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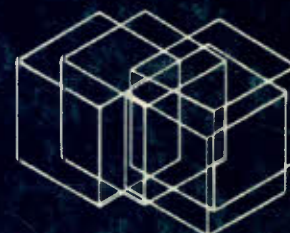
**OCCUPATIONAL HEALTH AND SAFETY:
ISSUES AND ALTERNATIVES**

Pran Manga, Ph. D.
Robert Broyles, Ph.D.
Gil Reschenthaler, Ph.D.



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OCCUPATIONAL HEALTH AND SAFETY:
ISSUES AND ALTERNATIVES

by

Pran Manga, Ph.D.
Robert Broyles, Ph.D.
Gil Reschenthaler, Ph.D.



The findings of this Technical Report are the personal responsibility of the authors, and, as such, have not been endorsed by members of the Economic Council of Canada.

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P. Manga
R. Broyles
G. Reschenthaler

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RÉSUMÉ

L'étude est divisée en 12 chapitres. Le contenu de chacun d'eux est présenté brièvement comme suit. Dans le premier chapitre nous présentons une vue d'ensemble de l'importance des problèmes de santé et de sécurité au travail au Canada. La distinction entre accidents et maladies est particulièrement mise en lumière dans ce chapitre. Les facteurs sous-jacents à l'importance croissante attachée par le public à la santé et à la sécurité au travail sont expliqués. Le chapitre 2 fournit une description et une discussion de la situation canadienne concernant les accidents du travail alors que le chapitre 3 traite des maladies. Dans ces deux chapitres, l'accent est mis sur la nature et les carences de l'information statistique disponible au Canada ainsi que sur les évaluations des conséquences économiques des accidents et maladies. La conclusion principale est que l'étendue du problème est souvent sous-estimée par les données officielles.

Le chapitre 4 présente une brève évaluation du programme de la Commission des Accidents du Travail. Nous insistons sur certains des problèmes concernant ces programmes tels que ceux portant sur le processus décisionnel, les indemnisations et les évaluations concernant les accidents du travail et les maladies particulièrement.

Le chapitre 5 est consacré à une analyse des raisons économiques expliquant l'intervention du gouvernement dans des marchés privés afin de réduire les risques à la santé et à la sécurité au travail. Les raisons pour lesquelles on ne peut compter sur les marchés sont décrites et analysées. Nous en concluons qu'il y a de multiples raisons pour que le gouvernement joue un rôle important en vue de réduire les accidents du travail et les maladies.

Le chapitre 6 fournit une structure qui permet d'évaluer les raisons favorables ou non à l'intervention du gouvernement. Cette structure est alors utilisée afin de présenter brièvement un aperçu historique des actions et politiques gouvernementales dans le chapitre 7. Une attention

particulière est portée sur les industries d'extraction au Québec et en Ontario qui servent à illustrer l'application générale de la structure proposée au chapitre 6. Dans le chapitre 8 nous présentons les politiques et programmes du gouvernement fédéral portant sur la santé et la sécurité au travail. Les problèmes soulevés par ces politiques sont expliqués brièvement. Les changements récents ainsi que les questions controversées entourant les responsabilités juridictionnelles respectives du gouvernement fédéral et des gouvernements provinciaux sont aussi décrits.

La Colombie-Britannique est la seule province ayant intégrée à sa Commission des Accidents du Travail de nombreux programmes de santé et sécurité au travail. Cette approche portant sur la santé et la sécurité au travail est décrite au chapitre 9. Dans le chapitre 10 nous décrivons et évaluons le programme de la Saskatchewan. Il se distingue philosophiquement de celui des autres provinces et, à certains égards, a introduite des changements qui ont eu une influence importante sur le reste du Canada. Dans le chapitre 11 qui décrit le programme Ontarien, l'accent est mis sur la "Loi sur la Santé et la Sécurité au Travail" (loi 70) récemment promulguée. Les similarités et les différences dans les approches retenues par ces provinces sont soulignées.

Le chapitre 12 réunit les divers éléments de l'étude et recommande un ensemble de politiques publiques visant à réduire les risques au travail. Nous recommandons une réduction de l'importance accordée à l'approche réglementaires visant à réduire les accidents du travail si, et seulement si, des politiques compensatoires sont instituées dans les domaines des comités conjoints employés-employeurs, du droit à refuser un travail dangereux, des programmes d'information et d'éducation sur la sécurité. Nous recommandons aussi certaines réformes des Commissions des Accidents du Travail. Il est néanmoins impossibles, dans le cas des maladies du travail, d'éviter l'approche réglementaire bien que, dans ce cas, des stratégies alternatives sont parfois possibles et recommandables.

SUMMARY

The study is organized into 12 chapters. The contents of the chapters are summarily presented as follows. In Chapter 1 we present an overview of the dimensions of the occupational health and safety problems in Canada. The distinction between injuries and disease is highlighted in this chapter. Factors behind the increasing public concern about occupational health and safety are explained. This is followed by a description and discussion of the occupational injury experience in Canada in Chapter 2 and of occupational illness in Chapter 3. In both chapters much emphasis is placed on the nature and shortcomings of the statistical data extant in Canada as well as estimates of the economic burden of injuries and disease. The general conclusion is that the extent of the problem is often underestimated by official data.

In Chapter 4 a brief assessment of the Workmen's Compensation program is presented. We point out problems with these programs such as those related to the adjudication process, disability benefits and the estimates relating to occupational injuries and illnesses, particularly the latter.

Chapter 5 is devoted to an analysis of the economic rationale for government intervention in free markets to reduce occupational hazards. Various types of market failures are described and assessed. It is concluded that there is ample reason and scope for a significant role for government in reducing workplace injuries and disease. Chapter 6 provides a framework that permits one to assess the pressures and counterpressures for government intervention. This framework is then applied to present briefly a historical overview of government actions and policies in Chapter 7. Particular attention is focused on the mining industries of Quebec and Ontario as illustrative examples of the general applicability of the framework outlined in Chapter 6.

In Chapter 8 we present the occupational health and safety policies and programs of the federal government. The problems with these policies are briefly explained. Recent changes and contentious issues surrounding

jurisdictional issues between the federal and provincial governments are also described.

British Columbia is unique in having consolidated within its Workers' Compensation Board a variety of occupational health and safety programs. This approach or model to occupational health and safety is described in Chapter 9. In Chapter 10 we describe and assess Saskatchewan's health and safety program. It is philosophically differentiated from other provinces and in many respects introduced changes that had a significant influence on the rest of Canada. Chapter 11 describes the Ontario program with much emphasis being placed on the recently passed Occupational Health and Safety Act (Bill 70). In all these case studies similarities and differences in approach are highlighted.

Chapter 12 brings together the various elements of the study and recommends a public policy package in the pursuit of occupational risk reduction. We argue for a lower emphasis of the standards approach in controlling workplace injuries if and only if compensating policies are implemented in the areas of joint management-union health and safety committees, the right to refuse hazardous work, safety education and information programs. However, in the case of occupational disease, the standards approach is inescapable even though alternative strategies are sometimes both feasible and advisable.

Chapter 1: OCCUPATIONAL HEALTH AND SAFETY: MAJOR ISSUES AND DIMENSIONS OF THE PROBLEM

1.1 An Overview of the Problem

Approximately 200 new health problems arise annually, all unknown the year before and most of these are associated with the work environment (LRHPB, 1977). It has been estimated that on a typical eight-hour work day, 4,000 workers are injured on the job and that more than a million cases of occupational diseases, injuries and fatalities are reported to the provincial workmen's compensation boards (WCB) annually (Rabinovitch, 1979; OS & HB, 1979). The workmen's compensation claims have paid for more than half a million patient-days in Canadian hospitals annually, or the equivalent of 1,400 hospital beds every day for occupational injuries and illnesses (LRHPB, 1977). Dr. Paul Rohan, a McGill University specialist on occupational health and safety, estimates that one worker is injured in Canada every 16 seconds (The Ottawa Citizen, July 4, 1978).

That occupational injury represents a serious economic problem may be further documented by comparing the number of man-days lost due to disabling-nonfatal accidents with the number of man-days lost due to work stoppages (strikes and lockouts). An inspection of Table 1.1 reveals that the time lost due to disabling injury increased from 6,535,000 man-days in 1968 to 12,277,000 man-days in 1978. Thus, during this period, time lost due to disabling injury increased by 88 percent. In addition, these data reveal that, with the exception of 1969, the time lost due to disabling injuries exceeded the time lost due to work stoppages. Moreover, if we ignore the ratio of .94, the time lost due to disabling injury was between 8 and 244 percent greater than the time lost due to work stoppages. On the average, 6,895,000 man-days were lost due to work stoppages per year as compared with the average annual loss of 9,702,000 man-days due to disabling injuries. The comparison portrayed graphically in Figure 1.1 is even more impressive when one recognizes that a portion of the days lost to strikes and lockouts was probably precipitated by disputes concerning health and safety issues.

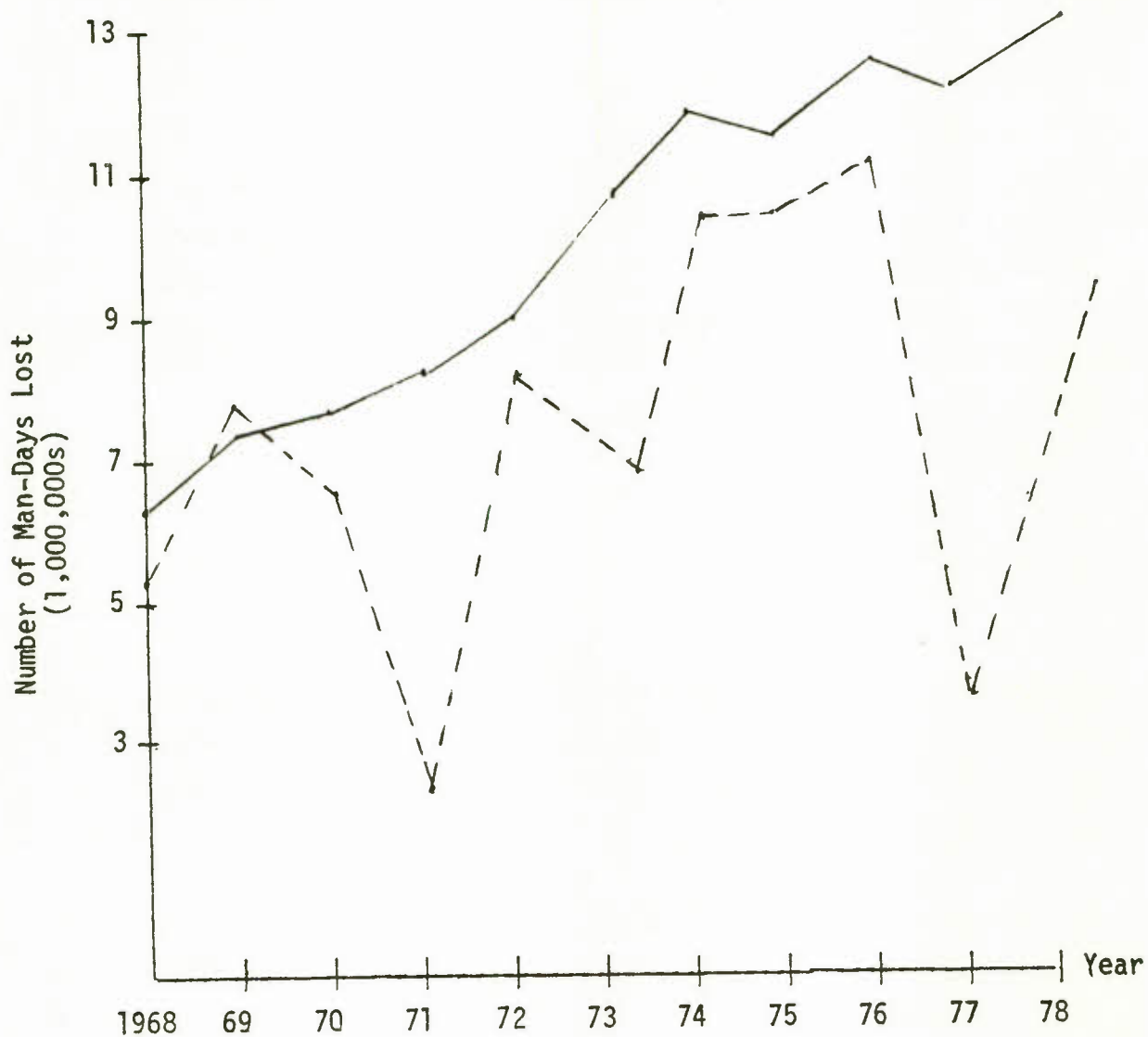
Table 1.1 Man-Days Lost Due to Disabling Injuries and Work Stoppages in Canada, 1968-1978

Year	Man-Days Lost (in 000's)		Relative Importance of Disabling Injuries[1]
	Work Stoppages	Disabling Injuries	
1968	5,083	6,535	1.29
1969	7,752	7,271	.94
1970	6,540	7,564	1.16
1971	2,867	8,147	2.84
1972	7,754	8,709	1.12
1973	5,769	10,501	1.82
1974	9,255	11,500	1.24
1975	9,221	11,011	1.19
1976	10,909	11,830	1.08
1977	3,308	11,385	3.44
1978	7,393	12,277	1.65

(1) Relative importance measured by the ratio of the man-days lost due to injury relative to the man-days lost due to work stoppages.

Source: Economics and Research Branch, Labour Canada.

Figure 1.1 The Relative Importance of Disabling Injury



Source: Economics and Research Branch, Labour Canada.

Moreover, it should also be noted that the loss of man-days which is attributable to fatal injuries is not reflected in the data presented in the table. It has been estimated that approximately 6,000 man-days are lost for each fatal injury. Since an annual average of 1,005 fatal injuries occurred during the period 1968-1978, an additional 6,031,800 man-days were lost each year. More recently, Rabinovitch (1979) estimated that more than 70 million working days are lost due to disabling injuries, fatal injuries and noncompensated cancer deaths. The annual loss of 70 million man-days is estimated to be more than ten times greater than the loss of time due to work stoppages. These estimates seem to suggest that a crisis exists in the Canadian workplace.

1.2 An Overview of the Issues

That occupational injury and disease create serious economic and social problems is not seriously contested. In response to these problems, most industrialized societies have increased the scope and pervasiveness of government regulation, much of it reflecting a relative emphasis on "social" regulation rather than "economic" regulation.¹ Perhaps the most important examples of social regulation are those pertaining to occupational health and safety.

Regulations have always engendered critical comments and controversy and this is particularly true of those respecting occupational health and safety. There are several distinct themes or strains of criticisms concerning current and proposed regulations.

Judging from the literature in this field it is apparent that contemporary regulatory processes are found to be insufficiently democratic in the sense that effective public participation and the full expression of the views of particular constituencies are lacking. With respect to labour, the Ham Commission (1976, p. 6) concluded that "the worker as an individual and workers collectively in labour unions or otherwise have been denied effective participation in tackling these problems; thus the essential principles of openness and natural justice have not received adequate expression". This lack of participation not only applies in the

formulation of new regulation but also in the enforcement and administration of existing regulations or programs (for example the Workmen's Compensation system). The process of formulating regulations is said to be complex, uncertain and ad hoc, usually lacking clearly enunciated rules and bases (technical, medical, legal, economic) upon which interested parties can contest particular decisions. This deficiency is compounded by not only the scarcity of the knowledge and sound technical information to allow effective participation in the regulatory process, but problems in the access and distribution of relevant information. There have been frequent accusations of improper secrecy and contrived difficulties in the collection, analysis and dissemination of data. Another compounding factor is the long-abiding perception that government, either by design or by neglect, has a dismal record of enforcing regulations. The resulting scepticism can only serve to denigrate the regulatory process.

