Worker health and safety: an area of conflicts

An examination of the technical, legal, and economic problems related to the prevention of occupational disease and injury

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HEALTH, WORK, AND ENVIRONMENT rank among the most important areas of social concern today, and the workplace is the point where these concerns converge. This article outlines four basic conflicts concerning occupational health and safety, discusses the nature and dimensions of health and safety problems, examines the generation of information and its diffusion, and deals briefly with some economic issues.

The nature of the conflicts

There are at least four kinds of conflicts characterizing health and safety in the work environment. The first is the clashing of self-interests that is characteristic of management-labor relations on many issues. Fundamentally, the basic conflict in self-interests stems from management's desire to keep costs down and to maintain control of the workplace versus workers' desire to gain the largest possible package of wages and benefits, job security, and control. Three characteristics of the industrial relations system are especially important for occupational health and safety: (1) By and large, management is responsible in both tradition and law for providing a "safe" workplace. (2) Until recently, health and safety were not central issues in collective bargaining. Even when health and safety were at issue, the worker was traditionally aware that improvements could be attained only if he were willing to trade off some portion of his wage and benefit demands for them. (3) Both labor and management have difficulty balancing off the concrete and immediate costs of health and safety improvements against their often indeterminate and long-term benefits. Short-term and known considerations usually win out. This often means that actions are taken to limit *injuries*, which are dramatic and whose costs are reflected in immediately perceived pain and in workers' compensation premiums, but that improvements relating to *health*, whose benefits are likely to accrue in the future, are limited.

The Occupational Safety and Health Act of 1970 is slowly serving to raise the consciousness of both management and labor.[1] The mandate to comply with health and safety standards is causing management to internalize costs, in much the same way that workers' compensation legislation did. The critical difference is that the emphasis is now on *prevention* related to both health and safety, rather than treatment or compensation for an injury, and management and labor now argue about the nature of safe and healthful work conditions. These new conflicts thus center on issues that, if resolved, are more likely to improve workers' health and safety (and productivity in the long run) than the resolution of conflicts over who will pay for the harm.

The *second* kind of conflict derives from an insufficient data base regarding the nature and severity of health hazards. A good example is the controversy over the adoption of standards for 14 carcinogens by the Occupational Safety and Health Administration (OSHA) in the Department of Labor. Establishing "safe levels" for toxic materials on the data presently available is difficult enough; the chronic nature of many diseases, including cancer, compounds the problem by making the unequivocal establishment of causation difficult. In the case of cancer particularly, we have not yet settled the debate over whether there is *any* "safe level" for exposure to a carcinogen or whether we should adopt the concept of a "zero threshold" (no permitted

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exposure). The lack of a firm data base on the effects of exposure to toxic materials explains in part why only three permanent health standards—those for asbestos, the 14 carcinogens and vinyl chloride—have been promulgated by the Department of Labor, as of this writing. (A standard for noise exposure is currently in the process of being issued.)

This problem of inadequate knowledge raises the further question of the burden of proof required to make legal-political decisions. The standard of proof required for acceptance of a scientific thesis is much higher than that required by the law. When it comes to safeguarding rights under the law, a "scintilla of evidence" may justify legal sanctions, controls, and even the establishment of liability. The law thus attempts to make the best decisions on the information that exists. Absolute certainty or even consensus is not always required. What is required is an opportunity for all the available evidence to come in and for all parties to be heard. This pervasive principle in our system of jurisprudence is not fully understood by "pure scientists," nor is it easily accepted by parties adversely affected as a result of a legal proceeding. In such situations, demands are sometimes made for "scientific proof" that is not available. And it is very unlikely that sufficient "scientific proof" will *ever* be available—or is even *possible*—with respect to some occupational health issues.

A *third* kind of conflict relates to differences in perception of what is just or fair in public policy and what are the appropriate limits to public policy. The controversies over the Delaney Amendment concerning the testing of food additives and proposed toxic substances legislation hinge on the question: Do we prohibit use or consumption of a material until it is proven safe, or do we allow its use until it is proven harmful? Either course involves costs and risks to someone—and honest persons can differ on what is fair.

