricula by providing occupational safety and health educational resources for training today's and tomorrow's managers.

DuPont and Procter and Gamble are examples that epitomize how, through safety efforts, corporations can reap enormous savings.

President Reagan has called for a public-private partnership to enhance the aims of business and to meet social goals at the same time. Protecting the American worker, our most important national resource, offers business management and our educational institutions their greatest challenges of this century. NIOSH has invested over $200,000 in personnel, time and funds in Project Minerva to date. In addition, The Minerva Education Institute, a not-for-profit corporation, has been created to assist and augment the NIOSH initiative. In a true sense of cooperation, industry's support of The Minerva Education Institute will be a much needed response to the President's call for a public-private parnership. For more information, please write to The Minerva Education Institute, Drawer 246, Carrboro, NC 27510.

Conclusion

An appropriate note for this article comes from John V. Grimaldi, executive director of the Institute of Safety and Systems Management at the University of Southern California: "The common sense that underlies Project Minerva deserves the advocacy of every reasonable person."

Project Minerva challenges our nation's business schools to help prepare future managers for the awesome task of protecting our most valuable resource, the American worker, through the promotion of occupational safety and health management concepts and principles in our nation's business schools. Your involvement and creativity can make a difference. The lives you save may be more than merely a matter of academic interest. □

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SECTION VII

ANNOTATED BIBLIOGRAPHY

VII. ANNOTATED BIBLIOGRAPHY

A Joint Union-Management Approach to Alcoholism Recovery Programs. National Council on Alcoholism, Inc. New York, 1976.

> ABSTRACT: This booklet presents guidelines for establishing effective programs to deal with alcoholism in the work place distilled from more than 30 years of experience of organizations which have pioneered in the development of work-related alcoholism recovery programs. The key elements of effective programs include: (1) a written policy dealing specifically with alcoholism alone, (2) specific procedures for referral of employees, (3) an effective referral system, (4) access to treatment facilities, (5) adequate training for supervisors and union representatives, (6) an educational program on alcoholism for all employees, (7) an effective medical record keeping system and (8) third party payment for the treatment of alcoholic employees.

Ashford, Nicholas A. Alternatives to Cost-Benefit Analysis in Regulatory Decisions. *Annals of the New York Academy of Science,* July 1980, 129–137.

> ABSTRACT: The author examines the differences between economic regulation and the regulation of health, safety and the environment. Problems involved in estimating and comparing the costs and benefits of health, safety and environmental regulation are discussed. The use of cost-effectiveness, health-effectiveness and equity instead of cost-benefit analysis for evaluating proposed regulations is also discussed.

Baldwin, Doris M. Cutting Costs Through Safety Management. *Job Safety and Health,* 4, June 1976, 20–26.

> ABSTRACT: Boise Cascade's experience with a total loss control program shows that putting money into safety programs can produce significant returns. The company estimates that the program resulted in a 33 percent reduction in accidents which saved $2.1 over the first two years.

Baldwin, Doris M. Total Loss Control Means Total Safety. *Job Safety and Health,* 3, March 1975, 14–19.

> ABSTRACT: A description of the emerging field of loss control which enables safety professionals to talk dollars and cents with management. Loss control is defined as: "Engineering to control, reduce or eliminate losses to persons or property." Loss control terminology is defined and the extent of loss control is examined but no specific examples of applying the techniques are given.

Barth, Peter S. The Effort to Rehabilitate Workers' Compensation. *American Journal of Public Health,* 66, June 1976, 553–557.

> ABSTRACT: State workers' compensation laws have been subjected to criticism since their inception; pressure to change them is now increasing. The author reviews the current challenges and concludes that basic structural shifts in the compensation laws will not occur in the near future unless it develops that the system excludes large numbers of individuals who are disabled or killed by occupational diseases. Some evidence indicates that this may be the case.

Beck, Robert N. IBM's Plan for Life: Toward a Comprehensive Health Care Strategy. *Health Education Quarterly,* 9, Special Supplement, 1982, 55–60.

> ABSTRACT: A description of IBM's health care strategy for their employees which is based on five principles: (1) Responsibility for good health belongs to the individual, (2) all non-job related programs are voluntary, (3) all health care and lifestyle data are collected in such a way that individual privacy is maintained, (4) company assistance is provided but some individual action and commitment are required, and (5) health care programs should be cost-effective. The early detection and health education elements of the IBM program are discussed and the results of a pilot program evaluation are presented.

Bennett, Dianne, and Barry S. Levy. Smoking Policies and Smoking Cessation Programs of Large Employers in Massachusetts. *American Journal of Public Health,* 70, June 1980, 629–630.

> ABSTRACT: Presents the results from a questionnaire sent to 128 large employers in Massachusetts to assess the current extent of their programs and policies to facilitate smoking cessation among employees. Sixty-four percent had designated jobs or work areas in which smoking was prohibited, usually because of potential danger to products or equipment. Eight percent provided counseling and 12 percent provided smoking cessation programs for employees who desired to quit smoking. The authors conclude that their is a need for the development and evaluation of workplace policies and programs aimed at reducing smoking.

Brennan, Andrew J. J. Health Promotion in Business: Caveats for Success. *Journal of Occupational Medicine,* 23, September 1981, 639–642.

> ABSTRACT: Ten caveats to facilitate the establishment of an effective and efficient health promotion program are presented and discussed. The caveats are: (1) COMMITMENT is vital, (2) program CONTENT must be selected carefully, (3) CAPITALIZE on existing programs, (4) CONSISTENCY and CLARITY in policy is required, (5) CREDIBILITY and CONFIDENTIALITY are crucial, (6) CONSPICUOUS and CONSERVATION approaches work, (7) COMMUNICATE genuine CONCERN for employees well-being, (8) CALCULATE cost-effectiveness of efforts, (9) COMBINATIONS of learning experiences yield the best results and (10) COMPLIANCE is fostered by mutual respect and trust.

Brennan, Andrew J. J. Health Promotion, Health Education and Prevention at Metropolitan Insurance Companies. *Health Education Quarterly,* 9, Special Supplement, 1982, 49–54.

> ABSTRACT: The author describes the health promotion, health education and prevention programs which Metropolitan Life has established for its employees. From the beginning of a health promotion program in 1871 to the establishment of its unique Center for health help in 1979, Metropolitan has been a leader in the development of employee health promotion and health benefit programs. Metropolitan has also initiated an effort to help establish health care priorities for the employees of its group insurance policyholders.

Brennan, Andres J. J. Health Promotion: What's In It For Business and Industry? *Health Education Quarterly,* 9, Special Supplement, 9–19.

> ABSTRACT: Health promotion has been linked to improved morale, increased productivity, reduced absenteeism and turnover, more appropriate utilization of medical services, and decreased disability and premature death claims due to unhealthy lifestyles. Although preliminary data in favor of health promotion programs are being accumulated, final proof if not yet available to "sell" myopic bottom line managers on the concept. However, as Immanual Kant stated, "It is often necessary to make a decision on the basis of knowledge sufficient for action but insufficient to satisfy the intellect."

Brown, Marianne Parker. Hazards in the Hospitals: Educating the Workforce Through Its Union. *American Journal of Public Health,* 69, October 1979, 1040–1043.

> ABSTRACT: Describes an occupational health education program developed to help hospital workers recognize hospital health hazards and how to eliminate or minimize these hazards. The difficulties involved in convincing the union officials to sponsor and support the program, in performing a thorough needs assessment and in including the target population in program planning are discussed.

Bujan, Ronald. Compensation and Benefits: Prescriptions for Reducing Health Care Costs. *Personnel Journal,* 62, June 1983, 452–456.

> ABSTRACT: Many methods for reducing organization health care costs have been proposed. The nine methods which are discussed in this article are: health screening tests, health promotion programs, adding insurance coverage for outpatient tests and surgery, routine physical examinations, increased deductibles, shared premium contributions, patient auditing of medical bills, a health bonus and second opinion coverage. Although the author implies that all of these methods will reduce health care costs, and provides some examples to support his claim, the evidence is more antidotal than factual and is often not convincing.