Another major theme critical of regulations in this field is that the existing and proposed regulations do not take adequate account of their economic consequences. The "economic impact" critiques of regulations assert that all too often the cost-effectiveness of proposals are simply not known; and when known occasionally indicate that regulations are unwise. It is argued that existing policies and programs are not or may not be effective in achieving the occupational health and safety objectives and that alternative strategies may be preferable. These critics typically advocate that the regulatory process take adequate cognizance of the cost-effectiveness of proposed rules and standards in their decision-making and that these analyses be made public. Some regulatory reform proposals require that regulatory objectives be achieved in the most cost-effective manner, unless the agency decides that the public interest requires the use of a less cost-effective alternative and clearly explains the basis for such a decision (Brown, 1979).

In several jurisdictions in Canada the decision to require governmental agencies to conduct economic (sometimes called inflation or socio-economic) impact studies for proposed major social regulations has already been taken.² Unlike Canada, the regulatory process in the United States has undergone more scrutiny recently than ever before. Consider-

able attention has been given to improving the regulatory process.³ In both countries, there are some who still question whether or not regulation is necessary and couch their antipathy in theoretical rhetoric about "big government" versus "private enterprise". However, much of the debate has moved from this question of principle and focuses on regulatory methods, costs and effectiveness and improving the regulatory process so as to enhance effective public participation.⁴

The present study will pay particular attention to the broad issues described above. There are, of course, a number of more specific but important concerns that are manifest in the controversies surrounding occupational health and safety regulations and legislation. Before turning attention to these matters, however, we consider first, the distinction between occupational illness and injury, specific health and safety hazards present in the workplace as well as the quantitative importance of occupational illness and injury in Canada.

1.3 The Distinction Between Occupational Disease and Occupational Injury

For legal, conceptual and theoretical reasons it is desirable to distinguish between occupational illness and occupational injury. At the risk of over-simplifying, an occupational injury is: 1) definite in both time and place; 2) the result of an etiology which is usually definable in terms of an unsafe act or an unsafe condition; 3) an event which imposes more or less immediate consequences on the worker, the employer and the insurance carrier.

These characteristics have important policy implications regarding the combined use of economic incentives and standards or guidelines in reducing the frequency or rate of occupational injuries. Since accidents are usually the result of an unsafe act or an unsafe condition, the reduction or elimination of occupational injuries represents the responsibility of both management and labour while the Joint Health and Safety Committee represents an organizational vehicle by which these parties might cooperate in improving the environment of the workplace. On the other hand, standards or guidelines established by management and labour

with the assistance of government represent the basis for monitoring, evaluating and controlling hazards present in the workplace. Thus joint health and safety committees coupled with a set of standards or guidelines that are enforced, in large part, by management and labour might be regarded as permissive factors in the system by which safety hazards and occupational injuries are reduced or controlled. With regard to the importance of economic incentives in reducing the accident rate, recall that occupational injuries occur in an identifiable workplace and impose more or less direct economic consequences on the employer and employee. As will be discussed in more detail later, employers consistently underestimate the costs of accidental injury which results in an underinvestment in occupational safety. Further, we shall argue that an incentive system in which the full costs of occupational injury are imposed on the firm induces the employer to reduce the underinvestment in safety programs as well as the frequency or rate of accidental injury.

In contrast to accidental injuries, many of the commonly recognized occupational diseases are believed to be the result of: 1) environmental factors; 2) biological and lifestyle factors; 3) occupational factors; and 4) a complex interaction between environmental, lifestyle and occupational hazards. As such, occupational disease depends, in part, on work-related conditions, but its etiology is complex and not well understood by the worker, the physician or the employer. As a consequence, it is difficult to establish a cause-effect relationship between exposure to a work-related hazard and the onset of illness (Ashford, 1977, p. 408). Moreover, many of the commonly recognized forms of occupational illness are difficult to detect and are characterized by long latency periods (Ison, 1977, p. 64).

In particular, when considering cancer, Mayneard (1978) observes that "an important feature of carcinogenesis is the long so-called 'latent period' between the application of the carcinogen and the observation of the tumor, this time interval usually being greater the smaller the dose of the agent, whether physical or chemical. What precisely is happening in that latent period we do not know, but much evidence from pathology, cytology and many other fields suggest the occurrence of a series of events,

mostly moving towards increasing abnormality and heterogeneity of structure of cells and tissues until limited by abnormality so great as to lead to cell 'death' or capacity for increased and finally controlled cell division. 'Latent' is a misleading term if it suggests 'inactivity'".

As in the case of occupational injuries, the characteristics of occupational illness have important policy implications. The long latency period of many illnesses coupled with the mobility of labour suggests that the benefits which emanate from an investment in an occupational health program may not be captured by the employer. Moreover, given the complex etiology of many occupational diseases, the assignment of responsibility for the onset of illness is a difficult task. As will be discussed in more detail later, these factors mitigate against the use of economic incentives as a mechanism of controlling health hazards and reducing the incidence of occupational disease. As a result, we shall argue that the regulatory and enforcement process is the only mechanism which will result in a reduction or elimination of health hazards in the workplace.

In summary, relative to occupational injury, occupational disease is the result of a more complex etiology while occupational hazards that result in the onset of illness are not only less definite in time or place but they are also less likely to impose direct economic penalties on the employer. Further, as will be documented in the following chapters, occupational injuries and illnesses emanate from two more or less distinct sets of hazards or risks. For these and other reasons, then, we shall consider the importance of occupational disease and injury separately.

Chapter 2: OCCUPATIONAL INJURIES

Although occupational health is the subject of increasing attention and concern, Workmen's Compensation Boards and educational programs continue to focus on occupational injuries. As a result, we consider first the safety risks which are present in the workplace and then consider the importance of occupational injuries in Canada.

2.1 Safety Hazards

Ashford (1976, pp. 68-71) identified fires, explosions, electrocution, the operation of stationary and moving equipment, operations requiring eye protection, ergonomic factors, vibration, heat stress and noise as specific safety hazards. In addition, aspects of the work process to include shift work, overtime and the rate of production as well as the quality of working life are believed to increase the probability of industrial injury. Each of these factors is considered below.

All machines have moving parts which, if unguarded, can cause injury. For example, machines that are capable of sawing, binding, molding, mixing, grinding or transporting raw material, parts or semi-finished products have moving parts which can cut, mutilate or otherwise injure the worker. In addition to the hazards posed by stationary machinery, workers may be injured by moving equipment, particularly in situations where there are no warning signals, guard rails or aisle markers. Closely associated with the presence of industrial equipment is the risk of electrocution which is enhanced by the fact that most of the machinery used in Canadian industry requires 220 volts or more.

An additional source of risk involves an exposure to occupational vibration. The operation of transportation equipment as well as many forms of industrial equipment such as pneumatic drills results in vibration which is absorbed by the worker. More specifically, "white finger", which is a circulatory disorder characterized by numbness and ulceration leading to possible gangrene of the fingers has been associated with the

prolonged use of power equipment (Winnipeg Free Press, July 11, 1978). In addition to the direct and obvious hazards associated with the operation of such equipment, it is also important to note that occupational vibration can contribute indirectly to the incidence of occupational injury and in some instances to occupational disease. When absorbing vibration or repeated blows, the worker must exert muscular energy which increases metabolic processes and physical stress. Both of these factors can result in fatigue and a reduction in reflex responses which, in turn, can contribute to the incidence of industrial accidents.

Ergonomic factors and the design of industrial equipment may also contribute to the incidence of accidental injury. The objective of most industrial processes is to maximize the amount of output that is obtainable from a given set of resources. In designing the equipment employed in such a process, increasing productivity rather than enhancing the safety of workers is usually of primary concern. More specifically, equipment is frequently designed so that the operator is positioned near moving parts which, of course, contributes directly to the incidence of occupational injury. Other ergonomic aspects such as lighting, comfort of the operator as well as the size and shape of tools exert an impact not only on efficiency but also on the well-being of the worker. Thus, to the extent that the design of equipment increases worker fatigue as well as psychological and physiological distress, the likelihood of industrial accidents is correspondingly increased.

Perhaps one of the most important side-effects of mechanical devices is the creation of sudden or prolonged noise. Obviously, excessive noise can damage or rupture the eardrum. On the other hand, the presence of excessive and prolonged noise can contribute to the incidence of injury by preventing the worker from hearing warning signals or by reducing the acuity of other senses (Raytheon Service Co., 1972). The effects of excessive noise can cause physiological problems other than just the loss of hearing. "It can have an effect on emotions, produce irritability, increase blood pressure and heart rate and produce nausea. These effects on the worker in a noisy environment are not well defined as an occupational illness, but may have an effect on the quality and efficiency of work

performed" (NIOSH guide, 1979, p. 147). That noise is a safety risk has been long recognized by health and safety professionals who have joined labour in demanding increased regulations designed to reduce noise levels in the workplace.

In addition to the problems posed by noise, the presence of excessive heat can also contribute to the incidence of industrial accidents. The presence of excessive heat is perhaps most pronounced when the worker is engaged in intense physical activity and can produce dehydration, cramps as well as psychological and physiological discomfort. The effects of excessive heat are manifest in a reduced job performance and concentration which, in turn, contributes to the incidence of occupational accidents and injuries.

As mentioned earlier, aspects of the workplace and the quality of working life are believed to contribute to the occurrence of occupational injury and, in some cases, occupational disease. More specifically night and shift work seem to disrupt circadian rhythms which results in sleep and digestive disorders (Simard, 1977; Zalusky, 1978; Story, 1973). In addition, the European Commission (1977) highlights a greater than average incidence of serious injuries among individuals engaged in shift work as well as the disruptive influence of shift work on the social and family lives of workers. Even though some workers are able to adjust to night shifts, frequent changes in work schedules reduce the alertness and the responsiveness of employees (Eustace, 1965). As a result, workers are less able to respond adequately to an emergency situation (Alluisi, 1967).

Even though no law specifically deals with shift work in Canada or the U.S., legislation specifies the number of hours of work permitted per day or per week as well as the overtime premiums that must be considered when designing shift work. Other factors that should be considered include shift differentials, the sequence of shift rotation, the frequency of shift rotation¹, periods of rest², the number of crews³ to be used as well as the social-psychological and physiological problems that emanate from shift work (WWR, 1978 and Zalusky, 1979). The basic problems posed by shift work have been recognized explicitly in France

where the further extension of shift work is limited to areas in which technological factors require continuous operations (Young, 1978; WWR, 1978).

In the U.S. and Canada, the problems posed by shift work have increasingly been resolved within the context of the collective bargaining process. Labour unions have been successful in obtaining wage differentials to compensate employees for shift work and we might expect workers, employers as well as the government to seek alternate methods of alleviating the problems emanating from shift work.

At this point it is important to note that the safety hazards identified above seldom exist in isolation. Rather, several of the individual hazards are likely to be present in a given work situation and interact in a synergistic fashion. As a result, the presence of several factors in a given environment is likely to give rise to a greater number of injuries than in workplaces in which the same hazards exist in isolation.

Finally, falls and lifting cause frequent accidental injury. In most cases falls could be avoided by providing guard rails, warning markers and maintaining an uncluttered work area. In addition, nets, safety belts and safety lines can prevent serious injury in the event of a fall. Similarly, improper lifting may result in a back injury which is becoming one of the most frequent reasons for worker compensation.⁴ As an indication of the importance of the problems created by improper lifting, it has been demonstrated that muscle strain among Canadian hospital workers contributes to an annual absenteeism rate of 3.2 days per employee (LRHPB, 1977).

In general, both the worker and the employer are aware of the safety hazards that are present in the work environment. Moreover, methods of reducing or eliminating most, if not all, safety risks in the work environment are currently available. For example, technological and ergonomic solutions are available for many safety hazards. Similarly, even though it is not possible to reduce or eliminate shift work in certain areas such as the steel and hospital industry, it seems feasible to reduce the use of

overtime, worker fatigue and hence the occurrence of injuries. Thus, unlike occupational disease, the presence and the nature of safety hazards as well as the solutions to such risks are known and available to both management and labour.

2.2 Deficiencies in Information Regarding Occupational Injury

Before addressing the injury experience in Canada, it seems desirable to comment on the validity of the data on which our discussion will be based. The information pertaining to the frequency of work-related injuries is compiled from the records of the various Workmen's Compensation Boards. As a result, the validity of the data reviewed here is related to the collection practices, reporting mechanisms, claims policies and definitions employed by the various provincial boards. These factors, coupled with employer-specific and employee-specific incentives, have created an environment that is conducive to the potential concealment and persistent underreporting of injuries.

There is no administrative agency which has as its major responsibility the collection and analysis of national and provincial data that pertains to the total incidence of industrial accidents. Given that the information collected and reported by provincial Workmen's Compensation Boards is fragmentary at best, it is not possible to assess the extent to which the problem of occupational injury and disease has been controlled in recent years. As an example, except for the Province of Quebec, the Workmen's Compensation Boards do not compile information depicting the number of workers covered within their jurisdiction (OS & HB, 1979). In addition, available data do not include information for the workers of the Yukon and Northwest Territories (OS & HB, 1979). Although these workers constitute roughly .5 percent of the Canadian work force, their particular situation is obviously unique in relation to the rest of the work force.

The most recent attempts at coordinating and developing a uniform classification system for recording provincial occupational injury and disease statistics began in 1974. This was undertaken by the Occupational Safety and Health Branch of Labour Canada in conjunction with the Provin-

cial Workmen's Compensation Boards and with the assistance of the Canadian Association of Administrators of Labour Legislation (CAALL). To date only British Columbia, Saskatchewan and Ontario have joined the National Statistics Program. As this seems to represent the major body for standardizing information pertaining to injuries and diseases, the discrepancies in data collection practices, reporting mechanisms, claims policies as well as injury and disease definitions or categories employed throughout Canada will continue for the foreseeable future.

The presence of unreported injuries has been documented by several studies. For example, Sands (1968) examined 50 American companies and concluded that only one-half of all accidents are reported. Similarly, the Robens Commission (1972) estimated that injuries in Great Britain were understated by 25 percent. It is also probable that injuries are not uniformly underestimated. For example, accidents resulting in death or disability usually require medical assessment and, as a result, these types of accidents are usually not concealed. On the other hand, the problem of underestimation is probably quite pronounced when viewed from the perspective of less serious injuries that neither incapacitate the worker nor require medical care.

The extent to which injuries are underreported depends on a set of employer-specific incentives and a set of employee-specific incentives. With respect to the latter, it is important to recognize that the difference between the normal rate of pay and the amount of compensation received from the Workmen's Compensation Board represents a reduction in the money income of the injured worker. As such, the reduction in money income represents an economic incentive that induces the individual to ignore a minor injury, remain on the job and perform less demanding tasks. In addition to the potential reduction in money income, concerns regarding job security also induce the individual to ignore a less serious injury (Doherty, 1979). During periods of widespread unemployment, the job security of a worker may be jeopardized by frequent or extended absences from the workplace. Further, to the extent that the work day is shortened during periods of reduced activity, the economic imperative to avoid additional reductions in pay due to absences from work is enhanced. Thus,

the set of employee-specific incentives may result in an underreporting of less serious injuries.

When viewed from the perspective of the employer, there are incentives that are conducive to the underestimation of injuries. For example, the possible loss of merit rebates, the imposition of super assessments and experience rating systems of determining workmen's compensation premiums induce the employer to underreport injuries. Thus, the potential for imposing economic penalties or withholding economic rewards also contributes to the problem of underestimating occupational injuries. It should be noted that these economic incentives are offset somewhat by the presence of fines that are imposed on the employer for concealing injuries. Unfortunately, however, the expected cost of concealing an injury is not only a function of the level of the fine but also the probability that a fine will be imposed. As a consequence, the expected cost of concealing injuries is usually much less than the fines that might legally be imposed on the employer.

In addition to the economic incentives mentioned above, several institutional factors also influence the extent to which injuries are underreported. First, the presence, or absence, of labour unions and work site committees probably influence the magnitude of underestimation. It is reasonable to presume that the presence of a labour union or a work site committee tends to ensure that all accidents are reported. Consequently, the accident experience of firms or sectors in which labour unions and work site committees are absent is probably understated.