The question of public policy with respect to the general environment as compared to the work environment is complicated by differences in the degree and selectivity of the risk posed. Chemicals that degenerate in the general environment or are used in diluted form may present low risks to the general population and confer important benefits, such as certain pesticides. Similarly, materials such as asbestos may save lives as fire retardants or brake linings. In such cases, the general risks may be low and almost randomly distributed, and there is thus a certain equity in the use of these substances that gives us comfort. But if a selected group of chemical, agricultural, or asbestos workers is exposed to severe health risks, there is a strong argument that these situations are not equitable, even if more lives are saved than lost by the continued use of these materials. The nonrandom selection of those who bear these extra risks deserves special attention by both public and private decisionmakers.

The *fourth* kind of conflict relates to the fact that various institutions, forces, and mechanisms in our technological society are not connected very well. For example, those people and institutions concerned with problems in the *general* environment are not yet interacting adequately with those concerned with the *work* environment. A rather vivid example of this exists in the handling of pesticides. General environmentalists succeeded in eliminating DDT for use as a pesticide because it posed serious ecological dangers to wildlife and to the consumer. These efforts resulted in the increased use by farmers of parathion, which deteriorates in the environment much faster than DDT. However, parathion may be very much more harmful than DDT for the workers who handle it. Because mechanisms did not exist to coordinate the resolution of problems in the work environment with those of the general environment, control of pesticides in the work environment came very much later.[2]

A second serious discontinuity is in the field of health services, where *preventive* medicine is not tied sufficiently to the *treatment* establishment. Occupational health problems can be most effectively dealt with through the practice of preventive medicine, and preventive medicine is very underdeveloped in the United States. In fact, many professionals concerned with medical-care delivery systems will define preventive medicine as merely early detection of disease, rather than an elimination of those hazards that can ultimately cause disease. The distinction is very important, especially with diseases whose progress is difficult to reverse, such as cancer. The growing interest in Health Maintenance Organizations (such as the Kaiser-Permanente Plan) reflects mainly the importance of early detection of disease. Preventive medicine needs a different kind of mechanism for its institutionalization—one which emphasizes the reduction of exposure to potentially harmful substances.

A third example relates to the different languages

used and different problem areas dealt with by the various professional interests in the society. General practitioners know little of occupational medicine. The industrial hygienist views preventive medicine differently than does the occupational physician. The personnel director may not want workers to talk directly with the plant doctor or industrial hygienist because management-labor relations are his "problem area." And finally, the safety professional does not speak the same language as the health professional even though it is futile to draw a distinction between safety and health in many instances.

Consider the example of noise. Noise has been recognized as a safety problem by safety professionals, and they have sought to reduce the noise level of both the workplace and the general environment to minimize hearing loss. But the issue of noise as a stressor and a cocausative factor of disease is of little, if any, interest to the safety professional. Each professional therefore chooses to deal with only some aspects of a problem, and words like "noise" mean different things to different professionals.

The problems in the work environment are complex and demand both long- and short-term, transdisciplinary approaches for their solution. The issues go far beyond the medical and technical problems of disease and injury. It is thus futile to place sole reliance on any single policy instrument to reduce occupational injury and disease—be it research and medicine, the law and the regulatory process, or market incentives.

Nature and dimensions of problems

Safety Versus Health. *Safety* hazards are those aspects of work environments which can cause burns, electrical shock, cuts, bruises, sprains, broken bones, and the loss of limbs, eyesight, or hearing. In general, the harm is usually immediate and sometimes violent, is very often associated with industrial equipment or the physical environment, and often involves an employment task that requires care and training. Such injuries have increased enormously over the past decade—nearly 29 percent from 1961 to 1970.