Carroll, Bill J. An Effective Safety Program Without Top Management Support. *Professional Safety,* July 1982, 20–24.

> ABSTRACT: An interesting article in which the author discusses some ways a safety director can motivate supervisors to become aware of safety and to begin asking for help in reducing accidents. The approach does not require top management support of the safety program but should result in their ultimate support of the program because of its effectiveness. In brief, keep it simple and work with what you've got. Use peer pressure to motivate supervisors to improve safety. When they come for help, be ready to advise, consult, and periodically audit to be sure your advice is being followed.

Castleman, Barry I. The Export of Hazardous Factories to Developing Nations. *International Journal of Health Services,* 9, 1979, 569–606.

> ABSTRACT: As hazardous and polluting industries come under increasing regulation in industrial nations, some of the affected processes are exported, without improvements to make them less hazardous, to non-regulating countries where cheap and uninformed labor is abundant. "Runaway shops" then market their products in industrial nations with the competitive advantage of not having to comply with costly workplace and pollution control regulations. The export of hazardous industrial plants to developing nations is examined for a number of industries and the international trade impacts of hazard export are identified and discussed.

Chelius, James R. Economic and Demographic Aspects of the Occupational Injury Problem. *The Quarterly Review of Economics and Business,* 19, Summer 1979, 65–70.

> ABSTRACT: A linear regression analysis of injury rate changes (as measured by changes in the manufacturing injury frequency rate) indicates that two factors, business activity (as measured by changes in the number of newly hired and rehired workers per 100 employees) and the age composition of the workforce (as measured by the percentage of workers 18 to 35) account for 53 percent of the variance in injury rate changes which occurred from 1948 through 1970. Knowledge of this type results in a better understanding of occupational accidents and could lead to the development of a more effective public policy toward occupational safety.

Chelius, James R., and Harry F. Stark. OSHA's Voluntary Protection Program. *Labor Law Journal,* 35, March 1984, 167–174.

> ABSTRACT: This article describes OSHA's new voluntary protection program and examines three aspects of the program: (1) the incentives for participation, (2) its relevance to labor-management relations and (3) the use of voluntaryism as a public policy strategy.

Chovil, Alan, and Philip Jacobs. A Guide to Conducting an Economic Evaluation of an Occupational Health Program. *Occupational Health Nursing,* 31, February 1983, 37–40.

> ABSTRACT: The purpose of this paper is to provide some guidance for conducting an economic evaluation of an occupational health unit. The authors present a form and explain how it should be used to collect the required cost data. They then use a hypothetical example to illustrate how the data can be used for cost effectiveness and cost benefit analysis. The difficulties involved in allocating costs and in measuring benefits for some aspects of health programs are discussed briefly.

Clark, George. Just Plain Good Business. *Job Safety and Health,* 3, March 1975, 2427.

> ABSTRACT: An interview with Dr. Norbert Roberts, Exxon's medical director, in which Exxon's occupational health program is described and some relevant occupational health issues are explored. Dr. Roberts explains why he believes that health related decisions which are good for the employee are also good for the company.

Cohen, Steven R. Another Look at the In-Plant Occupational Health Program. *Journal of Occupational Medicine,* 15, November 1973, 869–873.

> ABSTRACT: The author describes and defends an in-pLant occupational health program which would meet the requirements of acceptable occupational safety and health care delivery in 1973. Some of the factors which should be included in a cost-benefit analysis of an occupational health program are discussed but no evidence is presented to indicate that such programs really are cost beneficial.

Corn, Morton, and Peter S. J. Lees. The Industrial Hygiene Audit: Purposes and Implementation. *American Industrial Hygiene Association Journal,* 44,February 1983, 135–141.

> ABSTRACT: The industrial hygiene audit is a process by which persons with relevant health and safety expertise, external or internal to an organization, determine the presence or absence of industrial hygiene program elements and compare them to those currently required by law, or to those established by professional groups or by the organization. The authors identify and describe the basic criteria which should be evaluated in an industrial hygiene audit and provides some guidelines for the implementation of such an audit.

Costs and Benefits of Occupational Health Nursing. DHEW Publication No. (NIOSH) 80/140, September 1980, 89p.

> ABSTRACT: The costs and benefits associated with occupational health nursing programs were studied for small manufacturing facilities in four industries for a three year period. The programs provided substantial economic benefits to employers and employees in small facilities. Less benefit was found in facilities which had few occupational hazards or which had developed cost effective alternatives for the delivery of occupational medical care. The author recommends that facility managers pay greater attention to costs associated with employee illness and injury.

Crapnell, Stephen G. How Safety and Health Pros Analyze and Control Costs. *Occupational Hazards,* 45, August 1983, 41–44.

> ABSTRACT: Safety and health managers must be able to demonstrate to top management that effective prevention programs reduce both the direct and indirect costs associated with employee accidents and illnesses. In this article, managers from three disciplines, safety, industrial hygiene and occupational medicine, discuss how they are analyzing and controlling the costs of injuries and illnesses and how they are translating this information into effective preventive efforts. The managers are from ITT Continental Baking, S.C. Johnson & Son, Inc. and FMS Corp.

Crockford, G. S. Personal Protection—The Last Resort? *Annals of Occupational Hygiene,* 19, 1976, 345–350.

ABSTRACT: The concept of the use of personal protection equipment as 'the last resort' is critically examined. It is suggested that the concept of 'last resort' be rejected and replaced by the concept of 'integrated environmental exposure control' in which (1) conventional environmental control engineering, (2) safe operating procedures, (3) ergonomics, (4) safe design, (5) education and behavior modification, and (6) personal protection devices are all used to achieve safe, healthy working environments at the lowest cost.

Dennis, Clive, A. R. To Work Safely in a Health Environment: A Right and a Responsibility. *Canadian Journal of Public Health,* 67, Sept./Oct. 1976, 1976, 61–64.

ABSTRACT: This article presents a clear definition of occupational health and the health related needs of workers. The author discusses the responsibilities of employers, employees and government in meeting these needs in a country such as Canada which has a government supported health care program.

Derby, Stephen, L. and Ralph L. Keeney. Risk Analysis: Understanding "How Safe is Safe Enough?" *Risk Analysis,* 1, 1983, 217–224.

ABSTRACT: The basic characteristics of determining acceptable risk are discussed. Technical, political and social aspects of the problem add much complexity. An appropriate manner to reach responsible decision regarding acceptable risk is suggested. This approach explicitly addresses the alternatives, the objectives, the uncertainty and the values which constitute the information necessary to arrive at any solution. The inappropriateness of many of the suggested "solutions" which are currently in use is exposed.

Doherty, James F. HMOs: The Road to Good Health Care. *AFL-CIO American Federationist,* June 1979, 7–12.

ABSTRACT: A historical review of the development of HMO's in the U.S. and the role of labor in HMO development. In general, labor favors the development of HMO's which they believe will provide better health care at a lower cost. However, the major reason the labor movement wants to encourage the rapid expansion of HMO's is to make them the centerpiece of the universal and comprehensive national health insurance program which is strongly supported by labor.

Earnest, R. E. Safety Performance Analysis. *Professional Safety,* 28, April 1983, 21–46.

ABSTRACT: This article deals with a behavioral oriented appraoch to safety, provides a method to identify effective safety management activities, and provides a tool to analyze safety performance deficiencies.

Edgahl, Richard H., and Diana Chapman Walsh. Sounding Board: Industry-Sponsored Health Programs: Basis for a New Hybrid Prepaid Plan. *The New England Journal of Medicine,* 296, June 9, 1977, 1350–1353.

ABSTRACT: An interesting proposal for the establishment of industry-sponsored hybrid health care for an employee and his or her family at the plant and at sites near the employees' homes or near the hospital used by most employees.