That an accident is reported only if the individual is covered by the provincial Workmen's Compensation program is also one of the institutional factors that results in the underestimation of work-related injuries. It is estimated that 20 to 30 percent of the Canadian work force is not covered by the Workmen's Compensation system (LRHPB, 1977). Consequently, coverage is neither comprehensive nor uniform among the various provincial jurisdictions. For example, in Alberta less than five percent of workers employed in the financial sector are covered by the Workmen's Compensation program. Conversely, the percentage of similar employees covered in Brit-

ish Columbia is much higher. This comparison suggests that the reported injuries among workers employed in the financial sectors of both provinces will understate the actual number of accidents and that the extent to which injuries are underreported is greater in Alberta than in British Columbia.

In addition to the extent of coverage, the claims policy of the Workmen's Compensation Board may also influence or distort reported injuries. In particular, a Workmen's Compensation program that: 1) offers a minimum benefit package; 2) processes claims slowly; and 3) has a history of rejecting claims is likely to discourage workers from reporting less serious injuries. Given the concerns expressed by labour regarding the adjudication process, the claims policy of Workmen's Compensation boards undoubtedly contributes to the systematic understatement of occupational accidents and injuries.

2.3 The Importance of Occupational Injuries

The prevalence and importance of occupational injury may be quantified in terms of: 1) absolute frequencies; 2) various injury rates such as the number of injuries per 100 workers or the number of injuries per 100,000 man-hours worked; 3) the severity of occupational injuries; and 4) the relative costliness of occupational injuries. Further, the problem of occupational injury may also be discussed in terms of differing levels of aggregation. Accordingly, we shall assess the extent to which occupational safety constitutes a serious problem by examining national, provincial and industry-specific data. The lowest level of aggregation involves an examination of the extent to which characteristics of the worker are associated with the occurrence of industrial injuries.

2.3.1 The Accident Experience in Canada

Presented in Table 2.1 are time series data for the period of 1969-1978 which reflect 1) the number of employed workers; 2) the number of reported injuries; and 3) the number of reported injuries per 100 workers. The data presented in this table reflect a more or less constant number of

Table 2.1 The Number of Employees, the Number of Reported Injuries and the Number of Reported Injuries/100 Workers in Canada, 1969-1978

Year	Number of Reported Injuries[1,2]	Employment (in 000's)	Reported Injuries/100 Workers
1969	795,407	6,590.7	12.07
1970	793,670	6,691.8	11.86
1971	793,535	6,849.7	11.58
1972	880,454	7,108.5	12.39
1973	985,640	7,491.4	13.16
1974	1,047,007	7,861.4	13.32
1975	988,155	7,981.2	12.38
1976	1,044,505	8,120.8	12.86
1977	1,039,650	8,339.6	12.47
1978	1,071,484[3]	8,491.0[3]	12.62[3]

(1) Excludes the Yukon and Northwest Territories.

(2) Includes illness and fatality claims.

(3) 1978 data are preliminary.

Source: Occupational Safety and Health Branch, Labour Canada (October 1979).

injuries per 100 workers during the period, with an annual average rate of 12.5 reported injuries/100 workers.

Presented in Table 2.2 are the number of nondisabling, disabling and fatal injuries as well as the rates at which these types of injuries occurred during the period 1967-1978. In terms of the categories of injury portrayed in the table, a disabling injury is defined as "any work injury (including a fatality and occupational illness) that prevents an employee from reporting for work or effectively performing all the duties connected with his 'regular work' on any day subsequent to the day on which the injury occurred whether or not that day was a holiday or other nonworking day; or results in the loss by an employee of a body member or part thereof or in a complete loss of its usefulness or in the permanent impairment of a body function whether or not the employee is prevented from reporting for work or effectively performing his regular work." On the other hand, a nondisabling injury has been defined as any "work injury" for which medical aid only was provided and that was not a "disabling injury" (OSMB, 1979, p. 1). As such, these categories reflect the relative seriousness or severity of work-related injuries during the time interval.

The data presented in this table suggest that the number of disabling and nondisabling injuries increased by 65 and 20 percent respectively while the number of fatal injuries declined slightly. A further inspection of this table reveals that the number of nondisabling injuries per 100 workers decreased during the period while the number of disabling injuries per 100 workers increased substantially. At first glance, these data seem to suggest that nonfatal injuries have become more serious or severe during the period. However, it is important to note that the number of potential workers increased at a rate which exceeded the growth in the available job opportunities. Thus, even though employment increased during the period, the number of unemployed individuals also increased. Referring to our earlier discussion, it is possible that increasing unemployment resulted in deteriorating job security and increased the sensitivity of employed workers to the economic incentives to ignore less serious injuries. Thus, it is possible that the observed increase in the ratio of disabling to nondisabling injuries is perhaps more an artifact of under-

Table 2.2 Nondisabling, Disabling and Fatal Injuries and Diseases and their Respective Rates, Percentages of All Claims and the Ratio of Disabling to Nondisabling Injuries (1969-1978)

Year	Nondisabling Injuries		Disabling Injuries		Ratio of Disabling Injuries to Nondisabling Injuries
	Number (000's)	Rate (/100 Workers) All Claims	Number (000's)	Rate (/100 Workers) All Claims	
1969	504.6	7.66	290.8	4.41	.576
1970	491.1	7.34	302.6	4.52	.616
1971	480.3	7.01	313.2	4.57	.652
1972	488.8	6.88	391.7	5.51	.801
1973	547.3	7.31	438.4	5.85	.801
1974	573.3	7.29	473.7	6.03	.826
1975	547.1	6.86	441.0	5.53	.806
1976	571.3	7.04	473.2	5.83	.828
1977	584.3	7.01	455.3	5.46	.779
1978	580.4	6.84	491.1	5.78	.846

(*) Includes a large number of deaths in Ontario of pensioners who had earlier disabling work injuries.

(1) See the comments in the footnotes on the previous table, Table 1.2

(2) Information for 1978 is preliminary and probably represents an underestimation.

Source: Occupational Safety and Health Branch, Labour Canada (October, 1979).

reporting less serious injuries than a relative increase in the severity of nonfatal injuries.

Of particular interest is the relative decline in the number of disabling and fatal injuries per 100 workers during the period 1974-1977. At first glance, these data suggest that improvements in occupational safety have resulted in a reduction in the rate at which serious injuries occur.

However, the decline in the disabling and fatal injury rates is probably related more to the relative growth in employment in the comparatively safe sectors of the economy and to changes in the size and composition of the labour force than to improved working conditions. Each of these factors is considered below.

As documented earlier, the risks of occupational injury are not distributed evenly among the various sectors of the economy and certain industries, such as manufacturing, forestry and agriculture are more hazardous than others. It should also be noted that the frequency of serious injuries depends not only on the number and types of hazards present in the workplace but also on the number of employees who are exposed to such risks. As a result, it seems reasonable to argue that, other things remaining constant, a shift in employment from a hazardous to a safe industry will have the net effect of reducing the number of serious accidents.

During the latter half of the period for which data are available, reduced economic activity in the more hazardous industries, such as manufacturing, agriculture and forestry precipitated a decline in employment while safer industries such as finance and the service sector of the economy experienced increases in employment. Consequently, the relative growth in the number of workers employed in the tertiary sectors of the economy probably served to reduce the frequency of serious accidents.

In addition, when the level of employment in a given industrial sector is reduced, younger, inexperienced workers are among the first to become unemployed. That the composition and, in particular, the age

structure of the work force influences the accident rate has been documented by Smith (1972, 1976) and Chelius (1977). The findings of these studies indicate that, as the proportion of the work force comprised of younger, inexperienced workers increases (decreases) the accident rate also increases (decreases). Given that the younger and inexperienced workers are less able to recognize and avoid occupational hazards than are the older more experienced workers, it is possible that the increasing unemployment of the period and the resulting attrition of these individuals also served to reduce the serious accident rate.

2.3.2 The Provincial Accident Experience

Presented in Table 2.3 is a percentage distribution of work-related injuries by geographic region and specific province. These data are based on annual averages for the period 1967-1976. An inspection of this table reveals that the distribution of work-related injuries closely parallels the distribution of hazardous industries in Canada. For example, 77.68 percent of all work-related injuries are associated with Ontario, Quebec and British Columbia where such hazardous industries as manufacturing, logging and construction are concentrated. Accordingly, these provinces account for 76.04 and 70.0 percent of the disabling and fatal injuries respectively.

2.3.3 The Accident Experience of Selected Industries

That the risks of occupational injury vary from one industrial sector to another is suggested by the geographic distribution of accidents. Perhaps the major factor which impedes an examination of accidental injury by industrial sector is the fact that industry-specific information is not routinely collected on a national basis in Canada. However, data concerning the number and rate of injuries by industrial sector have been compiled and published by the Workers' Compensation Board of British Columbia and, as a result, we are forced to limit our examination of industry-specific injuries to these data.

Table 2.3 The Percentage Distribution of Work-Related Injuries by Geographic Region

Geographic Region	All Injuries (%)	Disabling Injuries (%)	Fatal Injuries (%)
Maritimes	7.67	7.04	10.2
Prairies	14.65	16.12	19.8
Quebec	24.69	25.84	23.1
Ontario	42.13	38.90	30.60
British Columbia	<u>10.86</u>	<u>11.30</u>	<u>16.30</u>
TOTAL	100.00	100.00	100.00

Source: Rohan, Paul, "The Trend of Work Injuries in Canada", Canadian Family Physician 24, 578-582.

Referring to the earlier discussion concerning specific hazards of accidental injury, we would expect those industries that employ a technology in which specific safety hazards are embodied to experience a relatively high incidence of accidental injuries. These expectations are confirmed by the data presented in Table 2.4 where the percentage of injuries and the number of injuries per 100 workers by industrial sector are presented. Observe that the forestry, mining, manufacturing, and construction sectors of the economy experienced a higher number of injuries per 100 workers than industries such as hospitals and schools, commercial services and trade. The industrial sectors that experienced a relatively high rate of accidental injury are characterized by the specific safety hazards mentioned earlier (e.g., the forestry, mining, manufacturing and construction industries).

That the severity of occupational injury also varies from one industrial sector to another is partially reflected by the data presented in Table 2.5. Shown in this table are the number of fatalities per 100,000 workers in Canada during the period 1967-1977. These data include not only those accidental injuries that resulted in death but also fatalities that have been attributed to occupational disease. As a result, these data represent a somewhat imperfect measure of the extent to which injuries in the different sectors resulted in death.

As seen in the bottom row of Table 2.5, the average number of fatalities per 100,000 workers, for all sectors, was 13.4 deaths. Using this rate as a bench mark, an examination of the relatively high incidence of fatalities in the forestry, fishing, mining, construction and transportation industries is probably attributable to the hazardous conditions present in these economic sectors. It should also be noted that a portion of the relatively high incidence of fatalities in the mining industry is probably attributable to the chemical or physical hazards which are present in this sector of activity (Ham Report, 1976; Gibbs and Pintus, 1978).

Table 2.4 The Percentage of Work Injuries and the Number of Injuries per 100 Workers by Selected Industry:
British Columbia, 1970-1972

Description	Forestry	Mines	Manufac- turing	Construc- tion	Transpor- tation	Trade	Commercial Services	Hospitals & Schools	Public
Percentage of Injuries									
1970	10.0	3.9	31.3	13.9	13.7	10.6	5.8	3.8	7.0
1971	9.5	3.2	28.9	16.7	13.0	11.3	5.3	4.2	7.9
1972	9.0	3.4	31.3	14.6	12.1	12.4	5.4	4.6	7.2
Number of Injuries Per 100 Workers									
1970	16.15	9.95	8.23	13.12	5.34	3.08	2.16	1.42	5.56
1971	16.42	9.22	8.46	15.76	5.57	3.73	2.20	1.76	6.96
1972	20.13	9.65	10.02	15.11	5.69	4.26	2.32	2.11	6.73

Table 2.5 The Number of Fatalities Per 100,000 Workers in Canada by Industrial Division, 1967-1976

Year	Agriculture	Forestry	Fishing	Mining	Manufacturing	Construction	Transport	Trade	Finance	Service	Public Administration	Totals
1967	5.4	134.2	132.0	160.5	10.6	47.0	36.0	5.2	1.6	3.2	7.9	15.7
1968	4.9	127.5	79.2	114.5	10.0	46.2	26.4	4.6	0.0	2.5	14.0	13.5
1969	5.6	110.0	85.7	139.7	11.4	48.8	29.7	4.6	0.6	2.6	13.5	14.4
1970	3.1	130.6	125.0	125.6	10.2	41.4	27.0	4.7	1.1	2.8	16.7	13.5
1971	4.1	130.6	50.0	131.0	10.4	45.5	29.2	5.9	1.0	3.4	12.9	14.0
1972	6.2	108.5	36.4	141.1	14.1	41.7	31.1	5.1	1.6	5.0	11.8	14.9
1973	6.4	125.0	60.0	150.4	13.2	41.3	34.8	5.8	1.5	4.2	17.9	15.7
1974	7.0	103.7	45.8	161.1	15.1	38.8	32.2	7.6	1.6	4.2	10.3	15.5
1975	2.7	98.6	117.4	119.7	11.4	35.9	26.8	4.5	0.7	3.3	13.1	12.5
1976	3.4	80.6	130.0	97.9	8.3	26.0	23.6	3.	1.4	2.0	6.9	9.7
1977	3.2	85.9	90.0	82.5	9.1	26.1	20.6	4.2	1.5	2.2	6.8	9.4
Average	4.6	113.5	81.8	126.9	11.6	38.8	28.2	5.0	1.2	3.3	12.0	13.4

Source: Labour Canada, Occupational Health and Safety Board
 1 Preliminary

2.3.4 The Accident Rate and the Firm

In addition to variability in the incidence of occupational injury that is associated with different industrial sectors, the injury rate also varies with the size of the firm. Since injury data grouped by industrial sector and size of firm are not readily available for the Canadian economy, we are forced to rely on the U.S. experience to examine the relation between size and the incidence of occupation injuries. Presented in Table 2.6 is the incidence of occupational illness and disease per 100 workers by size, as measured by number of employees, and industrial sector. An inspection of the table reveals that the smallest and largest firms for all industries exhibit the lowest incidence of illness and injury per 100 workers. Moreover, as the firm size increases, the incidence rates increase and reach a maximum for firms employing between 100 and 249 employees. Thereafter, firms of larger size experience a progressively lower incidence of disease and injury. A speculative explanation of this pattern involves the relation between capital, labour and the physical plant as well as the level of expenditures on health and safety programs.

Concerning the latter of these factors, it seems intuitively plausible to argue that expenditures on accident prevention tend to reduce the incidence of injuries in the workplace. Moreover, expenditures on health and safety programs are probably related to the scale of operations since firms of small to medium size are probably unable to finance an extensive health and safety program. However, as the size of the firm increases, expenditures on health and safety become more feasible. To the extent that health and safety programs exert a significant impact on the incidence of injuries, a higher propensity of larger firms to operate an extensive health and safety program may, in part, explain the decrease in the incidence of illness and injury associated with firms that employ 500 or more workers.

Consider next, the interrelation between capital, labour and the physical plant. It is well recognized that a physical plant of a given size is capable of producing differing volumes of output. Further, if we assume that a given industry is characterized by a more or less fixed re-

Table 2.6 Occupational Illness and Injury Rates, by Employment Size and Industry: 1973 U.S.A.

Number of Employees	Private Sector	Agriculture Forestry & Fisheries	Contact Construction	Manufacturing	Transportation and Public Utilities	Trade	Finance Insurance & Real Estate	Services
All Sizes	11.0	11.6	19.8	15.3	10.3	8.6	2.4	6.2
1-19	5.5	8.5	13.6	10.9	7.4	4.5	1.9	2.6
20-49	10.3	12.1	21.2	16.2	11.9	8.9	2.1	5.0
50-99	13.1	13.6	23.7	19.2	13.7	11.1	2.8	6.4
100-249	14.8	15.3	23.8	20.2	11.5	12.5	2.8	8.4
250-499	13.8	14.3	23.7	17.6	9.9	12.4	3.1	7.7
500-999	12.5	15.6	21.0	14.4	9.1	11.5	2.7	10.0
1000-2499	10.9	16.3	16.8	17.2	10.4	11.7	3.3	8.1
2500 & Over	9.7	-	8.6	11.0	8.5	8.8	2.0	6.1

lation between capital, labour and output, increases in the volume of production require additional units of both capital and labour. Holding the size of the physical plant constant, an increased use of these inputs also increases the capital and labor density of the firm which, in turn, may result in more frequent contacts between men and machines. As implied earlier, such contacts can contribute to the occurrence of occupational injuries. If, in a given industry, a more or less fixed plant size will accommodate the worker-capital complement associated with approximately 250 employees or less, an increase in the capital-labour density, coupled with the absence of an extensive health and safety program, may explain the increase in the accident rate associated with the smaller firms. Also observe that, holding firm size constant, differences in the injury rate may be attributable to the capital intensities of the production processes used in the various industrial sectors. It is important to note, however, that the explanation offered above is speculative in nature and should be verified empirically.