Safety professionals insist that the term *safety* is all-encompassing and includes health, but their concern is more with the explosive nature of chemicals than with their toxicology and more with the effects of noise on hearing than with its role as a stressor and cocausative factor of disease. However, to the extent that the causes of accidents are recognized by the State workers' compensation system, they do become a concern for the firm, its insurance carrier, and its safety professionals.

Typical *health* hazards include toxic and carcinogenic chemicals and dusts, often in combination with noise, heat, and other forms of stress. Other health hazards include physical and biological agents. The interaction of health hazards and the human organism can occur either through the senses by absorption through the skin, by ingestion, or by inhalation. The results of these interactions can be respiratory disease, heart disease, cancer, neurological disorders, systemic poisonings, or a shortening of life expectancy due to general physiological deterioration. The disease or sickness can be acute or chronic, can require a long latency period to appear even if the original exposure occurs briefly, and can be difficult or impossible to diagnose early or with certainty. (It should also be noted that disease can give rise to accidents.)

The real world, unfortunately, does not offer isolated hazards. Chemical, physical, biological, and stress hazards are often found in combination, and their effects can be not merely additive but intensified (synergistic). Carbon monoxide and heat, amphetamines and overcrowding, asbestos and smoking, and promoters of cancer are all examples of agents whose effects can be synergistic. Most such combination effects are probably still to be recognized, and this recognition unfortunately often occurs after adverse effects are accidentally encountered, such as in the case of barbiturates and alcohol.

Unlike safety hazards, the effects of health hazards may be slow, cumulative, irreversible, and complicated by nonoccupational factors. While an unguarded blade in a circular saw may present a severe and immediate or "imminent" danger, it is often difficult to perceive the severity or imminent danger contained in a brief exposure to a potential carcinogen that can take years to cause a tumor or death. However, the probability of dying from cancer may be just as high as being injured by the saw.

The inability of the Nation's injury reporting system and workers' compensation system to include occupational disease adequately has contributed to the failure of society to recognize the severity of occupational health hazards. The very nature of the differences between health and safety hazards has resulted in a pervasive safety bias that has affected

legislation, the setting of standards, enforcement, manpower development, employer and employee education, and technology development. This relative overemphasis on safety has prevented much needed progress in the more neglected area of occupational health.

The safety bias that pervades this field is especially serious in the case of manpower and is manifested in a severe imbalance in the mix of safety versus health professionals and in the type of facilities available for their training. This imbalance is in large measure attributable to the rational response of firms and insurance companies to economic forces and government regulations. Workers' compensation, insofar as it acts as an incentive at all, primarily influences firms' demands for *safety* as opposed to *health* manpower, as few diseases are recognized as being of occupational origin for compensation purposes. The Occupational Safety and Health Act with its emphasis on safety has, if anything, worsened the manpower imbalance, as firms demand additional *safety* personnel to comply with the act and government demands additional *safety* personnel to enforce it.

Disease and occupational causation

The Public Health Service estimates 390,000 new cases of occupational disease annually. Epidemiological analyses of excess mortality among workers in several industries suggest that as many as 100,000 deaths occur each year as a result of occupational disease.[3] Evidence from the insurance industry indicates that the excess risk of death, in actuarial terms, is substantial among certain occupational groups. This excess risk is on the order of magnitude of all the other risks of death which we face—in other words, the probability of death (given such factors as age, race, and sex)—facing members of certain hazardous occupations is in some cases greater than twice the norm for a matched cohort drawn from the general population.[4]

Occupational factors may very well play a far more significant role than is presently realized in the causation of the major disease and health problems which face us. Two million people die every year in the United States. Only 25 percent of heart disease, the leading cause of death in the United States (38.7 percent of all deaths or about 750,000 persons a year)[5] is "explained" by known physiological and environmental factors, such as overweight, hypertension, serum cholesterol and cigarette smoking.[6] An unknown, but quite possibly substantial, proportion of the 75 percent of heart disease risk which is presently unaccounted for could be related to work and its attendant hazards, particularly stress.