Ellwood, Paul M., and Michael E. Herbert. Health Care: Should Industry Buy It or Sell It? *Harvard Business Review,* July/August 1973, 99–107.

ABSTRACT: The authors maintain that private companies can reduce their own health care costs by becoming involved with HMOs. By starting and managing HMO's, companies can provide a needed infusion of management know-how, can obtain a better health product for their employees and can expand into an industry of critical social importance. Some guidelines for getting started are provided.

Epstein, Samuel S. Information Requirements of the Public. *American Industrial Hygiene Association Journal,* 40, December 1979, 1152–1158.

> ABSTRACT: In this indictment of the quality of the scientific and economic information provided by business, the author provides specific examples of the use of biased, invalid, and grossly inadequate data by companies to support claims that the products they produce are not carcinogenic or toxic. Data have been destroyed, manipulated and suppressed to prevent workers and the public from learning about the toxicity of materials to which they are exposed. The article concludes with six suggestions for coping with the problems caused by the poor suggestions for coping with the problems caused by the poor quality of the information produced by industry: (1) realize the extent and scope of the problem, (2) insist on the disclosure of the identity of all chemicals used in the work place, (3) make all data generated, freely accessible to public scrutiny with due safeguards for industrial secrecy, (4) create a buffer between those who profit from a product and those who test it, (5) provide limited liability clauses so an industry will not be held liable for health problems caused by products which are openly tested and found to be safe by the government or independent testing laboratories and (6) provide much stronger social and criminal sanctions against anyone who suppresses, manipulates or distorts data.

Ezell, Charles W. No More Safety "Band-Aids." *Occupational Hazards,* March 1979, 71–74.

> ABSTRACT: Safety engineering is the "Band-Aid treatment" of applying strict engineering solutions to improve the work environment. Although it is an important part of a safety professional's job function, a broader view of the safety function is required for effective accident and loss prevention. The Systems Safety Management approach, which maintains th at the management of accident and loss prevention programs must consider all aspects of the work place which act to shape and mold individual behavior, is presented as a more viable solution for implementing effective loss prevention programs.

Ezell, Charles W. Safety's Magnificant Obsession—Definition and Direction. *Professional Safety,* February 1979, 22–26.

> ABSTRACT: The author defines safety (as a profession) as: "The management of human resource involvement in the various areas of loss control accomplished chiefly through the techniques of motivation." The article discusses the four elements of safety as stated in the definition: (1) management, (2) human resource involvement, (3) loss control and (4) motivation. Emphasis is placed on the recognition that safety is a managerial function instead of a technical speciality and that both managers and workers must be motivated to make safety a part of the total managerial operating strategy before current injury rates will show a significant reduction.

Fannin, Thomas N., and Teresa Ann Fannin. Coordination of Benefits: Uncovering Buried Treasures. *Personnel Journal,* 62, May 1983, 386–91.

> ABSTRACT: The author's suggest that many companies can reduce health care costs by more carefully managing the coordination of benefit clauses which are included in most health insurance policies. The potential savings are illustrated by examples which include the inclusion of incentive contract in the agreement with health plan administrators to increase the coordination of benefit savings.

Fielding, Johnathan E. Preventive Medicine and the Bottom Line. *Journal of Occupational Medicine,* 21, February 1979, 79–88.

> ABSTRACT: This article identifies and discusses several preventive programs which appear to be able to reduce the cost of health care for an organization. Companies which claim such reductions include Motorola, Gillete, General Mills, and Continental Bank and Trust of Chicago. Six specific programs which are suggested are: (1) hypertension screening, (2) smoking cessation, (3) exercise, (4) diet modification, (5) alcoholism groups,

and (6) safe driving courses. Although current (1979) evidence indicates a favorable return on an investment in disease prevention and health promotion programs, very few carefully designed cost-benefit studies have been completed.

Friedman, Emily. Autos, Tires, Aluminum, Oil and Cost Containment. *Trustee,* 31, September 1978, 35–43.

ABSTRACT: Faced with massive increases in the costs of the health care benefits they provide for their employees, many large U.S. corporations are becoming increasingly involved in efforts to contain health care costs. Often seeing their efforts as posing an alternative to direct federal government intervention, business leaders are implementing a wide range of programs, including specific arrangements with providers, education of hospital trustees who are also employees, and fitness and preventive medicine programs.

Glendon, A. Ian. Is Safety Motivation Possible and Worth Attempting? *Safety Supervisor,* September 1982, 4–9.

ABSTRACT: Top answer the questions posed in the title, the author presents a model of motivation and performance relevant to safety and discussed the elements of the model. He concludes that the answer to both questions is yes with qualifications. Motivation is possible 'to a limited extent' and is worth attempting in some work places, depending on the existing physical hazards, work practices, accident rate, and safety organization. Unfortunately, it is difficult to determine in advance if a specific motivation program will be cost-effective in a particular work place.

Glickman, Frederick R. Work Place Safety: A Hazard Recognition Approach. *Family & Community Health,* 6, May 1983, 71–79.

ABSTRACT: The annual cost of industrial accidents, including medical costs, wages, and fire losses, has been estimated to be $23 billion. The author recommends than an approach based on systematic hazard recognition and control be used to reduce the number and cost of work place accidents. A simple guide to the recognition of hazards is presented and the elements in the guide are discussed. Hazards are divided into three groups (primary, intermediate and proximal) and useful classification schemes are developed for each group. Hazard measurement, evaluation, prevention and control are discussed briefly.

Goldsmith, J. The New Ethic: The Doctor's Responsibility for Health on the Job. *Environmental Research,* 11, 1976, 170–175.

ABSTRACT: The author discusses three issues which are central to occupational health. The first issue concerns the right of a worker to know the hazards of the materials and equipment with which he is working and to understand those hazards well enough so that, individually and collectively, he can be properly protected against those hazards. The second issue concerns the allocation of costs of occupational illness and injury between the government, the employer and the employee. The third issue concerns the right of a worker to receive top quality medical treatment for occupational illness and injury.

Gricar, Barbara Gray, and H. Donald Hopkins. How Does Your Company Respond to OSHA? *Personnel Administrator,* April 1983, 53–57.

ABSTRACT: A study of the OSHA experiences of 27 heavy manufacturing firms within the foundry industry indicated that the firms exhibited four general types of responses to OSHA regulations: technical, informational, administrative and external. The research indicated that informational responses had no effect on accident rates but that well targeted technical and administrative responses were effective in reducing accidents.

Hannan, Edward L. and J. Kenneth Graham. A Cost-Benefit Study of a Hypertension Screening and Treatment Program at the Work Setting. *Inquiry,* December 1978, 345–358.

> ABSTRACT: In this study, the authors developed a model to enable a specific company or organization to predict the costs and benefits which will result from the introduction of a hypertension screening and treatment program at the work setting. The methodology used to develop the model is explained and the types of data required for the development of more complete models are discussed. Predicted costs and benefits are presented for hypothetical firms in several different industries but no comparisons between predicted costs and benefits and actual costs and benefits for real firms are presented.

Haynes, Robert S., Randall, C. Pine, and H. Gordon Fitch. Reducing Accident Rates with Organizational Behavior Modification. *Academy of Management Journal,* 25, June 1982.

> ABSTRACT: This study evaluated the effectiveness of an intervention package which involved feedback, competition and incentives to reduce the accident rate of urban transit operators. Results showed a 24.9 percent reduction in accident rates, establishing a definite link between the intervention and reduction in accident rates, severity and cost.

Head, George L. Selling Safety: Using Management's Language. *Professional Safety,* April 1984, 21–17.

> ABSTRACT: The author explains the concepts of cost-benefit analysis, expected value and present value using an example concerning the safety of landings and take-offs from an airport. The article is written primarily for safety professionals who have not previously been exposed to these concepts.

Hill, Catherine. A Long, Long Way From Brandywine Creek. *Job Safety and Health,* 3, October 1975, 14–20.