2.3.5 The Accident Experience and Worker Characteristics

Thus far, our analysis has focused on conditions in the workplace as the major cause of accidental injury. In contradistinction to this discussion, it is possible to argue that occupational injury is attributable to the "accident proneness" of the worker. When assessing the extent to which characteristics of the worker contribute to industrial accident injury, several studies have found that the age, sex, experience, nationality, physical condition, temperament, psycho-motor retardation, awareness of potential hazards and the intellect of the worker have been found to be associated with the occurrence of occupational injury (Hale and Hale, 1972; Fisher, 1922; Viteles, 1932; Hagglund 1966). Concerning the relation between worker characteristics and the occurrence of occupational injury, Sass (1977) observes that accident proneness "has yet to be proven to exist. The best study in this field by Crystal Eastman suggests that many accidents attributed to the worker were mainly due to efforts to compensate for equipment deficiencies".

Presented in Table 2.7 are the average annual number of fatalities, by type of accident, as well as the percentage distribution of fatalities by type of accident. As seen in this table, a large percentage of the deaths occurring during the period 1975-1977 resulted from vehicular accidents and other situations in which the actions of the worker might have precipitated the fatality. It is important to note, however, that these data do not provide the basis for reaching conclusions regarding the extent to which the unsafe acts of labour contributed to the pattern of fatalities portrayed in the table.

2.3.6 Policy Implications

The discussion above suggests that characteristics of the worker and/or hazardous working conditions are the primary causes of accidental injury. For the moment, assume that the characteristics of the worker and unsafe acts are the primary causes of industrial accidents. Under such an assumption a policy designed to reduce occupational injury might focus on modifying worker behaviour by implementing educational or training programs concerning safe work habits (e.g., the recent promotional activity of the Ontario Workmen's Compensation Board). Conversely, suppose we believed that unsafe working conditions are the primary cause of industrial accidents. Given that management is usually viewed as assuming responsibility for maintaining a safe work environment, it would seem reasonable to introduce policies that are designed to induce employers to reduce safety risks present in the workplace (e.g., injury tax, use of experience rating to determine WCB assessments, safety standards and regulations). Further, if we believe that the responsibility for reducing the accident rate is shared by management and labour, it would seem reasonable to introduce policies to force these two groups to engage in a cooperative effort to reduce accidental injury (e.g., health and safety committees). Even though there is no uniform agreement as to the cause of accidental injury, policy decisions must not only reflect the need to reduce safety hazards in the workplace but also the need to improve the work habits of labour. These and related issues will be considered in greater detail later.

Table 2.7 The Average Number of Fatalities in Canadian Industry by Type of Accident (1975-1977)

Type of Accident	Average Number of Fatalities/Year	Percentage Distribution
Transport (including collisions, crashes, derailments, etc., or motor vehicles, ships, planes, trains and industry vehicles)	273.3	25.8%
Struck by or against (including stepping on, landslides and cave-ins)	181.3	17.1%
Caught in, on or between (including machinery, industrial vehicles, etc.)	73.0	6.9%
Slips and falls (on same or different levels)	98.7	9.3%
Drownings and asphyxiations (including boat accidents and falls into water)	50.0	4.7%
Cardio-vascular strain (including arterial diseases, cerebrovascular diseases, etc.)	55.0	5.2%
Over-exertion (including strains, hernias, etc.)	12.0	1.1%
Systemic poisoning (including injuries affecting functioning of an entire body system such as poisoning, corrosive action, etc., affecting internal organs, damage to nervous system, etc.)	14.7	1.4%
Occupational illnesses (silicosis, asbestosis, radiation effects such as lung cancer, etc.)	130.7	12.4%
Fire, explosions, temperature extremes (including related deaths from these such as asphyxiation, falls, and being struck by flying objects from explosions, etc.)	40.7	3.8%
Contact with electric current (including lightning)	50.0	4.7%
Late effects (death more than a year after initial accident and deaths of workers who were on pensions for an earlier disabling injury)	49.0	4.6%
Miscellaneous (homicides, suicides, bites, stings, and unspecified causes)	29.3	2.8%
TOTAL	1057.7	100.0%

Source: Occupational Health and Safety Branch, Labour Canada (1979)

Figures may not add due to rounding.

2.4 The Costs of Occupational Injury

Perhaps one of the most important problems confronting workers, employers and governmental authorities is the dramatic increase in the cost of occupational injuries. That the cost of occupational injuries has escalated without abatement in recent years is documented by the data presented in Table 2.8. As seen in this table, total reported compensation costs, which are comprised of medical aid, compensation for lost wages and the capitalized value of pensions for permanent, partial or total disabilities, increased from \$274,481,000 in 1967 to \$966,655,000 in 1978. During this period, then, reported compensation costs increased by more than 350 percent.

The increase in reported cost is a product of the increase in the total number of injuries, as documented earlier, and an increase in the average cost per claim or the average cost per worker. The data presented in Table 2.8 suggest that the cost per claim increased by 260 percent during the period 1969-1978 while the cost per worker increased by 270 percent during the same interval.

Even though the information presented in Table 2.8 suggests that the cost of occupational injury has increased dramatically in recent years, these data probably underestimate the costliness of accidental injuries. In order to understand both the nature and the magnitude of this understatement, it is necessary to view the total cost of occupational injury as consisting of three components, each of which represents the costs that are incurred by a member of one of three groups. Employing this approach, we identify the worker, the employer and the insurance carrier as economic actors which share the burden of occupational injury and we refer to those costs that are incurred by one of the three parties as "private" costs.

Consider first the direct costs that are incurred by the insurance carrier which, in this case, is the Workmen's Compensation Board. The primary responsibility of this agent is to defray the costs of medical care, to compensate the worker for lost earnings and to provide pensions

Table 2.8 Work-Injury Experience and Cost in Canada,[2] 1969-1978 Work-Injury Direct Costs,[1] 1969-1978

Year	Medical Aid Cost[3]	Compensation for Lost Earnings	Pension[4]	Total Payments	Cost Per Claim	Cost Per Worker	Payroll (\$000,000s)[6]	Work Injury Cost Per \$100 Payroll[7]
1969	68,159	120,443	85,878	274,481	\$345	\$42	40,663	0.68
1970	76,805	134,192	96,714	307,711	388	46	44,088	0.70
1971	79,612	148,389	90,990	318,992	402	47	48,458	0.66
1972	86,115	177,845	103,723	367,683	418	52	53,923	0.68
1973	96,939	209,565	119,660	426,162	432	57	62,426	0.68
1974	106,070	264,007	151,321	521,396	498	66	74,509	0.70
1975	137,275	337,241	182,775	657,291	665	82	86,727	0.76
1976	162,769	411,416	200,333	774,518	742	95	100,059	0.77
1977	173,544	453,538	230,220	857,301	825	103	110,076	0.78
1978[8]	198,281	494,008	274,367	966,655	902	114	119,764	0.81

1. Includes cost of claims originating in prior years and compensated in the given year.
2. Excludes Northwest Territories and Yukon
3. Medical aid includes hospitalization, rehabilitation service, funeral and related expenses. Medical aid payments are for both disabling and medical treatment injuries.
4. Total amount paid out but not including any funds set in reserve.
5. Cost per worker understated since Statistics Canada Employment figures used. Not all persons employed in Canada are covered by workmen's compensation.
6. Estimate of Labour Income, Statistics Canada, Catalogue No. 72-005. Payroll excludes wages and salaries paid to workers in Northwest Territories and Yukon Territory.
7. Rate is understated since Statistics Canada statistics on payroll are used. Not all payroll is earned by workers covered by workmen's compensation.
8. Preliminary.

Source: Occupational Safety and Health Branch, Labour Canada (1979).

Figures may not add due to rounding.

to individuals who have been permanently disabled. Also observe that the total payments presented in Table 2.8 represent:

- 1) the cost of medical aid to include hospitalization, rehabilitation as well as funeral and related expenses;
- 2) compensation for lost earnings; and
- 3) the provision of pensions for permanent and partial or total disabilities.

As such, these data only represent the private costs that are incurred by the insurance carrier. Hence, neither the private costs incurred by the employer nor the direct costs incurred by the worker are reflected in these data.

The private costs of occupational injury that are assumed by the employer have been summarized by Naquin (1975) and include items such as:

- 1) the wages and salaries paid to workers which are in excess of the amounts required by the provisions of the Workmen's Compensation program;
- 2) the wages or salaries paid for time not worked on the day of the injury;
- 3) the inefficiency of the affected worker in performing normal duties;
- 4) the cost of selecting, replacing and training substitute workers;
- 5) the initial inefficiency of the replacement employee;
- 6) the cost of time lost by the injured worker's co-workers who, for example, may assist the injured individual or transport the individual to a medical facility;
- 7) the cost of overtime pay which is precipitated by the injury;
- 8) the administrative costs associated with an injury;
- 9) cost of cleaning up after an accidental injury;
- 10) the damage to equipment;
- 11) the cost of damaged or spoiled materials;
- 12) the cost arising from a failure to fill orders on a timely basis;
- 13) a reduced morale of the work force; and

- 14) the cost of attorney's fees and other legal expenses that arise from tort actions related to occupational injury.

The list introduced above is not collectively exhaustive and is only intended to illustrate the nature of the costs that are incurred by the employer.

Similarly, the affected worker and the worker's family incur a set of private costs that arise from an occupational injury. With regard to nonfatal injuries, the costs incurred by the worker include foregone income, which is represented by the difference between the normal pay that would have been earned by the worker and the compensation paid by the insurance carrier, loss of self-esteem as well as the physiological pain and the psychological suffering that is generated by an injury. Similarly, with regard to fatal injuries, the costs incurred by survivors include the foregone income which results from the premature death of the worker as well as the grief and suffering experienced by surviving relatives and friends.

In addition to the private costs identified above, society incurs a set of costs that should be considered when examining the costliness of industrial injury. Perhaps one of the largest and fastest growing components of the social costs that are associated with occupational injury involve the costs of social welfare services as well as the costs of retraining and rehabilitating the injured worker. In addition, an accidental injury may result in the social-psychological costs of family disruption, disintegration and dissolution which, in turn, can also generate additional welfare costs.

Since most of the costs incurred by the employer the employee and society are not reflected in the data presented in Table 2.8, we are forced to conclude that reported costs seriously underestimate the actual costs of occupational injury. In fact, several researchers (Wallach, 1962; Crosby, 1962; Smart and Sanders, 1976) have suggested that the total cost of occupational injury is between two to six times higher than the private costs incurred and reported by the insurance carrier. In Canada,

Findlay (Cochrane, 1979) has estimated the range to be between 4 and 10*. These data suggest that, in order to obtain a more accurate approximation of the true cost of occupational injuries, it is necessary to increase the values presented in Table 2.8 by a factor of between two and ten.

* In Canada, despite rapidly rising Workmen's Compensation costs (Goldstein, 1978) management is alleged to be reluctant to implement health and safety programs (Cochrane, 1979).

Chapter 3: OCCUPATIONAL ILLNESS

In this chapter our focus shifts from occupational injury to occupational illness and disease. Similar to our earlier discussion, we shall consider first the health hazards that are present in the workplace and then examine the importance of occupational illness in Canada.

3.1 Health Hazards

Unlike safety hazards, occupational health hazards: 1) are more difficult to identify; 2) can interact in a synergistic fashion with lifestyle and environmental factors; 3) assume many different forms; and 4) usually result in disease or illness only after a long latency period. Ashford (1976, p. 73) groups occupational health hazards into: 1) chemical factors (dusts, poisonous fumes, gases, toxic materials and carcinogens); 2) biological factors (bacteria, fungi and insects); 3) physical factors (noise, heat, vibration and radiation); and 4) stress, as induced by physical, chemical, psychological and ergonomic factors. Most health hazards are introduced into the human organism by absorption through the skin, ingestion into the digestive tract or inhalation into the lungs. It is believed that an exposure to work-related health hazards contributes to the incidence of heart disease, cancer, respiratory disease, neurological disorders, systemic poisonings as well as a shortened life due to a general deterioration of the individual's physiological condition.

In the following, we consider the various health hazards in terms of the four groupings identified above. It should be noted that this discussion is not intended to represent an exhaustive review of all health hazards. Rather, our intent is to describe only the major health hazards and their effects on the human organism.

3.1.1 Chemical Factors

The exposure to gases, metals and chemicals occurs in the chemical industry as well as in those industries that use the products of the

chemical industry. The harmful effects of exposure to toxic materials or fumes are manifest in local or systemic damage. Local effects are usually limited to injuries to the eyes, skin or the membranes of the respiratory tract. On the other hand, systemic effects result from ingestion or inhalation of a chemical agent that is then distributed to internal organs.

Dusts are airborne materials that may be organic or inorganic and are introduced into the human organism by inhalation into the lungs. The extent of the biological damage caused by inhalation of these airborne materials depends on: 1) the composition of the dust; 2) the length of exposure; 3) the concentration of dust in the air; 4) the rate of breathing during the exposure; and 5) the rate of elimination from the body (Gray, C., 1977). In short, "(t)he more dust retained, the more severe the resulting illness" (Stellman, 1973, p. 167). Presented in Table 3.1 is a summary of the most common dust-related diseases, the type of dust that contributes to the disease, and the industries in which the presence of each type of dust and dust-related disease are most frequently associated (OSHA, 1972; NIOSH, 1972; Lehman, P., 1974; Graylosski, 1978; Farant, J.P., Moore, C., 1978).

Exposure to toxic gases such as sulphur dioxide, chlorine, ammonia, nitrogen oxides and alkaline mists contribute to a high incidence of acute respiratory disease while a prolonged exposure can result in chronic obstructive pulmonary disease (WHO, 1972). Exposure to ozone primarily affects the eyes and mucous membranes while the inhalation of ozone may result in pulmonary edema as well as hemorrhages.

Toxic metals that can produce serious health problems include cadmium, lead, mercury, nickel and beryllium. Most of these metals produce serious systemic effects and, upon acute exposure, can prove to be lethal. In addition to being poisonous, toxic metals may also be carcinogenic (causing cancer) mutagenic (altering the chromosomal structure of offspring) and teratogenic (causing birth defects).