Cancer is the second leading cause of death in the United States today with an annual toll of 330,000. The incidence of cancer has risen rapidly with industrialization: in 1900, 3.7 percent of deaths was attributable to cancer, but by 1968 the proportion of deaths from this cause was 16.5 percent.[7] In part, improved diagnosis and longer life expectancy are responsible for this dramatic increase. Nevertheless, there are indications that the true incidence of cancer has in fact been on the upswing.

Research in the United Kingdom indicates that more than 80 percent of cancer is of environmental origin and therefore, theoretically, is preventable.[8] This conclusion is based upon the observation that the variation in cancer incidence rates among geographic and occupational environments is enormous. The Health, Education, and Welfare Task Force on Research Planning in Environmental Health Science reported that probably more than 90 percent of malignant neoplasms (cancer) are "induced, maintained, or promoted by specific environmental factors."[9]

Of the 80 or 90 percent of cancer which could be environmentally caused, it is not presently known how much is occupationally related. There seems to be a general consensus among cancer researchers and environmentalists that probably one-half of this figure is complicated by occupational factors. The experience of chemists, asbestos workers, underground uranium miners—and most recently, rubber workers handling vinyl chloride—as well as other occupational groups amply documents the case that "excess" cancer of various types is indeed occupationally related.

Since the production of petrochemicals in the United States has doubled every 5 years since the end of World War II, the incidence of cancer characterized by long latency periods may be expected to rise significantly over the next 20 to 30 years. This expectation coincides with considerable legislative activity geared towards chemical regulation—especially of chemical carcinogens.

Chronic diseases of the respiratory system have been reported with increasing frequency in the United States and have become major causes of

death and disability.[10] Chronic bronchitis and emphysema are the fastest growing diseases in the United States, doubling every 5 years since World War II, and account for the second highest number of disabilities under social security.[11] This doubling rate equals that of the increase of petrochemicals mentioned earlier.

Much of the respiratory disease which plagues the worker is also known to be job-related. Both "specific" diseases such as coal workers' pneumoconiosis and general diseases such as emphysema and chronic bronchitis can be of occupational origin. Note that even if only 5 percent of heart disease, cancer, and respiratory diseases is in fact occupationally related, the amount of occupationally caused death would number 60,000. Thus the Public Health Service estimate of "as many as 100,000" may not be unreasonable.

A study sponsored by the National Institute for Occupational Safety and Health that has just been completed by the University of Washington[12] indicates that 31 percent of over 1,100 medical conditions found in 908 participants were of probable occupational origin, with an additional 10 percent "suggestive history." The probable occupational disease incidence was 28.4 per hundred workers. Only 2 percent of this occupational illness was reported on the Employer's Log required to be kept for the Occupational Safety and Health Administration (OSHA)—and only 3 percent was found in workers' compensation records.

The risk of occupational illness is not shared equally by all members of the labor force. Miners, construction and transportation workers, and blue-collar and lower level supervisory personnel in manufacturing industries experience the bulk of both occupational disease and injury. Further, the job illness and injury rate in agriculture is exceeded only by those in mining and construction.

Occupational health problems are not restricted, however, to the industrial or agricultural worker. They affect white-collar workers and corporate executives as well. Dentists are being studied for the possible effects of x-radiation, mercury, and anesthetics on their having the highest rate of suicide of any professional group, and a higher incidence of diseases of the nervous system, leukemia, and lymphatic malignancies. Operating room nursing personnel suffer several times the miscarriage rates of other nurses and give birth to a larger proportion of children with congenital deformities. Cosmetologists (beauticians) display excess cancer and respiratory and cardiac disease. Administrators are far more likely to develop coronary disease than are scientists and engineers.

These and numerous other examples suggest that presently available statistics seriously understate the enormity of America's occupational health and safety problem and the degree to which the Nation's general health problems may be occupational in origin.

The information problem

In almost every public policy arena, knowledge and its transmission as useful information are inadequate and imperfect. It is helpful to consider these problems in terms of the *generation* of knowledge, its *dissemination*, and its *utilization*.