> ABSTRACT: A review of the long history of safety and health programs at the DuPont Company. Although, it would be difficult for most companies to match DuPont's safety and health resources, their general safety and health policies, which are discussed in the article, would be an excellent basis for an effective safety and health program at any company.

Jacobs, Phillip, and Alan Chovil. Economic Evaluation of Corporate Medical Programs. *Journal of Occupational Medicine,* 25, April 1983, 273–278.

> ABSTRACT: This article reviews data published in 11 articles on the economic evaluation of corporate medical programs. The authors develop a framework within which profitability and cost-effectiveness can be assessed. Critical evaluation of the available data confirms the probable cost benefit of preemployment examiniations, and absenteeism and alcoholism abuse control programs. It is noted that the data are limited to a small and unrepresentative sample of industry.

Kerr, Lori E. The United Mine Workers of America Look at Occupational Health. *American Journal of Public Health,* 61, May 1971, 972–978.

> ABSTRACT: The relationship between organized labor and occupational health is examined in terms of the experience of the United Mine Workers of America. The need to involve labor in occupational health decisions is stressed.

Knox, A. E. Hetzler, and William E. Burke. The Insurance Industry and Occupational Alcoholism. *Labor Law Journal,* August 1975, 491–495.

> ABSTRACT: Based on actual salary data collected as part of an alcoholism treatment program, the authors estimate that the annual loss in productivity due to alcoholism at the Hartford Insurance Company was almost $3.5 million in 1975. The article discusses a program implemented at Hartford to treat all employees who have any type of work

performance problem. Although the program was too new to draw valid conclusions concerning the efficacy of treatment, early results indicated that recovery rates exceeded 60 percent.

Komaki, Judi, Kenneth D. Barwick, and Lawrence R. Scott. A Behavioral Appraoch to Occupational Safety: Pinpointing and Reinforcing Safe Performance in a Food Manufacturing Plant. *Journal of Applied Psychology,* 63, August 1978, 434–445.

ABSTRACT: The behavioral analysis approach was used to improve worker safety in two departments in a food manufacturing plant. The intervention consisted of an explanation and visual presentation of the desired behaviors and frequent, low-cost feedback. It was concluded that the intervention, particularly with frequent feedback, was effective in improving safety performance. Not only did employees react favorably to the program but the company was later able to maintain the program with a continuing decline in the injury frequency rate. The results suggest that behaviorally defining and positively reinforcing safe practices is a viable approach to occupational accident reduction.

Komaki, Judi, Arlene T. Heinzmann, and Loralie Lawson. Effect of Training and Feedback: Component Analysis of a Behavioral Safety Program. *Journal of Applied Psychology,* 65, June 1980, 261–270.

ABSTRACT: Desired safety practices were behaviorally defined for a city's vehicle maintenance division. A study was carefully designed to determine the effects of training and feedback on safety performance. Employees showed only a slight improvement in performance with training alone but their performance improved substantially when feedback was provided at least three times a week. The need for frequent feedback raises significant questions with regard to sustaining performance gains and supervisory support.

Kristein, Marvin M. The Economics of Health Promotion at the Worksite. *Health Education Quarterly,* 9, Special Supplement, Fall 1982, 27–36.

ABSTRACT: There is no hard evidence that health promotion programs are cost effective but there is some highly suggestive evidence that some programs improve productivity and decrease absenteeism. There is also evidence that, in the short run, spending on health promotion does promote health and improve the 'quality of life'. Specific examples of the estimated costs and benefits for smoking cessation and hypertension control programs seem to indicate that both of these programs can be cost effective.

Larson, K. Per. Taking Action to Contain Health Care Costs: Part I. *Personnel Journal,* 59, August 1980, 640–644, 675.

ABSTRACT: Health care is one company expenditure that can definitely be cut and controlled. In Part I of a two part article, the author focuses on what major corporations have been doing to keep their costs down and their employees health, practices which will work within most existing structures. Specific actions which can be taken to control health care costs are discussed for top management, finance, personnel and operations.

Larson, K. Per. Taking Action to Contain Health Care Costs, Part II. *Personnel Journal,* 59, September 1980, 735–739.

ABSTRACT: Part I of this two part article focused on controlling health care costs within existing corporate structures. In Part II the focus shifts to a consideration of some potential changes in corporate roles which might prevent some expenditures for health care. The

article discusses actions such as: redefining the corporation's role in health care prevention and delivery of care, developing new policies and procedures to encourage more health-effective behavior, transfer and exchange of responsibilities between personnel and finance and the creation of a new position of health programs manager.

Larson, Lynn D., John F. Schnelle, Robert Kirchner, Jr., Adam F. Carr, Michelle Domash, and Todd R. Risley. Reduction of Police Vehicle Accidents Through Mechanically Aided Supervision. *Journal of Applied Behavior Analysis,* 13, Winter 1980, 571–581.

ABSTRACT: Tachograph recorders were installed in police vehicles to monitor vehicle operation in an attempt to reduce the rate of accidents. Each tachograph chart was reviewed and feedback was provided to officers regarding driving performance. The tachograph intervention and components of the feedback system nearly eliminated personal injury accidents and sharply reduced accidents caused by officer negligence. A cost-benefit analysis revealed that the savings in vehicle repairs and injury claims outweighed the equipment and operating costs.

Lee, Jeffrey S., William N. Rom, and Bobby F. Craft. Preventing Disease and Injury in the Work Place: Issues and Solutions. *Family & Community Health,* 6, May 1983, 1–15.

ABSTRACT: The authors discuss the magnitude of the occupational health problem,the inadequacy of current regulations concerning occupational exposures to toxic substances, the non-existence of an occupational health surveillance system, the inadequacy of existing systems for compensating employees who suffer from occupational diseases, and the inadequacy of existing occupational health training, education and research programs. They make 15 specific recommendations for improving existing systems to provide better information concerning occupational health problems, better information concerning occupational health problems, to provide adequate compensation for victims of occupationally related diseases and to reduce the number of injuries and deaths resulting from occupational accidents and diseases.

Levinson, Charles. Positive Health Accounting: Occupational Health at the Economic Crossroads. *Annals of the New York Academy of Sciences,* 1979, 507–512.

ABSTRACT: In the short run, the policies of the International Federation of Chemical, Energy and General Workers' Union (ICEF) seek to upgrade levels of health protection for workers. However, in the long run the ICEF hopes to change the "problem" of occupational health into a central and positive aim of industrialized society. In this article, the author discusses the basis for the long term ICEF campaign to raise occupational health to a higher status so worker health will become a major element at every level of collective bargaining.

Lichtenstein, M. E., T. G. Buchanan, and J. C. Nohrden. Developing and Managing an Industrial Hygiene Program. *American Industrial Hygiene Association Journal,* 44, April 1983, 256–262.

ABSTRACT: Establish a comprehensive industrial hygiene program at a major manufacturing location can be a formidable task even when many of the basic elements are available. The growth of a manufacturing location often requiresa change in industrial hygiene operational methods as well as an increase in staff size. A successful six-step approach is described: 1) learning the management system; 2) defining industrial hygiene concerns; 3) establishing industrial hygiene priorities, goals and objectives; 4) defining the business needs; 5) communicating the business needs; and 6) managing the programs and measuring progress.

Lipschultz, C. Employers' Health Action Coalition. NTIS. HRP-0903479/4, May 27, 1981, 24p.

ABSTRACT: This technical assistance memo presents examples of the kinds of activties a business health group could engage in to reduce health care costs. It is based on a program proposal for the Employers' Health Action Coalition of South Florida which was

created to: (1) improve data reporting and analysis; (2) improve utilization review; (3) develop increased competition through the establishment of a consumer medical information service, a fee review committee and the provision of technical information; and (4) the promotion of employee wellness through an inventory of resources, technical assistance for new programs and the development of an information resource center.