It is well known that cancer is widespread and represents a major cause of death in Canada and in the U.S. Given that most malignant neo-

Table 3.1 Dusts, Dust-Related Diseases and Dust-Related Industries

Type of Dust	Dust-Related Diseases	Comments	Dust-Related Industries
Silia	<ul style="list-style-type: none"> - Silicosis - Acute - Chronic 	<ul style="list-style-type: none"> - Pulmonary fibrosis (PF) and local pulmonary emphysema (EM) may lead to progressive massive fibrosis (PMF) and an increased susceptibility to tuberculosis (TB) and other respiratory infections (RIs) - As above, although symptoms may take many years to arise 	<ul style="list-style-type: none"> - Mining (especially coal, granite, etc.), stone and sandstone cutting, blasters, manufacturing, foundries, cement plants & cement products, potters, and kiln workers, metal workers, mortars, paint mixers, silica, silicon and slate workers, space craft workers, and street sweepers.
Asbestos	<ul style="list-style-type: none"> - Asbestosis - Cancers <ul style="list-style-type: none"> - Mesothelioma - Lung Cancer - Intestinal Cancer 	<ul style="list-style-type: none"> - due to the indestructibility of asbestos, the body tries to isolate the fine asbestos fibers that enter the aveoli, often resulting in PF and susceptibility to RIs and TB - cancer (CA) of the membrane lining of the chest or abdomen (rare before the introduction of asbestos) - compounded and primarily found in association with smoking - CA due to ingestion of the asbestos fibers - NOTE: CA may possibly be linked to the absorption of carcinogenic chemicals onto the surface of the asbestos fibers 	<ul style="list-style-type: none"> - Mining, crushing and processing of asbestos, asbestos insulation workers (1 out of 10 die of Asbestosis), shipyard workers, acoustical products, air filters, demolition workers, clutch, break, and gasket workers, shingle and tile makers, and textile workers.
Coal Dust	<ul style="list-style-type: none"> - Bituminous (soft) - Anthracite (hard) 	<ul style="list-style-type: none"> - dust deposits mainly at the ends of the bronchiole hence bronchitis (B); PA and EM may result - development of larger areas of scar tissue or PF - hardening of the aveoli leading to EM as well as RIs and TB - more silica content in Anthracite coal hence diseases are more like Silicosis (see above) 	<ul style="list-style-type: none"> - All aspects or phases of the coal mining, processing and distribution industry, as well as many related industries (e.g., steel manufacturing).

Table 3.1 (Continued)

Type of Dust	Dust-Related Diseases	Comments	Dust-Related Industries
Graphite	Pneumoconiosis	- parallels Black Lung (see above) and if more silica content then may be like Silicosis (see above)	- Industries where graphite is mined, processed or used in lubrication, heat or electrical conductors and as a carbon carrier in steel.
Mineral & Rock Wool & Fibrous Glass	Pneumoconiosis	- silicates with properties similar to asbestos, hence a similar disease process - relatively recent, but studies indicate development of PF - skin irritation and acute bronchitis or asthma is inhaled	- Industries using mineral and rock wool and in insulation and construction industries.
Talc	Pneumoconiosis Asbestosis (?)	- found in association with asbestos hence appears to have a similar effect (see above)	- Mining and processing industries, the cosmetic industry, and talc additives in food may cause intestinal cancers.
Beryllium Dusts	Berylliosis - Acute - Chronic	- lung, skin, liver and kidney diseases - severe pneumoconiosis-like lung infections (often fatal and may not show up on X-rays) - hardening of lungs resulting in a decreased lung function hence lower CO ₂ /O ₂ transfer - possibly leading to heart failure - symptoms similar to asbestosis (see above)	- Industries involved in the extraction of beryllium and in ceramics, metallurgy and fluorescent lighting industries.
Organic Dusts	Byssinosis Chronic Bronchitis	- an allergy-like reaction to cotton, flax, hemp and related dusts resulting in the constriction of the air tubes and excessive mucus - inflammation of the bronchiole (may have "nomial" looking X-rays)	- Cotton pickers, cotton milling industries, textile and related industries, farming and processing industries.

plasms may be caused by a work-related carcinogen as well as by environmental and lifestyle factors, it is difficult to determine which cancers are of a "purely" occupational origin. As an indication of the difficulty encountered when attempting to determine the percentage of cancers that are of an occupational origin consider the following claims. Doll (1977) asserts that the proportion of cancer in the population which is of an occupational origin is minute. On the other hand, after recognizing that conventional estimates of the percentage of all cancers which are due to occupational exposures range between one and five percent (Higginson, 1969, 1976-a, 1976-b; Wynder and Gori, 1977), The National Cancer Institute suggests that in excess of 20 percent of all cancers are of an occupational origin (National Cancer Institute, 1978).

Even though the exact proportion of all cancers that are attributable to occupational origin is not known with certainty, substances such as tar, paraffin, aniline, dye stuffs, x-rays, chromates, arsenic, asbestos, vinyl chloride, and other hydrocarbon derivatives are recognized as carcinogens. Cancers of an occupational origin frequently appear on the skin, lung, urinary tract, bladder or scrotum. Of particular importance recently is the increased incidence of mesothelioma which is caused by a prolonged exposure to asbestos^{1,2}. In addition to mesothelioma, the incidence of lung cancer, and cancer of the stomach, rectum and colon is excessive in asbestos workers.

The hazards identified above are compounded by two interrelated but separate factors. The first involves the widespread use of chemical substances as well as the rapid increase in the development and use of chemicals in industry. For example, the Assistant Surgeon General of the U.S. estimates that: 1) one-half million chemicals are produced and used in the United States; 2) 3,000 new chemicals are developed annually; and 3) 500 of the new chemicals are employed in American industry annually. Although these estimates pertain to the U.S., the situation in Canada is not likely to be significantly different. Given the widespread use and development of new chemicals, it is difficult, if not impossible, for the medical and scientific community to assess and evaluate the toxicity of the growing list of new substances. As a result, in the absence of sound

scientific or epidemiological research, consumers and workers are probably exposed to a growing and unknown number of new health hazards daily.

The second major factor involves the way in which chemicals are combined in the production process. In many situations, chemical substances are received from another firm and combined with additional chemicals during one or more intermediate steps in the production process. Unfortunately, it is quite possible that labour and, to a lesser extent, management have little or no information concerning the effects of: 1) the chemical substances that were originally received; 2) the chemicals which are added to chemical compounds during intermediate production phases; and 3) the interaction between the two sets of chemical substances. Further, the risks of disease are not limited to the workplace since the consumer may also be exposed to a health hazard after purchasing the finished product. In such a situation, labour, management, the consumer and the government may not be aware of the potential hazards associated with commodities that are produced and consumed daily (Sundin, S., 1978). As noted by Bingham (1978), "(i)n this century alone, we have witnessed the grim litany of workers' lives wasted by silicosis, asbestosis, black lung, brown lung and other dust-related diseases. These are a few of the occupational illnesses which are caused by the processing of naturally occurring substances. The rapid introduction of synthetic substances into our work place since World War II has now added to the spectre of disease induced through new man-made chemicals. We are geometrically compounding our work place exposures through the introduction of a potentially toxic chemical every 20 minutes".

This dynamism in American technology is awesome and of concern to both the medical and scientific community as well as to the public at large. In the United States, the response to their perceived potential danger has been the Toxic Substances Control Act (Public Law 94-469).

In specific terms, the Toxic Substances Control Act (TSCA) authorizes Environmental Protection Agency (EPA) to: 1) obtain information about existing and new chemicals and to take appropriate action against those that represent unreasonable risks; 2) require that manufacturers and pro-

cessors of potentially harmful chemicals conduct tests and submit to EPA data on the effects and behaviour of these chemicals; 3) require that EPA be notified in advance of the manufacture of new chemicals and supplied with information necessary to evaluate the effects of these new chemicals on human health and the environment; 4) when necessary, take steps to limit the manufacturing, processing, distribution, use or disposal of a chemical substance which may present an unreasonable risk.³

It is important to note that the reference is made to "unreasonable" risk and not to "no" risk and, as a result the law also provides some exceptions. The task of properly regulating and controlling chemicals to prevent risks of injury and disease is a complex one. The major questions include: just what is meant by "substantial" or "reasonable" risk; how much and what type of information must the regulatory authorities require for premanufacture approval to assure reasonable acceptance; will these requirements tax our scientific and laboratory resources as well as inhibit technical innovation or experimentation. In Canada, legislators are just beginning to examine the need for and contents of regulation such as TSCA and the many questions surrounding such a concept.

3.1.2 Biological Factors

As mentioned earlier, the biological factors that can contribute to occupational illness include bacteria, fungi and insects. More specifically, bulbs and leaves of certain plants are responsible for dermatitis and allergic reactions (Rosenthal, G., 1978) while fungal spores and pharmacologically active products of fungal origin, and in particular those associated with moldy hay, cereals and bark can result in immunological reactions of the lung (Farant, J.P. and Moore, C.F., 1978). Effected by exposures to these health hazards are agricultural workers and workers involved in handling and processing grain.

In addition, animal materials frequently contain micro-organisms and their products. These agents can result in zoonotic diseases, anthrax, Weil's disease and brucellosis. Most affected by these conditions are agricultural workers as well as fur, hide and textile workers, butchers

and veterinarians. Lastly, hospital workers are, by the very nature of their work, exposed to respiratory, skin and other infections of a magnitude second only to muscle strains and puncture wounds from needles (LRHPB, 1977).

Finally, visible organisms and their products can result in trauma which frequently assumes the form of animal and insect bites as well as infestations of intestinal worms. Animal handlers (e.g., beekeepers) as well as farmers and ranchers are occupational groups which are frequently exposed to such risks.

3.1.3 Physical Factors

Among the most important factors that can result in occupationally-related diseases are heat stress, noise, vibration and radiation. These factors were examined in the discussion concerning occupational safety hazards and we now consider each as a health hazard present in the workplace.

The effects of heat stress may be either psychological or physiological. The psychological effects are manifest in an increased irritability, fatigue or a heightened emotional state. The physiological manifestation of heat stress includes heat stroke, heat exhaustion and heat cramps. Heat stroke, which is the most serious manifestation of heat stress, may prove fatal and results from a failure of the body's thermoregulatory system. Heat exhaustion, which is a less severe form of heat stress, results from excessive losses of fluid and is manifest by weakness and fainting. Heat cramps results from a loss of salt through perspiring and is manifest by muscle cramps. In addition chronic heat stress has been found to have deleterious effects on the cardiovascular system. Of particular importance is the combined effect of heat and the presence of carbon monoxide gas (Ashford, 1977, p. 81).

In addition to impairing the auditory senses, noise has been found to induce changes in cardiovascular, endocrine and neurologic functions that suggest a stress reaction (Anticaglia and Cohen, 1970, p. 77). Thus, the

presence of noise induces a physiological and psychological state that is similar to the response associated with alertness or tension. In this regard, an exposure to prolonged noise might induce cardiovascular disease, hypertension and gastrointestinal disorders. Epidemiological study seems to show that neurological disorders, irritability and cardiovascular irregularity are frequently encountered in those occupations or industries in which noise levels are excessive.

Vibration has been mentioned earlier as contributing to occupational injury. In addition, prolonged exposure to vibration can create pressures on the heart and lung as well as affect vision (Lehman, 1974). These findings may imply that vibration is a more important cause of occupational disease than was believed previously.

The final physical factor to be discussed here involves exposure to high intensity nonionizing ultraviolet light as well as infrared radiation and ionizing radiation. The effects of exposure to high intensities of ultraviolet light occur mainly on the skin but the eyes can also be influenced if not properly protected. It is believed that the eyes are most sensitive to damage due to the focusing capacity of the eye lens which results in a concentrated beam of damaging radiation (Stellman, 1973). Occupational groups so affected include welders, steel-melt workers, glassblowers and electricians. Infrared radiation exerts a thermal effect and primarily results in eye burns. As before, welders, steel workers, foundry workers and glassblowers are frequently exposed to this health hazard. As a part of the lower energy spectrum, nonionizing radiation (also known as electro-magnetic radiation) can cause a general heating of the body (by infrared as well as radio frequency waves) and significant burns.

3.1.4 Stress

There is a growing literature that suggests the existence of a relationship between occupational stress and the onset of somatic disease (Hale and Hale, 1972). For example, Cobb (1973, 1974) found that the incidence of hypertension, diabetes and peptic ulcers are more common among

air traffic controllers than among enlisted men in the U.S. Air Force. Similarly, when subjects were exposed to stressful situations Frankenkauer (1971) and Levi (1972) observed physiological changes such as elevated heart rates, elevated systolic blood pressures, increased secretions of adrenaline and nonadrenaline as well as increased free fatty acids and triglycerides in the blood plasma. These studies seem to suggest that occupational stress plays a role in the onset of disease or illness.

3.2 Deficiencies in Data Depicting the Extent of Occupational Disease

When evaluating the importance of occupational disease we are faced with problems which are similar to those that plagued our assessment of occupational injury. As before, there is no administrative agency which has as its major responsibility the collection and analysis of national and provincial data that pertain to the total incidence of industrial disease. Given that the information collected and reported by provincial Workmen's Compensation Boards is fragmentary at best, it is not possible to assess the extent to which the problem of occupational disease has been controlled in recent years.

Available data suggest that 75.6 percent of all death and disability in Canada results from disease or illness while the remaining percentage is attributable to traumatic injury (Ison, 1977). By way of contrast, let us consider the claims experience of the Workmen's Compensation Boards in British Columbia, Manitoba and Alberta. Of the total number of accepted claims involving a fatality, only 2 to 17 percent are related to disease. Further, of the total number of accepted claims involving a disability, only 3 to 11 percent are related to occupational illness and, if we eliminate those claims that involve hearing loss, only between .8 and 1.7 percent of permanent disability claims are for disease. These data, coupled with information obtained from other Workmen's Compensation Boards, suggest that even though the majority of death and disability in Canada results from disease, most of the accepted compensation claims are for injury rather than illness.

One possible explanation for the disparity identified above is that only a small proportion of reported disease is of an occupational origin. However, such an explanation is not intuitively acceptable since the list of disabling and fatal diseases published by Statistics Canada and the Canada Pension Plan include a large number of disease entities for which the etiology is uncertain or unknown but probably emanates from occupational origins. With regard to several of the large volume categories, such as cancer, it is known that some percentage of the total number of cases results from employment but the exact proportion of such cases that are of occupational origin has not been estimated with precision.

An alternate explanation for the disparity involves the possibility that many cases of disease or illness which are of an occupational origin are systematically underreported. As before, the worker-specific and the employer-specific incentives mentioned earlier may result in a failure to report the onset of illness. For example, the imperatives of maintaining job security and a flow of money income may induce the worker to ignore the onset of a minor or nondisabling illness.

In addition to the set of incentives mentioned earlier, there are other factors that are conducive to underestimating the magnitude of occupational illness. Perhaps one of the most important of these factors is the lack of information concerning the causal relation between specific health hazards and the onset of disease or illness. In this regard, the individual may become ill but will fail to link the onset of disease with an exposure to an occupational health hazard. Such a situation is not only conducive to a systematic underreporting of illness but, in the absence of complete information concerning the relation between exposure and the onset of illness, the worker is unable to avoid health hazards which may be present in the work place.⁴

That several categories of occupational illness are characterized by multiple etiologies and long latency periods has been mentioned previously. These two factors have complicated the problem of establishing a causal relation between an exposure to one or more health hazards and the onset of occupational disease. As a result, the scientific community, and

physicians in particular, are unable to ascertain the extent to which the onset of many diseases are attributable to occupational hazards. In this case, opinions concerning diagnostic nomenclature and etiology are formed by comparing clinical findings with the occupational history of the individual. Unfortunately, the long latency period of many diseases, the presence of multiple etiologies and the possibility that the individual has been exposed to several health hazards in different sources of employment during the latency period prevents the physician from establishing a causal linkage between a specific occupational health hazard and the onset of disease. As a result, it is probable that a higher percentage of disabling or fatal illness is a result of employment than is presently reported.

In summary, the uncertainties surrounding the adjudication of claims and the reliance on the physician's judgement may induce workers to under-report illness which may be attributable to an occupational origin. While there is no hard evidence pertaining to the Canadian setting, Brown (1978) found that at least 60 percent of disease claims were denied in the U.S. Such a record is quite likely to deter workers from initiating claims.

These observations suggest that the magnitude of occupational disease in Canada is systematically underreported. As a result, the magnitude of the problem posed by occupational illness is only approximated by reported data. Mindful of these reservations, then, we consider next the fragmentary data that depict the prevalence of occupational illness in Canada.

3.3 The Importance of Occupational Disease

Even though quantitative evidence concerning the prevalence of occupational illness is scarce or nonexistent in Canada, the information which is available suggests that those industries which are characterized by a high injury rate also appear to pose the most serious health hazards. Presented in Table 3.2 are data that reflect the number of fatalities, by industry, which have been attributed to occupational illness. As seen in this table, the mining, manufacturing, construction and transportation

Table 3.2 The Number of Cases of Occupational Illness Resulting in Death, By Industry

Industry	Year		Total
	1975	1976	
Mining	88	63	151
Manufacturing	46	37	83
Construction	8	8	16
Transportation	4	2	6
Trade	3	-	3
Service	1	-	1
Public Administration	3	-	3
Agriculture	-	-	-
Forestry	-	-	-
Fixing & Hopping	-	-	-
Finance, Insurance, Real Estate	-	-	-

Source: Labour Canada, Occupational Safety and Health Branch.

industries were associated with the most frequent number of cases of illness that resulted in death. It should be noted, however, that these data not only reflect the presence of occupational health hazards in these industries but also the number of employees who are exposed to such risks.