The generation of knowledge. The systematic researching and establishing of "safe levels" of exposure for every chemical product in commercial use is simply impossible in any practical sense. First, there are as many as 13,000 materials of *known* toxicity in commercial use today. Second, as noted above, most human exposure to chemicals is exposure to mixtures, which may lead to multiple etiology of disease or to synergistic effects. Research suggests that 5 percent of the possible pairs of known toxic materials behaves with adverse synergistic effects, meaning that there are millions of such pairs to investigate. (Multiple combinations increase the numbers astronomically.) Third, the time lag between exposure of humans to occupational health hazards and the appearance or diagnosis of chronic disease is sometimes two decades or more, meaning that research, to be timely, must be undertaken with existing populations that have been exposed for long periods of time (a form of epidemiological study) or with animals. Finally, the *rate of increase* of new substances for which standards must be set is much greater than the rate at which we are able to improve our standard-setting or enforcement ability.

The dissemination of information. Information does little good if it is not made widely available to decisionmakers and to parties who bear the consequences of the decisionmakers' actions—and if it does not reach them in a form they find useful. Un-

equal access to information is a special problem.

Inequality of access—for example, between management and labor or between large firms and small ones—creates incentives for special interests to withhold or distort potentially damaging (or beneficial) information. Differential access converts information into a bargaining advantage for the more knowledgeable party, and compounds the difficulties of public and private decisionmakers faced with the problems of evaluating the merits of a bewildering variety of conflicting claims. Moreover, the pervasiveness of patent rights and licensing arrangements, and the proprietary nature of much of the information regarding newly introduced substances and processes means that the problem of differential access to information concerning workplace hazards is endemic to our economic system, not a mere superficial market imperfection. Although such problems are serious, much progress can be made by well-known techniques of training, technical assistance and publication.

Utilization of information. A great deal of knowledge has already been generated and fairly widely disseminated that holds promise of easing occupational health and safety problems, but its utilization has been painfully slow.

A tragic example of this situation is provided by the case of America's uranium miners, an excess number of whom have died or soon will die prematurely from lung cancer of occupational origin. It has long been known that exposure to airborne radiation carries greatly increased risk of lung cancer, and that the airborne radiation to which this Nation's underground uranium miners were being exposed was well in excess of levels proven to be unsafe. It has, furthermore, long been known in Europe that this hazard can be substantially alleviated by the simple expedient of installing adequate ventilation in uranium mines. Failure to utilize this widely disseminated information has exacted a terrible toll among America's uranium miners.

Another example is the adoption of substitute materials for asbestos. The debate surrounding the industrial use of asbestos has proceeded largely on the assumption that asbestos was an essential raw material without close substitutes for many uses such as shipbuilding. Given this assumption, the terms of the debate were confined to the choice of an appropriate asbestos exposure standard and the costs of meeting it in terms of filtration and ventilation equipment and the like. Yet while this controversy raged, the Swedish shipbuilding industry had for some time been using what are thought to be safer substitute materials in place of asbestos. These materials completely eliminate the necessity of exposing shipyard workers to the hazards of asbestos, at least in the construction of new ships. It seems clear that we have many lessons to learn from other countries with regard to superior technologies for improving the level of occupational health and safety. An important objective of public policy must, therefore, be to facilitate the technology transfer process among different nations.

Increasing the effective utilization of available information calls for a strategy combining enforcement, public awareness, information and technical assistance, and active concern on the part of those directly affected by workplace hazards.

The overall costs of hazards

The total cost of occupational hazards—in terms of lost wages, medical expenses, insurance claims, production delays, lost time of coworkers and equipment damage—was estimated by the National Safety Council at $15 billion during 1974—approximately 1 percent of the Gross National Product. This figure, moreover, is likely to be a gross understatement of even the direct costs to the GNP of both occupational injuries and illness. An estimated 28 million workdays were lost through absenteeism and restricted activity during 1973, according to the Bureau of Labor Statistics. This reported figure is equivalent to a loss of 112,000 man-years of work. The estimate includes not only actual days lost from work but also days in which an employee was restricted from performing all the duties of his permanent job.