Magnuson, Harold J. Ten Years' Progress—Real or Imagined? *Journal of Occupational Medicine,* 20, April 1978, 247–250.

ABSTRACT: A review of the events which occurred during the ten years from 1968 to 1977 during which much of the current legislation concerned with occupational health and environmental protection was passed. The legislation and its associated litigation are discussed briefly along with other changes in society which occurred during the same period.

Martin, Gail. The Western Approach to Worker Motivation. *Job Safety and Health,* 5, November 1977, 19–29.

ABSTRACT: Officials of Western Electric describe their company's safety and health programs and assess its effectiveness. The basic components of their program, which have been in use since the turn of the century, are positive motivation of workers and dynamic leadership from front-line supervisors.

Masi, Dale. Combating Alcoholism in the Workplace. *Health and Social Work.* 4, 1974, 42–59.

ABSTRACT: This article describes employee assistance programs (EAP's) which are designed to combat alcoholism in industry. The author, who administers various types of EAP's, describes the history, conceptual framework, and essential ingredients of a successful program. Relevant legislation and the implications for social work are also discussed.

Mendeloff, John. The Role of OSHA Violations in Serious Workplace Accidents. *Journal of Occupational Medicine,* 26, May 1984, 353–360.

ABSTRACT: California accident investigations for 1976 show that violations of the OSHA safety standards were a contributing factor in only 123 percent to 19 percent of the 645 deaths reported in 1976. However, a panel of safety engineers judged that only about 50 percent of these violations could have been detected if an inspector had visited the day before the accident. These findings indicate that the potential gains from stronger enforcement of current occupational health and safety standards are limited but not insignificant.

Miller, Arnold. The Wages of Neglect: Death and Disease in the American Workplace. *Journal of Public Health,* 65, November 1975, 1217–1219.

ABSTRACT: The author, who was the president of the United Coal Miners of America, discusses occupational health programs from a miner's point-of-view. He describes the difficulties of getting black lung disease recognized as a compensable occupational disease in West Virginia and provides some statistics concerning other recognized occupational hazards. In 1975 the average state budget allocated 40 cents per worker per year for occupational health and had one and a half times as many fish and game wardens as health and safety inspectors. He concludes with a plea to get on with the costly and difficult job of cleaning up the work environment.

Miner, Lynn E., and Kenneth R. Peters. A Model Hearing Conservation Program. *Job Safety and Health,* 5, February 1977, 15–19.

ABSTRACT: Every company with a noise problem needs a good hearing conservation program. In this article, the authors describe a program designed for small companies which (1) identifies noise hazards, (2) provides periodic testing for exposed employees,

(3) reduces noise through engineering and administrative controls, and (4) maintains adequate records. The authors give several examples which indicate that hearing conservation programs can save money but they do not cite any studies which indicate that the benefits from hearing conservation programs are usually greater than the costs of the program.

Moses, Marion. Cancer and the Workplace. *American Journal of Nursing,* November 1979, 1985–1988.

ABSTRACT: In this article the author provides a brief history of work-related cancer, a discussion of the characteristics of occupationally related cancers which make it difficult to assess the etiology of the disease, and a review of public health aspects of workplace carcinogens. The article concludes with a discussion of the three major controversies among industry, labor and government concerning the control of workplace carcinogens: (1) the problem of setting threshold levels for exposure to carcinogens, (2) determining the signifigance of results obtained from tests involving laboratory animals, and (3) the analysis of the cost and benefits associated with the control of workplace carcinogens.

Vicnete, The Understanding of Health of Working America: Causes, Consequences and Possible Solutions. *American Journal of Public Health,* 66, June 1976,538-547.

ABSTRACT: The author postulates that the main health problems in the U.S. are not due to prevalent life styles but to the maldistribution of economical and political power in our society and the absence of control by workers over the work process with which they are involved, the economic wealth which they produce and the political institutions for which they pay. It is asserted that a major public health task is to contribute to the political mobilization of forces aimed at bring about profound changes in the patterns of control of our working institutions and of the distribution of wealth and political power.

Nemac, Margaret N. A View From the Boardroom on OSHA, Regulatory Reform. *Occupational Hazards,* June 1979, 51–54.

ABSTRACT: Bethlehem Steel's president, Richard Schubert, who served as Under Secretary of Labor from 1973–75, reflects on his experience as Under Secretary of Labor, assesses the need for OSHA and examines the quality of OSHA regulations. He also discusses the controversial topics of cost-benefit analyses of OSHA standards, the adoption of a zero-risk goal for occupational exposures to hazardous materials, and the movement toward regulatory relief.

Newcom, Charles W. Employee Health and Safety Rights Under the LMRA and Federal Safety Laws. *Labor Law Journal,* 32, July 1981, 395–423.

ABSTRACT: A thorough examination of the potential for conflict among the agencies enforcing the Federal Mine Safety and Health Acts of 1969 and 1977, the Occupational Safety and Health Act of 1970, and the Labor-Management Relations Act of 1947. The overlapping parts of these acts are identified and interpreted through the citations of a large number of cases and judicial decisions.

Ondrejka, Dennis A. A Descriptive Evaluation of a Self-Care Medication Program in Industry. *Occupational Health Nursing,* 31, August 1983, 21–27.

ABSTRACT: Describes a program which makes common medicines, such as tylenol and sudafed, available to employees without being distributed by a nurse. The program assumes that an individual is capable of diagnosing minor health problems as well as, if not better than, a health professional. Although there is a small risk of overdose or adverse side effects, self-care mediciation programs appear to be a safe, cost effective method of handling minor, symptomatic health conditions such as headaches, colds, sore throats, sinus congestion and stomach upset.

Ossler, Charlene C. Cost-Benefit and Cost-Effectiveness Analysis in Occupational Health. *Occupational Health Nursing,* 32, January 1984, 33–38.

> ABSTRACT: This paper (1) reviews the methods for conducting cost-benefit and cost-effectiveness analyses, (2) critiques recent applications of economic analysis to occupational health problems, and (3) discusses methodological and ethical issues related to the use of economic analysis for decision making and evaluation in occupational health.

Pearson, Clarence E. Implementing a Health Promotion Program. *Personnel Journal,* 62, February 1983, 150–154.

> ABSTRACT: Successfully implementing a health promotion program requires (1) careful planning, (2) determining what management wants, (3) obtaining management support, (4) setting reasonable goals, (5) assessing employees' health needs, (6) identifying and evaluating alternative methods to meet the needs, (7) developing an effective communication campaign and (8) evaluating the program's effectiveness. Although the workplace is an ideal setting for health promotion programs, identifying and measuring changes in behavior is difficult and assessing the financial benefits resulting from the observed behavioral changes is often impossible.

Penn, Ann C. Radiation Safety in Industry—An Interview with Elmer Eisenhower. *Job Safety and Health,* 5, October 1977, 23–29.

> ABSTRACT: Radiation is used widely in a variety of manufacturing and construction procedures including inspection and sterilization. Safety and health hazards in industries which use various types of radiation sources are identified and the voluntary standards developed by the American National Standards Institute (ANSI) which address a variety of areas of concern to industry, including safety and health requirements, are discussed.

Personnel Leadership in Action: Doing Something About Health Care Cost Containment. *Personnel Journal,* 58, November 1979, 751–757, 811.

> ABSTRACT: It is no secret that health care costs are skyrocketing and will continue to do so unless business, which pays half of the nation's health care costs, assumes some of the responsibility for containing them. The Director of Public Relations for Blue Cross of Milwaukee, the Corporate Manager of Employee benefits for TRW Inc., and the Vice President of Personnel Relations for the Allen-Bradley Company discuss some of the concrete action which companies are taking to improve employee health and reduce health care costs.

Petersen, Dan. The Human Error Model of Accident Causation. *Occupational Hazards,* 1983, 97–100.