One way of assessing the importance of occupational illness is to examine specific diseases that have been linked with occupational health hazards. Perhaps one of the most obvious examples of such a disease is asbestosis which is a result of exposure to asbestos fibers. Asbestosis has been the focus of recent attention because a large number of Canadian workers are exposed to asbestos fiber. Presented in Table 3.3 is a distribution of asbestosis cases in Ontario by occupational grouping for the period 1942-1975. As seen in this table, only 25 cases of asbestosis were reported during the first 27 years of this period. However, during the last 6 years of the period, 97 cases of asbestosis were diagnosed and reported. The rapid increase in the number of reported cases of asbestosis during the last six years of the period is probably the reflection of the long latency period (25-30 years) associated with the disease.

As mentioned, asbestos has also been linked with various cancers, pulmonary fibrosis, emphysema and respiratory infections. As an industrial mineral, asbestos is found in over 3,000 products ranging from pot-holders and children's toys to industrial and household insulation (Solomon, 1979 and Stellman, 1973). Mining of asbestos began in Canada in the early 1880's and today most mines are open-pit or strip mines.

Perhaps one of the most contentious issues confronting labour, management, workmen's compensation boards and the scientific community is the identification of factors that cause lung cancer and many forms of respiratory disease. Rall (1979) contends that, given the complex etiology of most cancers, occupational exposures play a more pronounced role in lung cancer than has generally been recognized previously. Sherman (1979) claims that at least 30 percent or more of lung cancers can be directly related to occupation while Obey (1979) claims that present occupational exposures to industrial chemicals will cause 20-30 percent of cancers of all types in the future. The problem becomes even more complicated when

Table 3.3 Distribution of Asbestosis Cases by Occupational Grouping for Ontario, 1942-1975

Occupational Group	1942-1969	1970	1971	1972	1973	1974	1975	Total
Manufacturing	17	10	7	6	15	15	12	82
Construction	9	4	4	5	6	4	-	32
Warehousing	-	-	-	1	-	-	-	1
Maintenance	2	1	1	2	2	-	1	9
Mining	-	-	-	-	-	-	1	1
TOTAL	28	15	12	14	23	19	14	125

Source: Analysis section, Workmen's Compensation Board, Ontario.

diseases may be the result of self-inflicted hazards, such as smoking or drinking, and occupational health risks. For example, asbestos has been linked with bronchogenic lung cancer and the incidence of this disease among workers exposed to asbestos is roughly ten times as great as the incidence among the general population (Smith, 1977). Such a finding suggests that health risks present in the work environment contribute significantly to the incidence of lung cancer. On the other hand, the risk of dying from this disease is 92 times as great for smokers as contrasted with nonsmokers (Selikoff, Hammond and Chung, 1968). These results seem to suggest that self-imposed hazards are, in part, responsible for the incidence of lung cancer. These and other similar data raise an important issue concerning the extent to which claims might be rejected on the basis of assigning causation to a self-inflicted risk.

There exists a growing body of literature, however, that suggests that the increased incidence of lung cancer is attributable more to occupation than to smoking (Sterling, 1978). Consider the following reports. When developing criteria on occupational exposure to asbestos, the National Institute for Occupational Safety and Health showed that the rates of lung cancer among smokers and nonsmokers are indistinguishable. Decoufle (1970) reports similar findings while Wagoner et al. (1973) found excessive risks of lung cancer among a cohort of workers who were exposed to chrysolite asbestos. The latter group was of the Dutch Amish sect, which is known for abstaining from alcohol and tobacco. Similarly, Wagoner (1975) examined women employed in manufacturing asbestos tiles between 1940 and 1962. In this study, 7 cases of lung cancer were observed as compared with only .5 cases that would be expected from a similar group. Moreover, more than half of the women in the study group did not smoke. Newman (1972) reports as high an incidence among women who had worked with asbestos tiles as males while observing little or no difference in the incidence of lung cancer which depended on the smoking habits of the individual. Similarly, Still and McGill (1975) found 27.7 percent of patients with laryngeal carcinoma were exposed to asbestos as compared with 2.5 percent in a control group. It should be noted that the smoking habits of these two groups did not differ. In a later paper, Selikoff (1976) claimed that three-fourths of lung cancer deaths among asbestos

workers are attributable to an exposure to asbestos. These claims seem to contradict the conclusions reached in the study cited earlier (Selikoff, Hammond and Chung, 1968). As a final example, consider the findings of Sterling and Weinkam (1978) who report that white smokers smoke 20 percent more cigarettes than black smokers. However, blacks experienced a higher rate of lung disease than whites. Sterling and Weinkam concluded that it is reasonable to attribute the greater prevalence among blacks to the greater percentage of blacks than whites in those occupations in which they are exposed to toxic airborne particles (Mancuso and Sterling, 1975) than to differences in smoking habits. Similar findings are reported by Doll et al. (1965), Weiss and Boucot (1975), Lloyd (1973), Newman et al. (1976), Lunden et al. (1971) and Williams et al. (1977). These findings suggest that occupational rather than self-inflicted risks are the major causes of lung cancer.

After 3 to 5 years exposure, asbestos fiber has also been linked with mesothelioma (Epstein, 1978). In Canada, an annual incidence of 14 cases per one million population has been estimated (McDonald and McDonald, 1973). Since asbestosis, mesothelioma and bronchogenic lung cancer have prolonged latency periods, an increased number of such cases can be expected in the near future.

In addition to the hazards posed by exposure to asbestos, the health risks associated with ionized radiation, silica and coal dust are of particular importance in the mining industry in Canada. Each of these health risks are reviewed below.

Silicosis has been the most serious form of pneumoconiosis, which is a group of lung diseases, among workers in Ontario and Quebec mines (Ham Report, 1976; Gibbs and Pintus, 1978). The symptoms of silicosis are detectable 8 months after initial exposure (Stellman, 1973), although generally exposures of longer periods of time are associated with the disease. The prolonged inhalation of various dusts containing silica (e.g., anthracite coal, sandstone, granite and cements) leads to greater potential for developing silicosis. Silicosis is primarily seen as pulmonary fibrosis and local pulmonary emphysema. In addition, the inhalation of dust con-

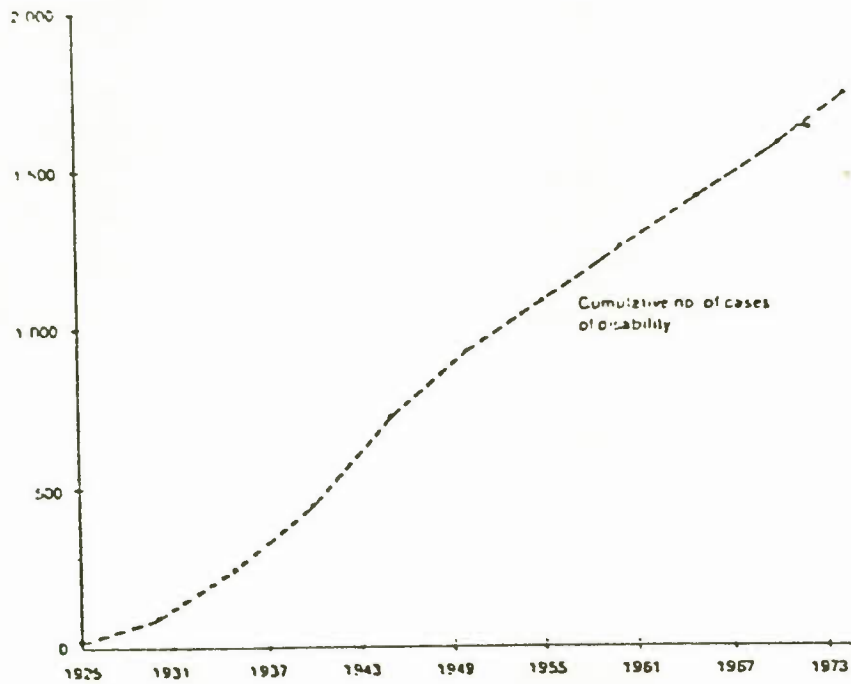
taining free silica also increases susceptibility to tuberculosis and other respiratory infections. During the years 1972-1974, the mining industry accounted for slightly more than half of the cases of pneumoconiosis that were recognized by the Workmen's Compensation Boards. The remaining number of cases were associated with other industrial activities such as asbestos manufacturing and foundries.

The magnitude and scope of silicosis among workers in Ontario mines is shown in Figure 3.1 where the cumulative number of new cases during the period 1925 to 1975 is shown graphically. An inspection of this figure reveals that approximately 1,800 cases of silicosis have been recognized in Ontario during the 50-year period. It should also be noted that the population at risk and dust conditions in the mining industry have remained relatively constant during the period for which data are available. These factors, coupled with the relatively long latency period of the disease, suggest the general configuration of the cumulative curve cannot be expected to change rapidly in the near future. As a result, it is possible that a significant number of new cases will emerge in the near future.

That the new number of cases of silicosis has increased in recent years is also substantiated by the experience of the mining industry in Quebec. According to the Quebec Metal Mining Association, approximately 70,000 miners were exposed to silica dust during the period 1937 to 1975. Of these workers, 122 were receiving a pension for disability in excess of 10 percent and 75 for a disability of 10 percent.

Even though the number of new cases of silicosis has increased recently, available evidence suggests that the degree of disability has decreased while the age of the worker at the time the disease is accepted as compensable has increased. These observations are documented by the data presented in Table 3.4. Moreover, the average age of death for recognized silicotics in Ontario has increased from approximately 45 years in 1926 to approximately 75 years in 1975 (Ham Report, 1976). This finding implies that the life expectancy of recognized silicotics is similar to the expected life span of a comparable Canadian male population.

Figure 3.1 The Cumulative Number of Cases of Silicosis in Ontario Mines



Source: The Report of the Royal Commission on the Health and Safety of Workers in Mines, (The Ham Commission), 1976, p. 20.

Table 3.4 Silicosis Claims in the Mining Industry of Quebec, 1937-1975

Years	Number of Accepted Claims	Number Refused	Surviving Claimants	
			Average Age of Acceptance	Average Degree of Disability (%)
1937-1939	9	18	-	-
1940-1944	15	34	40.5	63
1945-1949	33	48	42	89
1950-1954	14	31	47	53
1955-1959	42	32	51	66
1960-1964	36	37	47	37
1965-1969	52	28	54	31
1970-1973	93	52	54	16
1937-1973	294	280	52	30
1974	NIA		52	28.5
1975	NIA		48	13

Source: Gibbs, G.W. and Pintus, P., Health and Safety in the Canadian Mining Industry, Centre Resource Studies, Kingston, 1978.

Table 3.5 Risk Ratios by Etiologic Agent and Type (or Site) of Cancer

Etiologic Agent	Type (or Site) of Cancer	Risk Ratio
Arsenic	Leukemia	3-8
Coal Tar Volatiles & Coke Oven Emissions	Larynx, skin & scrotum	2-6
	Hemangiosarcoma	200.4
	Lung	1.9
Chromium	Nasal cavity, sinus lung & larynx	3-40
Iron Oxide	Lung & larynx	2-5
Nickel	Lung	5-10
Petroleum Distillates	Lung & larynx	2-6

Source: Sundin, D., " The National Occupational Hazard Survey: a difficult quest for a reliable data base", Occupational Health and Safety 47;21-23.

Similar to silicosis, coal workers' pneumoconiosis (CWP) is a chronic pulmonary condition which is caused by prolonged periods of inhaling coal dust. The prevalence of CWP depends, to a significant extent, on the type of coal, the methods used in mining and the duration of exposure. Although information concerning the prevalence of CWP among Canadian coal miners is not presently available, data from the U.S. Coal Mine Health Program suggest that the prevalence of CWP is around 12 percent (National Institute for Occupational Safety and Health, 1973; Morgan, 1975, Morgan et al., 1976). The study conducted under the auspices of the National Institute for Occupational Safety and Health also reveals that 1.2 percent of those workers subjected to examination were found to have a complicated form of CWP and that all of these individuals had been exposed for more than 10 years. Even though these findings should be corroborated using Canadian data, they are suggestive of the potential problem that probably exists in Canada today.

That exposure to ionize radiation may contribute to the incidence of lung cancer is well known and exposure to this health risk is of particular importance to uranium miners. In attempting to evaluate the statistical relation between exposure to radiation and the risk of cancer, the Ham Commission (Report of the Royal Commission on the Health and Safety of Workers in Mines, 1976) examined the period 1955-1974 and identified the deaths of 956 persons who appeared on the Ontario Uranium Nominal Roll. Of this total, 81 deaths were attributable to lung cancer. On the other hand, using vital statistics for the male population of Ontario, it was expected that only 45.08 such deaths would occur during a comparable period of time. Hence, lung cancer deaths among uranium miners were in significant excess by 36 cases or 80 percent of the expected deaths. It was also noted that the excessive number of lung cancer deaths become apparent after the period 1960-1964. Although these data are only suggestive, they imply that exposure to ionizing radiation is a factor which contributes to the risk of cancer. In addition, West et al. (1979) suggest that the removal of employees from exposure to uranium generally results in a return to the minimal, acceptable level of risk as determined by bioassay. Finally, low level exposure to ionizing radiation is now considered more

harmful to workers' health than previously believed. Najarian (1979) studied nuclear workers exposed to low levels of ionizing radiation and found that they were contracting cancer at higher than average rates.

The National Institute of Cancer (1978) has estimated that at least 20 percent of all cancer deaths in the U.S. are associated with an occupational exposure to chemicals. A number of risk ratios (i.e., the number of cancers present in a study group relative to the number expected in a normal population) have been computed and are summarized as seen in Table 3.5. Although these findings should be corroborated using Canadian data, a review of this table suggests that an exposure to industrial chemicals increases the risk of cancer. In addition, as seen in Table 3.6 a number of different occupations are characterized by excessive cancer rates which have not yet been attributed to a specific etiologic agent.

In addition to cancer, which is perhaps most frequently associated with an exposure to an occupational risk, the World Health Organization (1976) identified additional work-related diseases. Among these illnesses are:

- 1) hypertension due to stress as well as exposure to excessive heat;
- 2) coronary heart disease due to stress and possibly exposure to carbon disulfide;
- 3) pulmonary heart disease due to complications of work-related lung disease such as pneumoconiosis;
- 4) gastroduodenal ulcer; and
- 5) arthritis and locomotor disorders such as osteoarthritis, low back pain syndrome and rheumatoid arthritis.

As before, however, extensive clinical and epidemiological studies are required to corroborate these suggestive findings for the Canadian work force.