It has been estimated that reduction of 1 day per year in the annual rate of absenteeism among the U.S. labor force would add $10 billion to the GNP.[13] Much disease resulting in absenteeism is probably occupationally related, although it is not reported or recognized as such. Thus if *unreported* occupational illness is responsible for even 1 additional day of absence per worker per year, inclusion of the hidden costs of such occupational hazards would result in a doubling of present National Safety Council estimates of the cost of occupational illness and injury. Many of the other costs of chronic occupa-

tional illness—early death or retirement, reduced efficiency, family and community problems—are also not reflected in the Council's estimates.

The market paradigm

Many policymakers are accustomed to thinking about the problem of providing a safe and healthful workplace in terms of the market paradigm. According to this view, the reason the free market results in too much workplace injury and illness is that market "signals" or incentives are "wrong" from society's point of view. Employers, for instance, are not held financially accountable for the full human and social consequences of their failure to provide safe and healthful working conditions. A disproportionate share of the damage associated with occupational illness and injury thus befalls working people, their families, and society at large, without even directly entering a corporate profit-and-loss statement. As a result, business has insufficient incentive to improve job health and safety, and the total costs of production enter neither the price nor the wage equations. The problem of public policy then becomes one of finding ways to make the market more effective in obtaining the socially desired level of job-related hazards. This approach suggests that public policy should be geared toward intervention in the price system to make it function in such a way that all prices reflect true social costs and all "externalities" are "internalized."

The workers' compensation system is an example of an attempt to "internalize" costs after the harm has been done. Job safety became a matter of self-interest to both management and labor when reducing accidents on the job could reduce insurance premiums. (It should be noted again that this system does not deal adequately with occupational health problems.)[14]

The market paradigm is helpful in determining the usefulness of market incentives for dealing with occupational health problems. The imperfections in the market approach are inherent and severe: First, the deficiencies in the knowledge of the nature and severity of health hazards, discussed above, are the most serious imperfections since market analysis assumes adequate knowledge of costs and benefits. The problem of chronic diseases that manifests its harm [costs] far into the future presents a "discounting" problem for even the most farsighted management. This "discounting" problem for future harm [costs] is paralleled by a discounting problem for future benefits as well. Even if a firm thought it profitable in terms of conserving its scarce human resources to reduce chronic disease, the uncertainty of future benefits makes it less likely that action would be taken. Second, there are serious reasons for questioning the notion that the existing level of workplace hazards represents working people's free market "choice" regarding the assumption of job-related risk. Beyond important informational problems, a wide variety of other forces—including social, cultural, psychological and environmental factors—influence workers' decisions regarding the assumption of job-related risks. An inability to assess or relate to low-probability, large-harm contingencies is a behavioral trait common to many—if not most—individuals. Further, many workers are conditioned to accept the hazardous nature of certain jobs and are convinced of the necessity of performing them in order to earn their livelihood.

The pervasiveness of these market imperfections with regard to occupational health and safety emphasizes the importance of social policy and private initiative in forcing employers to internalize more of the total costs associated with occupational health and safety hazards. The workers' compensation system rests on incentives (premium payments) that are keyed to the immediate and relatively undeniable nature of *injuries;* such a *post hoc* approach is not sufficient when dealing with the more complex matter of *disease*—especially those diseases that take decades to manifest their presence. Thus in the absence of some form of compulsion through government standards or through collective bargaining agreements, it is unrealistic to expect individual employers to assume what they view to be competitively disadvantageous costs.

Other economic considerations

Attempts to diminish occupational hazards are often complicated by other kinds of economic problems, not necessarily identifiable as market imperfections. Safe conditions are often more expensive to achieve for smaller firms than for larger ones since the cheapest control technologies often require a minimum size that is larger than the operations of many production units. Also, these smaller firms may often find it difficult to locate and pay for the expert advice or information they may require.