> ABSTRACT: Most safety programs are based on the simplistic "domino theory" of accident causation proposed by Heinrich in 1931. Use of this theory leads to the conclusion that accidents are prevented by reducing the probability of an unsafe condition or unsafe act. The author proposes a more complex theory—the human error model—to explain accident causation. Although it is not complete, this model incorporates recent research results and recognizes many of the complexities which are involved in accident prevention.

Preliminary Estimates of Direct Compliance Costs and Other Economic Effects of OSHA's Generic Carcinogen Proposal. NTIS, HRP-0025998, February 27, 1978, 630p.

> ABSTRACT: The capital and annual compliance costs and other economic effects of OSHA's generic carcinogen proposal were estimated for three regulatory scenarios of substance coverage and for two potential exposure targets. These estimates show that the capital costs of compliance for the substance producing and using industries,

estimated at the medium scenario, represent 32 to 88 percent of 1976 capital expenditures for all manufacturing, depending on the exposure levels which are established. An analysis of an alternative approach to regulating generic carcinogenic substances, as proposed by the American Industrial Health Council, concluded that the proposed approach would result in lower impact compliance patterns.

Reber, Robert A., and Jerry A. Wallin. The effects of Training, Goal Setting, and Knowledge of Results on Safe Behavior: A Component Analysis. *Academy of Management Journal,* 27, September 1984, 544–560.

ABSTRACT: This study demonstrates the benefits of providing knowledge of results in addition to goal setting in a strategy to improve occupational safety in a farm machinery manufacturing firm. An analysis of the results of a 56-week long multiple baseline investigation indicated that each of the three interventions (safety rule training, goal setting and providing knowledge of results) had significant positive effects.

Reinhart, Virginia. Safety = Profits = Jobs. *Job Safety and Health,* 3, May 1975,10–11.

ABSTRACT: At the Questor Corporation the health and safety of employees is viewed as a plant-level function which is as important as the demands of production, sales or other elements of the business. To support this policy the company: (1) regularly publishes the cost of workers' compensation claims at all 68 plants, (2) uses safety performance as one criteria for determining a plant manager's bonus, (3) provides all managers with information on developing effective safety programs, (4) makes annual safety inspections of each plant, (5) requires pre-employment physicals to match employees' health to job requirements, and (6) investigates accidents that take a worker away from the job for any length of time.

Reinhart, Virginia. Ergonomics Studies Improving Life on the Job. *Job Safety and Health,* 3, December 1975, 17–21.

ABSTRACT: Ergonomics is the study of human beings and their work environment. This article describes some of the ergonomic studies which have been undertaken at the Eastman Kodak human factors laboratory which was established in 1960 to study the physiological and psychological stresses of work.

Rhoton, William W. A Procedure to Improve Compliance with Coal Mine Safety Regulations. *Journal of Organizational Behavior Management,* 2, Fall 1980,243–249.

ABSTRACT: This article describes a program of periodic observation, contingent punitive control, praise, and graphic feedback which was implemented at a coal mine to reduce the number of violation notices issued bythe Mine Safety and Health Administration for failure to comply with five critical performance variables which affect underground mine ventilation. For the three months before the study the mine received an average of 2.6 ventilation citations per month. During the study the mine operated for 10 consecutive months without a ventilation citation.

Roccella, Edward J. Selected Roles of the Federal Government and Health Promotion/Disease Prevention Focus on the Worksetting. *Health Education Quarterly,* 1982, Special Supplement, 83–91.

ABSTRACT: The Federal government and industry share a common problem of controlling rising health care costs while simultaneously attempting to improve the health status of workers. Worksite health promotion/disease prevention activities may provide a means for achieving both of these objectives. Three roles that the Federal government might play in developing and promoting these activities are: resource leveraging, legitimation and information dissemination. The author discusses how the Federal government has used these roles in other health oriented programs to improve the effectiveness of the programs.

Ruchlin, Hirsch S., And Michael H. Alderman. Cost of Hypertension Control in the Workplace. *Journal of Occupational Medicine,* 22, December 1980, 795–800.

> ABSTRACT: A cost analysis of hypertensive treatment at the workplace indicates that average patient cost in 1978 was $194.77. This aggregate cost is well below that reported for care provided in private practice and hospital outpatient department settings. Evidence indicates that the quality of care provided at the workplace is as good as, or better than, the care which is provided to hypertensives in other settings.

Sahin, Kenan E., and Amy K. Taylor. Employer Acquisition of Health Care Facilities: A Possible Outcome of Escalating Premiums? *Sloan Management Review,* Summer 1979, 61–75.

> ABSTRACT: An economic analysis of the return on investment (ROI) which might be earned if organizations provided health care by building facilities and hiring doctors to staff then instead of buying health services from traditional suppliers. The analysis indicates that the ROI from investments in health care facilities is high enough to make employer ownership a serious option worthy of careful analysis, especially if the price of health care continues to escalate faster than most other prices.

Sass, Sherman G. New Frontiers of Health Care Cost Containment. *Personnel Journal,* 61, February 1/982, 142–145.

> ABSTRACT: The author reviews several approaches for reducing a company's health care costs including the implementation of health promotion programs. He is in favor of integrating health promotion programs with existing health benefit plans to emphasize that the health benefit plans are as concerned about preventing health problems through promoting more healthy life styles as with paying health care bills.

Schramm, Carl J. Evaluating Industrial Alcoholism Programs: A Human-Capital Approach. *Journal of Studies on Alcohol,* 41, July 1980, 702–713.

> ABSTRACT: The author reviews nine evaluative studies of worksite alcoholism treatment programs which used a broad range of cost-benefit techniques to estimate the economic impact of the programs. A major limitation of all of these studies is their failure to apply comprehensive economic theory. Without such a theoretical basis it is difficult to explain why negative cost-benefit ratios may not result in program termination or why positive prospective ratios may be unpersuasive in efforts to establish new programs. The author proposes the use of a human-capital model to explain decision of businessmen regarding the initiation or continuation of employee alcoholism treatment programs.

Simonds, Rollin H., And Yaghoub Shafai-Sahrai. Factors Apparently Affecting Injury Frequency in Eleven Matched Pairs of Companies. *Journal of Safety Research,* 9, September 1977, 120–127.

> ABSTRACT: Eleven pairs of industrial firms, which were selected so the two members of each pair were matched except for marked differences in work injury frequency, were analyzed to determine what factors, if any, contributed to the large difference in injuries. Many factors were found to be related to lower injury rates. The only two factors which were not related to the injury frequency were: (1) efforts to promote safety through workers' families, and (2) the quality and quantity of safety rules.

Soulliard, Clarance L. Eight-Point Plan Pays Safety Dividends. Occupational Hazards, September 1973, 42–45.

> ABSTRACT: The Budd Company bases its safety program on an 8-point plan that seeks to involve every employee in accident prevention. The article discusses each of the eight points in the company's program.

Steinfurth, Roy J. Care of the Injured Worker: A Labor Perspective. *Annals of the New York Academy of Sciences,* 1979, 521, 523.

> ABSTRACT: The author briefly summarizes the difficulties workers have had in collecting workers' compensation for asbestos-related diseases and concludes that: (1) workers' compensation laws in the U.S. have been a dismal and discriminatory failure, (2) that reparations must be made for the crimes that have been committed by the asbestos industry, and (3) that the withholding of information pertaining to all occupational disease should be made a criminal offense and punishment dispensed accordingly.

Strand, Stephen H., and William G. Johnson. Differentiating Occupational Illness and Injury: The Private Costs and Economic Incentives. *Social Science and Medicine,* 14C, December 1980, 259–266.

> ABSTRACT: The private incentives to supply occupational safety and health activities result from the expected costs of workplace injury and illness and the non-human costs, such as the damage to the plant, which are often associated with the occurrence of accidents. This paper analyzes expected illness and injury costs in detail and examines the distribution of these costs since private incentive to undertake prevention activity is related to the costs borne by each economic agent. Since the strength of private incentives are a central concern in the efficient allocation of resources by occupational safety and health agencies, the policy implications of the analysis for workplace regulation are also examined.