Additional insights into the problem of work-related disease might be obtained by examining the incidence of illness by type of disease and occupational category. Presented in Table 3.7 is the incidence of various

Table 3.6 Occupational Groups in Which Excess Cancer Incidence Has Been Reported Without Identifying a Specific Etiologic Agent

Occupational Group	Site of Cancer	Percent Excess Reported
Coal Miners	Stomach	40
Chemists	Pancreas, Lymphomas	54 79
Foundry Workers	Lung	50-150
Textile Workers	Mouth, pharynx	27
Printing Pressmen	Mouth, pharynx	125
Metal Miners	Lung	200
Coke Byproduct Workers	Large intestine Pancreas	181 312
Cadmium Production	Lung Prostate	135 248
<u>Industry</u>		
Processing	Stomach Leukemia	80 140
Tire Production	Bladder Brain	88 90
Leather and Shoe Workers	Nasal cavity & sinuses Bladder	5,000 150

Source: See Table 13

Table 3.7 Prevalence Rates of Disabling Conditions by Occupation Among Male Family Heads Aged 25-64 Unadjusted and Age-adjusted (in parentheses) Prevalence Rates of Disabling Conditions per 1,000 Persons

Main Occupation Categories	Total Study Population N	Total Study Population %	Major Disabling Conditions									
			Musculo-skeletal	Cardio-vascular	Respiratory and Related Disorders	Digestive	Mental Illness	Nervous System	Cancer	Diabetes	Visual and Hearing Impairments	Other Un-specified Conditions
Professionals & Managers	10,189	29.5	23.8 (23.5)	25.5 (26.5)	5.8 (6.2)	6.9 (6.9)	5.4 (5.2)	1.0 (0.9)	0.5 (0.3)	3.6 (3.5)	3.9 (4.1)	12.5 (12.5)
Clerical & Sales	3,724	10.8	30.8 (31.7)	24.6 (26.3)	8.2 (8.9)	7.6 (16.0)	1.9 (1.6)	2.9 (2.8)	0.9 (0.8)	3.9 (4.2)	2.5 (2.9)	17.5 (18.1)
Craftsmen, Foremen	7,540	21.9	46.7 (46.8)	26.0 (27.3)	7.9 (8.2)	8.6 (9.0)	1.3 (1.4)	1.0 (1.2)	0.6 (0.6)	2.6 (2.6)	5.6 (5.7)	17.5 (17.7)
Operatives	6,493	18.8	46.0 (48.6)	24.3 (27.8)	9.0 (9.8)	10.4 (11.2)	3.3 (3.6)	1.4 (1.3)	0.1 (0.0)	3.5 (4.1)	4.8 (4.8)	19.6 (20.5)
Services	1,780	5.1	59.7 (40.1)	32.9 (26.9)	13.6 (12.5)	13.9 (13.3)	0.9 (1.0)	2.4 (1.9)	0.0 (0.0)	7.3 (6.8)	4.0 (4.3)	34.4 (30.8)
Farmers & Farm Managers	1,343	3.9	96.9 (78.2)	64.5 (51.0)	28.4 (21.8)	33.7 (25.2)	3.1 (1.6)	0.0 (0.0)	0.0 (0.0)	8.1 (6.9)	11.5 (6.9)	63.4 (42.5)
Labourers	2,103	6.1	58.4 (59.4)	28.4 (28.8)	11.2 (10.5)	16.9 (16.8)	7.9 (8.0)	0.4 (0.6)	1.8 (1.8)	0.5 (0.5)	8.1 (7.7)	31.9 (33.2)
Occupation Unknown*	1,303	3.8	165.4 (162.2)	239.5 (171.3)	39.3 (27.9)	16.9 (10.9)	54.2 (59.1)	41.3 (67.3)	14.9 (7.7)	15.5 (11.6)	38.8 (46.8)	112.6 (92.6)

* Higher prevalence rates in "occupation unknown" category for all disabling conditions might be due to being unemployed, or failure to report any occupation on questionnaire.

Source: Wan, T. and A. Wright (1973) "Occupational Differentials in Chronic Disability", Journal of Occupational Medicine 15 (June) 493-98.

disabling conditions by the major occupation of male family heads residing in the U.S. The data presented in this table suggest that, in general, the disability rates resulting from illness are higher in those occupations associated with greater physical exertion and lower earnings. In particular, musculoskeletal and cardiovascular disorders appear to be most prevalent in all occupational groups. Moreover, agriculture workers, workers in the service industry and common labourers appear to experience the highest incidence of such disorders. It is also possible that the biological factors described earlier contribute significantly to the high incidence of disabling illness reported for these occupational groups. Although the data presented in the table only address the issue of work-related disease by indirection, they do seem to suggest that the rate of disability resulting from disease or illness is related to occupational factors.

Chapter 4: WORKMEN'S COMPENSATION

The purpose of this chapter is to present a brief assessment of the Workmen's Compensation programs in Canada. More particularly, the focus of discussion is on the adjudication process, disability benefits and the collection of data concerning occupational illness and injury.

4.1 Adjudication of Claims

Even though an injury occurring in the work place is a straightforward concept, a substantial amount of legislation has been required to specify its meaning. Despite the long history of the program, the litigation process continues but, as will be seen later, injuries are not as litigious as "disease".

An important and constant complaint of workers, particularly organized labour, is that they have inadequate knowledge and information about the criteria by which claims are decided. The British Columbia Board publishes its claims adjudication manual and in Ontario the WCB has published some of its diagnostic criteria, but both these developments are of recent vintage. Indeed, the Workmen's Compensation Board of Ontario declared that it will publish a secret manual it has been using to judge and administer claims only in March 1979 (Globe and Mail, March 10, 1979). This was a belated response to persistent demands for an open flow of information recommended by the Ham Commission Report, a Legislative Select Committee, the Ombudsman Office, the Royal Commission Inquiry into Civil Rights, among others. It is still generally true in Canada that the compensation boards publish neither the rules by which they adjudicate claims nor their diagnostic criteria. In addition, there is reason to believe that the criteria applied in claims adjudication sometimes deviate significantly from those expressed in the legislation (Ison, 1978, p. 317). Organized labour have complained for years that without knowing the rules and the criteria, appeals were difficult to file.¹

Another complaint is that Workmen's Compensation Boards have traditionally accorded a more generous recognition of visible anatomical loss in awarding partial and permanent disability benefits than the degree of impairment or economic loss.² "Thus for example, it is common to find permanent disability awards ranging from 40 to 70% for the loss of a limb, even though the actual wages loss may be negligible. But for a herniated disc treated by laminectomy and fusion, awards have commonly been about 5 to 10% of total disability, notwithstanding that actual wage loss may be 50% or higher" (Ison, 1978, p. 318). Permanent partial benefits are among the most controversial and complex aspects of Workmen's Compensation. These are often established by the boards rather than by schedules which are difficult to apply in such cases. Many employers believe that these payments are excessive whereas the labour interests, predictably, claim the reverse is true.

Of continuing concern to labour is the role played by the physician in the process by which claims emanating from the onset of occupational disease are adjudicated. In particular, Workmen's Compensation Boards are more dependent on medical opinion in cases involving illness than in those cases involving injury. In this regard, the physician plays a dominant role in determining which claims will be accepted and reported as a work-related disease³. In the event of injury, the worker is usually familiar with the etiology of the accident and the decision to file a claim does not normally depend on the content of medical opinion. In some situations, it is possible that the worker will also recognize an industrial disease, particularly if the illness is common to the industry in which the individual is employed. In such a situation a claim may be initiated by the worker independently of medical opinion. However, in most situations, a claim will not be filed unless the physician recognizes that the disease emanates from an occupational origin.

Compensability has proven to be an especially contentious issue with respect to occupational disease. With the exception of Manitoba, workmen's compensation acts contain a schedule of industrial diseases for which compensation is payable. Associated with each disease in the schedule is the industrial process or industry in which the disease must

arise in order to be compensable. If the disease and the job situation of the worker correspond to those specified by the legislation, the disease is presumed to have been due to the nature of the employment, unless the contrary is proven. When the worker claims compensation for an unlisted disease or for one in which there is a mismatch between the job situation and the disease, the burden of proof rests with the worker.⁴ Indeed until 1974, the mismatch usually resulted in a denial of the claim without further inquiries. Such a practice is inequitable, if not indefensible given the controversy surrounding much of the epidemiological evidence that limited the recognition of the industrial causation of disease; lack of knowledge on the part of board physicians; the proliferation of hazardous and toxic substances and new technology that many fear is creating new sources of disease. In those instances where there is doubt as to cause of disease by a claimant the workmen's compensation acts do not prescribe that a negative assumption should be maintained, as is commonly practiced. On the contrary, claims are to be decided according to the balance of probabilities. In British Columbia, the act allows that "where there is doubt on any issue and the disputed probabilities are evenly balanced, the issue shall be resolved in accordance with the possibility which is favorable to the worker". Labour organizations have argued that workers rarely get the benefit of the doubt and that in instances of doubt, the WCB investigations are painfully and unnecessarily slow.⁵ There is an increasing body of opinion that for certain substances any level of exposure could be harmful.

Unfortunately, the role of board physicians in claims adjudication and their relationships with adjudicators has been prescribed in an instruction manual as late as 1975. Such a manual does not exist in most other provinces. Physicians often decide whether a claim should be allowed or denied. The problem with such procedures is the "medical opinion on questions of etiology, perhaps drawing on perceptions of the nature of scientific proof, often seem to demand proof of the affirmative going beyond the balance of probabilities prescribed by law" (Ison, 1978, p. 317). This technical-scientific orientation to claims adjudication is compounded by the fact that the compensation boards just do not have a sufficient number of trained specialists in industrial medicine.

The shortage of industrial medicine specialists not only influences adversely the claims adjudication process but it also means that the boards have done very little to initiate research into the incidence and causes of occupational disease. They have also not responded to the research initiated by others. For instance, most provincial statutes have a schedule of occupational diseases. This schedule can be expanded or amended in some provinces on its own resolution and in others through order-in-council. But as a general rule, the boards have not introduced a systematic program of reviewing the results of medical research and amending the schedules accordingly.⁶ Indeed, there is a responsibility vacuum in terms of the continuous revision of the WCB disease schedules. The current system is haphazard, tenuous and all too dependent on pressure by labour via the claim procedures. It is, of course, highly variable between provinces. The responsibility of amending these schedules could be extended to occupational health and safety advisory bodies such as the Federal Canadian Centre for Occupational Health and Safety or provincial advisory bodies such as the Advisory Council on Occupational Health and Occupational Safety in Ontario.

Another related matter is that the threshold limit values and maximum allowable concentration values established in industrial regulations were sometimes treated as if they had significance in claims adjudication. This is surely a misinterpretation of TLV's and MAC's. Many of the existing TLV's were not founded on sound epidemiological evidence and often represent "consensus" or "recommended" standards, promulgated by industrial hygienists and scientists often in the employ of corporate interests (Epstein, 1978; Stellman, 1974). There is increasing evidence that some people can contract a disease even if the exposure to toxic substances is well below the threshold limit value. Furthermore, there is abundant evidence that workers are often exposed to contamination that had not been systematically monitored and recorded.

It is evident that labour will continue to insist that the workmen's compensation board apply the "no fault" principle to as many, if not all, of the diseases they believe to be workplace related.

4.2 Collection of Data

As mentioned earlier, the reporting mechanisms and the definitions used in collecting injury data vary among provinces. In this regard, the frequency of accidents, lost time accidents, the number and value of claims compensated as well as those claims involving a fatality or different levels of disability are useful when measuring and describing occupational injuries. Unfortunately, data pertaining to all of these dimensions are not reported by all provinces and, with the exception of fatalities, provincial programs use different definitions when recording and reporting injury-specific information. As a consequence, the lack of uniformity in recording, summarizing and reporting statistical information also results in a distorted view of the injury experience in a given year and over time. As a general rule, accident reporting systems have not been designed as information systems but have emerged in unplanned ways to meet individual preferences and the exigencies of the day (Adams and Hartwell, 1977).

4.3 Bureaucratic Nightmare and the Demands of Labour

Unions have typically characterized the workmen's compensation boards as a "bureaucratic" nightmare which is secretive, inhumane, inefficient and inequitable. They regularly accuse the boards of forcing them into costly appeals on behalf of injured or diseased workers. Among the numerous reforms they demand are the following: equal representation to labour at the policy levels of the Workmen's Compensation Boards in order to achieve a balance of influence with management; decentralization of WCB operations to increase the speed, accessibility and efficiency of claims processing; all benefits to be indexed to increases in the cost-of-living or increases in some industrial wage index; and a greater emphasis on prevention of accidents and diseases.

Chapter 5: THE BASIS FOR GOVERNMENTAL INTERVENTION

5.1 Introduction

The scope and form of government intervention respecting occupational health and safety has been and continues to be a subject of much controversy. The economic justification for government intervention is usually based on the existence of market failures. The theory of market failures is a powerful, effective and largely accepted foundation for specifying the role of government in the pursuit of an optimal reduction in occupational safety and health hazards. Indeed, "the theory has become such an accepted part of modern discourse that those who use it need not so much as know it exists, let alone be familiar with its formal details" (Wolf, 1979, p. 114).

It is our opinion that there has been an all too cavalier and glib invocation of market failures by economists and particularly noneconomists critical of the market system or market-oriented solutions to health and safety problems to justify the involvement of government in promoting the reduction of occupational hazards. Likewise, there has been rather frequent and facile denials by the defenders of the market system with respect to certain serious and highly problematic failures of the market in achieving optimal levels of occupational health and safety. We will argue that the existence of market failures is neither necessary nor sufficient for justifying government intervention in contrast to more conventional positions. However, we believe that it is important to understand the various types and the specific nature of market failures principally because the discussion has significant implications regarding the appropriate forms of government intervention respecting occupational health and safety.

5.2 The Market Paradigm: Occupational Health and Safety in a Perfectly Competitive Model

The market failures we intend to discuss are best appreciated with reference to a normative bench mark which we refer to as the market paradigm. In normative economic studies the workings of the competitive model serves as the welfare norm. The discussion is restricted to the assumptions underlying such a model and its essential conclusions since there are already numerous formal and complete treatments of the subject in the literature (Settle, 1974; Smith, 1976; Pachauri, 1978; Oi, 1978; Cannon, 1974; Viscusi, 1976).

When examining occupational health and safety in the context of the perfectly competitive model, economists usually assume that:

- 1) firms maximize profits or alternatively, and perhaps more importantly, firms minimize costs;
- 2) individuals maximize utility (real income);
- 3) workers and firms possess perfect and complete knowledge concerning health and safety hazards;
- 4) information is costless to obtain and process;
- 5) all costs (benefits) imposed (conferred) on "third parties" are internalized (i.e., there are no externalities);
- 6) firms and workers behave as price-takers.

The last of these assumptions refers specifically to wages which are of obvious importance to the consideration of the issues of occupational health and safety.

The utility-maximizing, freely mobile workers, with full and accurate perception of risks associated with different employment opportunities and facing competitive labour market will, at the margin, demand and will be paid, risk premiums to offset their "expected losses" from the work hazards. Expected losses are regrettably rarely defined explicitly in the literature but it evidently refers to the sum given by the "total loss" from injury or disease multiplied by the probability that such losses will

be incurred in the present period. "Total loss" in turn is the present value of the direct economic losses plus the income-equivalent of psychic losses (pain, suffering, anxiety, etc.) also appropriately time-discounted, that the worker would suffer were an injury/disease to occur¹. An alternative way of expressing the same conclusion is that "higher wages would be paid in high-risk employments with the premium over wages in zero-risk employments sufficiently high to compensate the worker for the cost of insurance against expected loss of income"² (Gregory and Gisser, 1973, p. 107). Furthermore, *ceteris paribus*, workers would be willing to accept a decrease in risk premiums when employers are willing to invest in the reduction in the level of occupational hazards by purchases of appropriate capital (safer machines, safer processes, etc.), labour (safety engineers, toxicologists, physicians, industrial hygienists, etc.), otherwise alter working conditions that yield a safer workplace (for example by alterations in shift work, overtime, etc.).

As far as firms are concerned, the market paradigm leads to the following intuitively obvious conclusion. The response of employers to the presence of occupational hazards will inevitably consist of a mixture of a) accepting higher injury rates and pay the associated costs in terms of wage premiums, lost output, damage to equipment, training costs, lower morale, etc., and/or b) reducing the hazards by employing safety-related capital and labour inputs in order to lower the number of injuries and associated costs. The firms will choose a level of investment in safety at which the marginal cost of reducing the injury rate equals the marginal savings from its reduction. Since the costs of reducing injuries and the savings from such reductions must vary across firms and industries, the optimal injury rate consistent with profit-maximization can be shown to vary across firms and industries.