It has been widely noted that the most profitable

firms in an industry are typically also the safest. This may of course be explained by many factors, such as better management (for both production and safety), the utilization of longer time horizons over which to evaluate the investment in good safety practices, and better access to information and expertise. The converse of this observation is that many firms with clear health and safety problems—often the ones with the worst health and safety problems—may also be economically marginal. Such firms are often found in highly competitive industries and are under constant threat of failure. When these marginal firms have larger competitors with substantial reserves or foreign competitors not forced to internalize the costs of health and safety, they may be faced with a choice between hazardous working conditions and bankruptcy.

The costs of providing a safe and healthful workplace *may* initially be high, especially if modification of existing facilities occurs, and the marginal producer *may* be forced out of business. But it is not clear that the smaller or marginal firm will *always* be forced out of business. The smaller firm's relatively smaller investment in capital equipment, closer employer-employee relations, and greater ease of relocation and job redesign may offset the advantages of economies of scale and large reserve funds of the larger firm. Furthermore, in many cases, the workplace can be made safer and healthier by education and management-labor cooperation, with little capital expenditure for new equipment or expensive substitute materials. In such cases, the size or marginal nature of the firm need not be a reason for ignoring workplace hazards.

Critical differences in incentives may exist at various levels within a firm. Top management, for instance, may believe in principle that it is consistent with the longrun economic interest of the firm to adopt good health and safety practices, but it may judge the short-run performance of its middle management by production criteria that result in disease and injury being higher than top management intends.

In the short run the costs of complying with the Occupational Safety and Health Act will be high and unequal in different industries, and severe pressures to resist the enforcement of the legislation will arise. However, if enforcement persists and other activities to facilitate adjustment are pursued aggressively, the longer run should see an encouragement of new technology, substitute materials, and redesigned jobs that should result in higher total U.S. productivity, decreased worker absenteeism, and improved job health and safety.

Implications for international competition

Although the percentage of the U.S. GNP that depends on foreign trade is much smaller than that for Western European countries, more concern has been expressed by business groups here than abroad over the effects of occupational health and safety legislation on the Nation's international competitive posture.

Ironically, if imposing strict occupational health and safety legislation raises the price of American products to the point we import from abroad, we are then in fact exporting disease and injury. Further, multinational companies may locate a production site in a particular country because the occupational health and safety of a worker is less emphasized there and hence the product of his work is cheaper. We are thus exporting jobs, albeit dangerous ones. (We could of course levy an import tax on all unsafely produced goods.) This problem is precisely why many European nations are moving in the direction of establishing international standards and work practices for occupational health and safety. If the United States seeks to keep its own standards below those of other advanced nations, it will not be avoiding a competitive *disadvantage*, but rather capturing a competitive *advantage*.

Nor is it clear that environmental controls will severely affect America's competitive position. A report for the National Commission of Materials Policy from the National Academies of Science and Engineering examines the impact of general environmental controls:

> There are only a few econometric estimates of the impact of environmental control on the short-term balance of payments and level of aggregate income. One, using an econometric model of the U.S. economy and projected future American EC measures (assuming other nations do *not* follow suit), emerges with the following results: Over the 1972–80 period, pollution control and compensatory macroeconomic policy measures are expected to raise the U.S. unemployment rate by 0.3 percent, raise the average annual rate of inflation by 0.26 percent, reduce fixed investment not related to pollution control by an average of $2.3 billion annually, and exert *a negative impact on the U.S. balance of trade in the amount of $1.9 billion* (Council on Environmental Quality 1972). If, on the other hand, pollution control costs

are 50 percent higher than current estimates, or standards are raised correspondingly, the average annual 1980 negative trade balance effect is estimated to be in the neighborhood of $3.2 billion or 6–7% of current level of exports. [Emphasis added.]