Stunkard, Albert J., and Kelly D. Brownell. Work-site Treatment for Obesity. *American Journal of Psychiatry,* 137, February 1980, 252–253.

> ABSTRACT: A brief report on a study which was designed to assess the feasibility of work-site treatment for obesity, and to compare the effectiveness of various treatment conditions. The three treatment conditions which were studied were: work-site versus medical site, lay therapist versus professional therapist, and frequent versus conventional (once weekly) treatment. It was found that work-site treatment for obesity is feasible and that lay therapists are at least as effective as professional therapists.

Sulzer-Azaroff, Beth. Behavior Ecology and Accident Prevention. *Journal of Organizational Behavior Management,* 2, Fall 1978, 11–44.

> ABSTRACT: An analysis of the effectiveness of implementing a simple, non-intrusive, cost effective feedback system to reduce hazards in a university laboratory research facility. The feedback system involved periodic inspections by safety officers who provided written feedback about, and suggestions for, ameliorating hazards. Results showed a marked improvement in safety conditions after the feedback system was implemented. The cost of operating the system for 30 laboratories was approximately $140 per month.

Sulzer-Azaroff, Beth, and Consuelo do Santamaria. Industrial Safety Hazard Reduction Through Performance Feedback. *Journal of Applied Behavior Analysis,* 13, Summer 1980, 287–295.

> ABSTRACT: An analysis of the effectiveness of implementing a simple feedback system in a small manufacturing plant to reduce the number of hazards which could result in an accident. The "feedback package," which consisted of presenting the supervisor with copies of observational data accompanied by a note which congratulated good practices and suggested ways for improving safety conditions, required little initial training and only 20–30 minutes perday. Use of the feedback system reduced the number of hazards by an average of 60 percent across all departments. A modified feedback system, which was implemented following the termination of the study, successfully maintained this reduction in hazard frequencies.

Swint, J. Michael, Michael Deckjer and David R. Lairson. The Economic Returns to Employment-Based Alcoholoism Programs: A Methodology. *Journal of Studies on Alcohol,* 39, 1978, 1633–1639.

ABSTRACT: A model for the estimation of the economic returns to a firm's investment in an occupational-based alcoholism rehabilitation program is described.

The Corporate Rx for Medical Costs: A Push for Revolutionary Changes in the Health Care Industry. *Business Week,* October 15, 1984, 138–146.

ABSTRACT: After years of buying health care without questioning the prices charged by health care providers, many companies are beginning to demand quality health services at competitive prices. This article provides a good survey of some of the approaches that are being used by various companies to reduce their health-related expenses by reducing the costs of health care services.

Trying to Curb Health Care Costs at the Bargaining Table. *Business Week,* September 19, 1983, 73, 76.

ABSTRACT: As health costs soar, employers are trying to get workers to share the expense. Many companies are bargaining with unions to win changes in health benefits which will require employees to pay more of their health care costs as a trade-off for keeping or improving benefits. This article reports on some of the contracts which have been negotiated to increase deductibles, and co-payments hoping that when individuals are at some financial risk for their health care decisions, their use of the system will be more prudent.

Vicklund, Birger. The politics of Developing a National Occupational Health Service in Sweden. *American Journal of Public Health,* 66, June 1976, 535–537.

ABSTRACT: A summary of the events which took place in Sweden during the 60's and 70's leading up to the establishment of the National Occupational Health Service.

Wegman, David H. Duty to Report Hazards: A Public-Health Perspective. *Bulletin of the New York Academy of Medicine,* 54, September 1978, 789–794.

ABSTRACT: In this paper, duty is defined as an obligation of health professionals to take all possible actions to prevent illness and to promote the health and well being of all people. Reporting is defined as the collection and dissemination of information to educate and to inform interested and appropriate persons, groups, or agencies. Using this broad concept of the duty to report hazards, the paper explores three issues: who reports, what is a reportable hazard, and to whom should the reports be sent?

Woodsides, Kenneth T. Yes, Management, Your Medical Department Can Affect the "Bottom Line." *Journal of Occupational Medicine,* 22, April 1980, 232–234.

ABSTRACT: To control sickness disability benefits paid after seven days of absence, which had been increasing approximately 18 percent per year from 1970 to 1976, Southern Bell-Georgia instituted a program requiring an employee's sickness disability directly to the company's medical department. The reporting program, which costs approximately $200,000 per year to operate, resulted in a reduction of $237,000 in actual benefits paid during the first year, a reduction in the cost per employee and a reduction in the cost per $1000 of wages. Annual savings were estimated to be between $700,000 and $1,000,000.

Wright, C. Craig. Cost Containment Through Health Promotion Programs. *Journal of Occupational Medicine,* 24, December 1982, 965–968.

ABSTRACT: The multiple health promotion programs provided for Xerox employees and the effect they are believed to have on cost containment, employee self-image, job satisfac-

tion, company loyalty, morale, and productivity are described. These programs include physical fitness programs, health education projects, life style and behavior modification efforts, an alcohol and drug abuse program, and health appraisal and health maintenance medical examinations. Although Xerox does not use a formal system for measuring the effectiveness of these programs, periodic evaluations are made to satisfy senior management that each program does make a contribution through increased productivity or cost containment.

Zohar, Dov, Alexander Cohen, and Naomi Azar. Promoting Increased Use of Ear Protectors in Noise Through Information Feedback. *Human Factors,* 22, February 1980, 69–79.

ABSTRACT: Information concerning the temporary hearing loss resulting from working a shift in a noisy department was fed back to workers to motivate greater use of ear protectors. Observation of earplug use in this department increased steadily, attaining a level of 85–90 percent in 5 months. No more than 10 percent of the workers in a similar department wore earplugs over the same 5 month period after being given a standard lecture on hearing conservation, later augmented by disciplinary threats. The effectiveness of the feedback technique in promoting earplug usage was explained as a two-stage process involving individual reinforcement, and subsequent group adoption of new norms for accepted behavior.

SECTION VIII

MANAGEMENT ORIENTED CASES CONCERNING OCCUPATIONAL HEALTH AND SAFETY

ACE Manufacturing Safety Program, M.A. Mourst and Michael A. Taubitz

Source: HBS Case Services: Case -9-381-692. The new safety supervisor in a division of a large corporation which manufactures small engines is facing the challenge of developing a strategy and programs to improve the safety standing of the division. To complete this task he has to deal with several parties with conflicting goals. The case requires students to analyze the internal and external variables that affect safety in order to make an appropriate policy change.

Allied Chemical Corporation (A), Joseph L. Badaracco and George C. Lodge

Source: HBS Case Services. Case -9-379-137 Rev. 5/82. This case describes the Allied Chemical Corporation, the chemical industry, and the effects of dumping Kepone, a toxic pesticide, into the James River. The executive in the case must decide whether the company should support the passage of the Toxic Substances Control Act and an internal program called Product Responsibility. Underlying these issues is the question of whether Allied should take a cooperative or adversial approach to government relations. The case investigates the desirability, under certain circumstances, of a corporation entering into a collaborative relationship with the government and examines the broad outlines of the circumstances which make such cooperation desirable.

American Cyanamid Co., D. E. Bell and N. Woloshyn

Source: HBS Case Services: Case -9-181-131. Because lead can be harmful to fetuses and because there is no way to tell early enough if a woman is pregnant, American Cyanamid excluded all fertile women from its lead pigment production line. Some of the women had themselves sterilized to avoid being moved. This case is intended to motivate discussion about national safety standards with respect to personal risks. What is the government's role, industry's role, and the individual's role.

Asheville Foundries, Inc. (A), Terry Allen and Neil H. Borden, Jr.