The meager empirical evidence available at this time suggests the balance of payments, employment, and national income effects resulting from domestic environmental controls are likely to be relatively small for the United States. This is true even if the trend toward indirect subsidization is reversed toward a full "polluter pays" principle. Thus, a tentative conclusion is that the *aggregate impact* of domestic environmental controls should not be a matter of deep concern for policymakers. Of more crucial importance are the short-term impacts on particular firms and industries. Substantial additional research is needed on these questions.[15]

Moreover, the President's Science Advisory Committee takes into account the expectation that foreign rivals would be adopting similar regulating controls.

Thus, the notion that the United States would suffer a severe competitive disadvantage internationally if it enforces strict environmental controls in the occupational health and safety area is open to question. Such enforcement may, however, change the mix of small and large firms in a hazardous industry, with some smaller and marginal firms disappearing. It would seem, then, that competition in international markets does not appear to create an economic imperative for relaxing the provisions of occupational health and safety legislation. What seems to emerge is an imperative to adopt uniform international standards and practices and to devise special forms of assistance to smaller or marginal producers. □

——FOOTNOTES——

[1] In coal mining, the Coal Mine Health and Safety Act of 1969 is also changing management and labor attitudes.

[2] There are other persuasive arguments for closer collaboration between those concerned with these 2 environments: (1) Very often persons who work in industrial plants also live near those plants and are thus in a position of "double jeopardy." (2) A health danger to the general population may be recognized as a result of illness among persons working with high concentrations of previously unknown hazards. (3) Efforts to clean up the factory may result in polluting the general environment, and, conversely, efforts to "contain the pollution" may mean increased pollution within the plant. The problems of the general and workplace environments are thus intimately connected and must be attacked together.

[3] See *The President's Report on Occupational Safety and Health*, (U.S. Department of Labor, Health, Education and Welfare, and Occupational Safety and Health Review Commission, 1972), p. 111.

[4] Richard Thaler and Sherwin Rosen, "The Value of Saving a Life: Evidence from the Labor Market" (Discussion paper, Department of Economics, University of Rochester, November 1973), p. 29.

[5] *Chemicals and Health: Report of the Panel on Chemicals and Health of the President's Science Advisory Committee* (Washington, National Science Foundation, 1973), p. 152.

[6] *Work in America: Report of a Special Task Force to the Secretary of Health, Education, and Welfare* (Cambridge, Mass., The MIT Press, 1973), p. 79.

[7] Statement of Marvin A. Kastenbaum, *Congressional Record*, Vol. 113, No. 108, June 30, 1972, p. 1.

[8] C. E. Searle, "Chemical Carcinogens and Their Significance for Chemists," *Chemistry in Britain*, January 1970, p. 7.

[9] *Man's Health and the Environment—Some Research Needs: Report of the Task Force on Research Planning in Environmental Health Science* (U.S. Department of Health, Education, and Welfare, Public Health Service and National Institutes of Health, National Institute of Environmental Health Sciences, 1970), p. 147.

[10] See Metropolitan Life Insurance Co. *Statistical Bulletin*, July 1973, p. 6.

[11] *Man's Health and the Environment*, p. 75.

[12] D. P. Discher and others, *Pilot Study for Development of an Occupational Disease Surveillance Method* (U.S. Department of Health, Education, and Welfare, 1975), HEW Publication (NIOSH) 75–162.

[13] See *Protecting the Health of Eighty Million Americans* (U.S. Department of Health, Education, and Welfare, Public Health Service, 1965).

[14] Workers' compensation in paying for treatment, rehabilitation, or harm is probably not nearly as cost-effective as prevention. However, since prevention costs must be incurred now whereas treatment and compensation costs may be deferred—or even avoided entirely—the higher dollar costs in delayed action may be discounted to a relatively lower present value than prevention costs.

[15] National Academies of Science and Engineering. *Man, Materials and Environment*, a report for the National Commission on Materials Policy, March 1973, p. 172.