Source: HBS Case Services: Case -9-379-663. The company is considering closing a large casting foundry which had just been cited by OSHA. The issue is complicated by such matters as disagreement over projected cash flows, the effect of a closing on other product lines, the impact on the local labor market and community, and a difference of opinion on how far the company should go in complying with OSHA. This is a good integrative case which requires students to analyze the financial, labor relations, customer relations and safety and health aspects of the decision.

Consolidated Industries, Inc. (CII), F. K. Foulkes and L. L. Roquet

Source: HBS Case Services: Case -9-675-121. This case describes how a large diversified company with a commitment to social responsibility implements the policies, programs and procedures of the Occupational Safety and Health Act. The role of safety directors (at the plant level), line managers, and group-level staff is highlighted. The case presents many of the problems encountered by divisionalized companies with a profit center structure (decentralized) in implementing social policies at the operating level.

Cumberland Gasket Co., Inc., Herman Gadon and Dwight R. Ladd

Source: HBS Case Services: Case -9-379-632. The division manager of the Cumberland Gasket Company is convinced that the asbestos used in manufacturing gaskets is harmful to workers. He can stop manufacturing the parts in question, but there is no acceptable substitute and the parts are critical. His company is only one of two supplying the parts. He can institute "white room" controls for work with asbestos, but only at great expense. The manager's success in the company is tied to the performance of his division.

Ferdanna Company (A)—(D), Robert J. Dran and Lawrence A. Benningson

Source: HBS Case Services: Case -9-672-088 (Rev. 12/78). This case discusses product liability in a large corporation and provides two examples of $1 million product liability suits; a complaint brought on behalf of a woman who was allegedly blinded by an exploding can of household drain-cleaner and a complaint filed by a parent for injuries received by a child from the same product. The case provides a brief description of the company and the product, an extensive discussion of the manufacturing process and quality control procedures which were used by the company, and a summary of the laws governing product liability.

Hartley Conglomerate (A)—(E)

Source: Glueck, W. F., Cases and Exercises in Personnel. Rvsd. Ed., pp. 97–102. A series of five short cases concerning he procedures used at the Bien Works of the Hartley Corporation to deal with OSHA inspections. The student is asked to (1) outline a procedure to improve safety and health conditions at the Bien Works and (2) to outline a plan for the Director of the OSHA office to deal with the management of the Bien Works.

Limits of OSHA, Kenneth A. Kovach

Source: Harvard Case Services. Case -9-379-684. OSHA is asked by an employee to investigate the air quality at his workplace, which is then found unacceptable by OSHA standards. OSHA orders the company to make changes which conform to standards, but the company contents that such changes will undermine production processes. The case is used to show the limits of OSHA and what happens when OSHA regulations and production considerations conflict.

Managing Product Safety: An Overview, K. E. Goodpaster and D. L. Davidson

Source: HBS Case Services: Case -9-383-127. Provides background information on the issue of product safety and discusses economic, legal, and ethical considerations for general management. A conceptual model is provided that can help students understand how companies might formulate a social response strategy to handle a produce safety controversy. May be used as part of a series, Managing Product Safety that provides an opportunity to compare and contrast the social response strategies employed by companies involved in a catastrophic product safety controversy.

Managing Product Safety: The Case of the Ford Pinto, K. E. Goodpaster and D. L. Davidson

Source: HBS Case Services: Case -9-383-129. Presents an accounting of Ford Motor Company's handling of the product safety controversy (1970–77) concerning its Pinto subcompact car.

Managing Product Safety: The Case of the Firestone 500, K.E. Goodpaster and D.L. Davidson

Source: HBS Case Services: Case #9-383-130. Presents an accounting of Firestone Tire and Rubber Company's handling of the product safety controversy (1972–78) concerning its steel-belted radial 500 tire.

Managing Product Safety: The Case of the Procter & Gamble Rely Tampon, K. E. Goodpaster and D. L. Davidson

Source: HBS Case Services: Case -9-383-131. Presents an accounting of Proctor & Gamble's handling of a product safety controversy (1980) concerning its Rely tampon.

Monterey Abalone Farms (A) and (B)

*Source: Leone, Robert A., **Government Regulation of Business: Developing the Managerial Perspective. (Boston: Division of Research, Harvard Business School, 1981).*** Reprinted by HBS Case Services: Case -9-679-051 (Rev. 11/81) and Case -9-679-052. These cases describe a small company pioneering a new technology for raising abalone in tanks on shore. The focus of the (A) case is on the company's response to a CAL/OSHA directive to undertake expensive modifications to its plant, the benefits of which are open to question. The (A) case can be used to familiarize students with OSHA, the alternatives available in dealing with it, and the particular burdens government regulation can impose on a small company. The (B) case is concerned with other forms of government involvement which pose serious threats to the viability of the company. This case raises the question of the merits of adopting an active as opposed to a reactive posture toward government regulations and illustrates the potential adverse impact of government involvement on incentives to undertake risky investment in new technologies.

National Chlor-Alkaki: Geisman, Louisiana Plant

*Source: Inverstine, J. C. and J. Kinard, **Cases in Production & Operations Management.** Case 43, pp. 175–193.* This case concerns the situation at the National Chlor-Alkali plant which resulted from the accidental electrocution of a chlorine cell repairman. The case emphasizes the behavioral problems associated with the accident and does not require a technical knowledge of the chlorine manufacturing process. The case includes an 8 page appendix outlining the role of employers, employees, and OSHA in the implementation of the OSH Act.

OSHA and Small Business, K. A. Kovach

Source: HBS Case Services: Case -9-380-793. On his way from one planned inspection site to another, an OSHA inspector impulsively stops off to inspect a small, family-owned, warehouse. He speaks to two employees upon entering, and is told to go ahead with the inspection. The owner approaches him after he has completed his inspection and claims the inspection is improper because no credentials were presented, no company official contacted, no company official present during the "walkthrough," etc. This case can be used to familiarize students with technical aspects of an OSHA inspection.

Parker Brothers (A)—(B), John F. Cady

Source: HBS Case Services: Case -9-580-085 (Rev. 9/82). The management of Parker Brothers must decide what to do when two deaths result from the misuse of Riviton, a construction set for 6–12 year old children, which met all voluntary, industry and federal safety standards.

Pittsburgh Corning—Tyler Insulation Plant, Clinton V. Oster, Jr.

Source: HBS Case Services. Case -9-679-064 Rev. 6/80. A non-analytic case concerning the asbestos industry and the responsibilities of all involved agencies (employer, union and government) to the workers at the Tyler Plant.

Reliance Electric, D. E. Bell and W. C. Schmidt II

Source: HBS Case Services: Case -9-380-793. This case describes the acquisition of Federal Pacific by Reliance and the acquisition of Reliance by Exxon, and focuses on the substantial liability inherited by both companies due to the questionable safety on a principal product of Federal Pacific. The case is intended to provide a foundation for a discussion about the management of risk in acquisition.

Resistance to Safety Management, K. A. Kovach

Source: HBS Case Services: Case -9-380-754. The new safety director of a manufacturing plant hopes to improve a poor safety record by having foremen conduct monthly "safety education and awareness" meetings with all employees. The foremen refuse saying it will cut into production time. The case can be used to discuss ways of implementing safety programs in the face of employee and/or supervisor resistance.

Sanford Mills Inc.

Source: HBS Case Services. Case -9-680-055. When the government banned the sale of TRIS-treated sleepwear, the management of the Sanford Mills has to decide whether to withdraw from the market or to try to develop and market sleepwear made from a new flame-retardent material.

TRIS and Children's Sleepwear, William Jackson and Robert A. Leone

Source : HBS Case Services. Case -9-680-028. In 1971, the Secretary of Commerce, promulgated strict flammability standards for children's sleepwear which essentially required all manufacturers to use 100% polyester fabrics treated with TRIS, the only available fabric which could pass the new standards. After TRIS was found to be a carcinogen, the Consumer Products Safety Commission, another government agency, shows that government decisions can be far from rational when agencies attempt to avoid adverse publicity by responding to public and political pressure.