The interplay of firm and worker behaviour in perfectly competitive markets should result in a situation where, for the same type of labour, the market would equalize wages among the different employments net of the risk premium. The costs associated with occupational hazards would tend to be shifted forward to consumers since these costs are essentially production costs, hence resource allocation would reflect the full costs of

production including the costs of worker injuries. Suppose that the level of hazards experienced by firms within an industry increases³ for some reason (introduction of new chemicals, machinery, processes). The effect of the increment in the hazard levels at the industry level should lead to an increase in output prices and a decrease in quantity of the industry output.⁴

It is evident from the above discussion that in the market paradigm, wage premiums play an important role in allocating labour and other resources among their various uses. Clearly then, a knowledge of whether or not these risk premiums exist is of paramount concern when forming public policies. If they do exist, then the private labour markets may be presumed to have a price mechanism for controlling industrial accidents and public policies can be based on the manipulation of these prices. If, on the other hand, these wage premiums do not exist or if they do exist but do not fully compensate for the risks assumed by workers, then the control of injury must be based on artificially created differentials--such as an injury tax or through experience-rating Workmen's Compensation premiums payable by employers--or through some other means including a system of standards.

There is a growing body of empirical work attempting to estimate compensating wage differentials for hazardous work. Smith (1974) found a positive and significant relationship between the wage rate and the probability of work-related death but that other measures of work hazards were not significant in explaining variations in individual wages. Viscusi (1976) also found a positive and significant relationship between wages and two measures of work hazards: a) a dummy variable indicating whether the worker perceived any hazards on his job; and b) the injury frequency for the worker's industry. Gordon (1973) found a positive, significant wage differential for the injury rate in a sample of train and engine employees. Thaler and Rosen (1975) found a compensating wage differential for hazardous occupations. Their measure of occupational hazard was the difference between the expected death rate for a given occupational group in an industry and the actual number of deaths. McLean, Wendling and Neergaard (1978) could not reject the hypothesis that a positive, signi-

ficant compensating wage differentials (risk premiums) existed for work hazard in manufacturing.

There are neutral and indeed contrary findings as well. For instance instead of finding a positive coefficient for the injury rate variables' impact on wages, Chelius (1974) found it was negative and significant. Dillingham "found a positive compensating wage differentials for non-white males but no significant differentials for white males" (McLean et al., 1978, p. 99).

The empirical studies cited here usually encounter a number of conceptual and data problems, limiting their validity and usefulness. Several different measures of occupational hazards have been used including death rates, disabling injury rates, severity rates, injury rates, and perception of dangerous conditions on the job; and there is the inevitable disagreement over which measure workers respond to in demanding the risk premium. Beyond the conceptual level, the real and serious difficulty in obtaining reliable and accurate data is evident from our discussion in the previous chapter. Further problems include the difficulty of controlling for occupational characteristics and the failure to incorporate the dual causality between wages and occupational hazards. Surprisingly, these studies do not include the effects of firms using different levels of safety practices and inputs. While this variable is presumably inversely correlated with the injury rate, it is an alternative that should have been examined. The studies also ignore the dynamic nature of occupational injuries. The demand for risk premiums is not only related to the probability of occurrence of occupational injury at a point in time, but also to the probability associated with the extent and duration of the losses resulting from the injury.

Our review of the theoretical and empirical literature leads us to believe that a market does indeed exist for industrial safety. As a practical matter hazard pay is quite common in many blue-collar occupations, and has been customarily sought by unions whose members are subjected to unusually dangerous work. Hazard pay differentials are also embodied in collective-bargaining contracts or in joint labour-management jobs-evalua-

tion plans. It would be folly to deny that risk premiums exist. But the market is, however, far from perfect. That is, the market does not generate sufficient risk premiums to achieve socially optimal levels of work injuries. We will explain the reasons for this conclusion in the sections that follow.

At this point, a crucially important issue must be raised. It should have been noted that both the presentation of the market paradigm and the brief review of the empirical literature on the existence of wage or risk premiums was cast exclusively in terms of workplace injuries only and not workplace injury and disease. This was not accidental but deliberate. No one seriously believes that the market paradigm is as valid for resolving the problems of occupational disease as it might be in resolving the problems of occupational injuries. This much is conceded by even the most ardent supporters of market-oriented solutions to the reduction of occupational hazards (for example, Smith, 1974 and 1976). One simple explanation for this is that while injury appears as an argument in the production function of the firm (i.e., injuries affect production costs and outputs) disease often does not. The reasons for this phenomenon are materially related to the etiology of disease and injury and the fact that Workmen's Compensation systems at least internalize injury costs to industry but fail to do so in the case of disease as was discussed earlier. There are of course other reasons as well, as will be evident from our discussion of the various types and nature of market failure.

5.3 Failures of the Market

In this section we focus on the failures of the market paradigm which result in an underinvestment in the area of occupational health and safety. In most cases, a market failure represents a violation of one of the assumptions on which the market paradigm is predicated and, as such, provides the basis for governmental intervention.

5.3.1 Informational Issues

Economic theory purporting to show the efficiency of the market mechanism is usually predicated on the assumption of perfect knowledge and information, though this often is ignored or at least underemphasized in conventional discussions of the subject. The present section outlines a variety of informational problems in terms of quantity, quality, dissemination and accessibility that are endemic to the field of occupational health and safety. It is argued that the pervasiveness and seriousness of the information problem renders the advocacy of laissez-faire market solutions to the provision of optimal amounts of occupational health and safety unacceptable (Cornell et al., 1976). Indeed, the problems of information not only inhibit efficient resource allocation but have serious implications for equity as well. In the face of lack of information and uncertainties workers cannot be presumed to make correct, informed, occupational choices among producers and firms. And misinformation in this field can be potentially very costly.

It is generally conceded that there is a quantitative deficiency in knowledge concerning the extent, nature and effects of occupational hazards. Furthermore, there is concern about the quality of information. What some might consider as knowledge or fact others consider as indefinite and uncertain. Controversies abound, with the result that even the knowledge or information we possess is occasionally of a questionable nature. This is true for both the "hard" scientific-medical questions (for example, the effect of low-level radiation) as well as social-science issues (for example, whether a majority of injury is caused by negligence, inexperience and careless behaviour on the part of the injured workers).

Indeed, it should be noted that the informational problems that one often encounters in occupational health and safety are more appropriately referred to as uncertainty. Economists would argue that uncertainties to which a worker cannot assign or estimate a probability of occurrence lead to inefficient outcomes and to demands for regulations designed to decrease the uncertainty (Arrow, 1963). Indeed, there are many instances where we had no information on the possible outcomes of exposure to chem-

icals which led to production, distribution and extensive use of the substances only to discover with the passage of time their disease-causing properties.

To establish "safe levels" of exposure for every chemical product in commercial use is practically impossible with the current scientific and medical research manpower, administrative and research techniques. The problems are well-known and need only be mentioned briefly. First, there are in excess of 12,000 substances of known toxicity in commercial use already. Second, many workers are exposed to chemical mixtures or compounds which potentially could have synergetic effects and lead to multiple etiology of disease. Third, there are scientific difficulties in extrapolating from animal experiments to humans. Fourth, epidemiological studies--of which we have too few--are facing difficulties in that the time lag between exposure to humans to occupational hazards and the appearance of diagnosis of disease is sometimes long (two decades or more) and variable, i.e., the effect of exposure varies with the amount of exposure and even individual-worker susceptibility to the hazard. Fifth, apart from the backlog of substances for which we have no assessment or "standards" for safe levels, the rate of increase in the use of new substances in commercial use is greater than our current capacity for assessment and standard-setting.

It should be noted that information regarding occupational hazards, especially those pertaining to disease and to a far lesser extent to injuries, must be generated through research, for the most part. The individual worker or firm cannot for economic and technical reasons discover many of these hazards through the usual channels of information: advertising and learning by experience.

Even if a sufficient quantity of fairly noncontroversial information could somehow be generated, there remains several formidable problems in the dissemination of information. There are the logistical problems of reaching workers and firms in various industries and localities as well as government bureaucrats, decision-makers and inspectors. In addition, there are the problems of communicating information and making what often

are very complex and technical matters intelligible to the people affected by the standards.

By far the most serious problem is that of the inequality of access to information. Inequality of access between labour and management is particularly important. The pervasiveness of patent rights, licencing arrangements, the concepts of management prerogatives, the proprietary nature of much of the new substances and processes are all indicative of the fact that differential access to information regarding workplace hazards is endemic to our legal and political economic systems and not a mere imperfection. The differential access to information not only conveys a bargaining advantage for the more knowledgeable party (management versus labour or management versus government) because it creates incentives to withhold, or worse, distort potentially damaging information but it compounds the difficulties of public and private decision-makers in terms of the setting of standards, evaluating the effectiveness of standards, enforcement, inspection, etc. (Epstein, 1978).

The problem of the inequality of access has other dimensions as well. For economic reasons, smaller firms have less access to information than larger firms. Similarly, unorganized workers have less access to information than organized, unionized workers.

Furthermore, it is important to recognize that in a free market environment there are real economic disincentives for the generation of relevant information. Individual workers and even well-endowed unions cannot or may not wish to bear the entire discovery costs of information about the potential carcinogenic properties of chemicals. Some workers prefer not to know. But the overriding economic obstacle to the generation of information is the so-called free-rider problem. In this case, a worker, a local union or the entire union may decide that the research effort does not depend on his (its) contribution. While each worker, local or union (in these instances where there are a number of unions in the same industry or working with the same chemicals, processes, etc.) has some individual stake in apprehending what the job hazards are, his (its) stake may well be perceived as being small relative to the costs the worker, local

or union would incur in making the decision to invest in the production of information.⁵

Generally speaking business are not likely to find the generation of information a profitable activity. Information about most occupational health and safety hazards, and the solutions to them, are difficult to sell since the information is more of a public good than a private good. The nature of information or knowledge makes it difficult for private arrangements to capture, at the margin, all of the social benefits from the production of information. (There are exceptions of course, for example, firms can use patent and other protection instruments to profit from information embodied in safer equipment, chemicals, processes and technology.) Furthermore, welfare-maximization requires that, once produced, knowledge should be distributed at marginal costs which are typically negligible relative to the average costs of producing the information. If the firms were to recoup the costs or insist on earning a competitive rate of return by disseminating information, the high price charged would mean too few consumers (firms and workers) would have the information. The implication is of course that the socially efficient investment in the production of information will not be undertaken in private markets.

The cost of producing and purchasing information is not the only difficulties that underlie this type of market failure. An important manifestation of purchasing cost is the costs associated with processing, interpreting and understanding the information. The processing of information is costly because it takes time, skilled personnel and at least some informational infrastructure on the part of workers/unions and firms. It has been generally noted that workers could easily fail to "correctly" process information about work hazards because it is very difficult for many people to assess and evaluate small probabilities, a difficulty compounded when these small probabilities are manifestations of infrequently or rarely experienced events such as bodily injury or serious disease. Workers, indeed most people, also find it hard to understand how probability theory applies to single, sometimes nonrepeatable events like serious accidents and illness. To many of the population, tendencies mean little

or nothing, particularly when the event may never be experienced again by the same individual (Fromm, 1968).

When confronted with choosing among jobs with different occupational hazards and varying probabilities of injury or disease, the worker may find that the cost in terms of time and psychological stress associated with making a correct judgement about expected losses and demanding appropriate compensation either in the form of risk-premium (hazard pay) or corrective action on the part of employers to reduce the level of hazards, more than offset the expected benefits of making the "right" decision. This is compounded by the fact that "workers can be given no assurance that it is their life or limb that will be lost or saved. As a result, they may tend to ignore or depreciate risk differentials between jobs and undervalue efforts to reduce the hazards they face" (Settle, 1974, 60).

From the above brief discussion, it is clear that neither workers, firms, nor governments make decisions on the basis of adequate or reliable knowledge or information. As a result, there is a likelihood that nonoptimal decisions will result with respect to the provision of occupational health and safety.

It would be reasonable to argue that management would tend to underprovide the necessary investment and measures to reduce occupational hazards, irrespective of whether they operate under a for-profit or non-profit motive. The containment of costs, *ceteris paribus*, is the presumed objective of management. This is particularly true for occupational diseases where, for the reasons described above, the uncertainties and the lack of information are generally more pronounced. The problem of diseases, some of which are latent, chronic and manifest their costs in the future, presents a "discounting" problem for even the most enlightened and farsighted management. Similarly for the benefits of investments made now to reduce disease. Of perhaps more importance is the fact that the Workmen's Compensation system is much less of an incentive to generate disease-related activities relative to injury-related activities on the part of management.

The lack of information about occupational hazards or information relating to the injury experience of a specific employer is hardly likely to enable workers to estimate, let alone insist on, the type of "risk premium" that the private market paradigm would lead one to believe. There are of course other reasons why workers may not receive "risk premiums", including lack of alternative job opportunities, transition costs, preference for location, job security, etc., as well as social, cultural, and psychological factors that may influence worker's decision regarding the assumption of risks. Also the inability to assess low-probability but catastrophic events is common to most individuals. Consequently, there are serious reasons for questioning the concept of existing levels of workplace hazards as deriving from workers' "free" choice. On the other hand, workers' concern for safe workplaces have often resulted in claims for unrealistic and indeed utopian standards that occasionally cannot be met for technical reasons but perhaps more often are rejected on grounds of their economic consequences. One wonders whether the unrealistic demands by labour are a reaction to their uncertainties and lack of knowledge. Perhaps with more evidence and information about the extent and nature of hazards, labour may indeed take more "reasonable" positions on occupational health and safety.

Thus far, the informational problems cited above are simply manifestations of a market failure. However, there are instances where workplace hazards are attributable, not to a lack of information, but to a persistent lack of utilization of the information that already exists. For example, substitute materials for asbestos exist and have been used in European industries for a considerable period of time. The North American mining industry has been reluctant to adopt adequate ventilation in uranium and other mines relative to European countries even when it was known that such measures would reduce the risks of cancer to mine-workers. The type of market failure suggested here is not one that is attributable to information per se but one that emanates from the discrepancy between social and private costs of occupational health and safety.

Clearly, one potentially crucial role for government in the achievement of the socially optimal level of occupational health and safety is

the provision of more complete information concerning job hazards. On the basis of such information, workers can better assess the risks and demand more nearly perfect compensating wage premiums (Ontario Economic Council, 1979, 37). But it would be folly to limit the role of government to providing only information. Furthermore, the task of generating and disseminating information is indeed a formidable one.

5.3.2 Externalities

Another serious obstacle to the provision of an optimal level of workplace health and safety measures is the existence of substantial "externalities" or third-party effects in that presently the employers and/or employees are not held financially responsible for the full economic and social consequences of workplace generated illnesses and injuries. A significant share of the economic costs of occupational injuries and disease is borne not only by workers and their families but also by society at large.

This is not to suggest that the direct costs to firms of occupational injury and illness are not substantial. As mentioned earlier, the direct costs to firms often underestimate significantly the total costs of occupational injuries and illness because quite often management is not aware of the magnitude or the very existence of the associated indirect costs. Of perhaps greater concern are the social costs of injuries and illnesses that do not enter either the direct or indirect cost calculations of firms but are nevertheless borne by the individual worker and society at large.

In a classic study of indirect and direct cost of injuries, Heinrich (1928) estimated that "indirect" and "hidden" costs were on average four times the conventional "direct costs" arising out of Workmen's Compensation premiums and medical expenses. Some Canadian estimates suggest that a ratio of 3.5 to 5.0 is perhaps more appropriate.

To be sure the ratio of indirect to direct costs will vary widely depending on how those terms are defined. They will vary from firm to firm and over time. For example, a number of the direct and indirect

costs may be considerably lower in times of unused physical capacity and high unemployment.

The troubling aspects of estimating direct or indirect costs of accidents and injuries are twofold. First, there has been very little effort devoted to the problem of determining the total costs of injuries and illnesses. Many of the current estimates are more properly described as "guesstimates". This is no doubt due to the paucity of data. In part, the lack of complete information is probably related to the belief that some of the data are not worth collecting and processing. On the other hand, most of the problem is related to the fact that we lack a carefully developed system of recording and reporting all of the costs associated with occupational disease and injury. Secondly, the implicit, if not explicit, view that employers are not aware of the full costs is probably true but it is surely highly variable from employer to employer. The very classification of direct and indirect costs is arbitrary. The obvious conclusion one could draw from the above-mentioned statistics that employers are not "aware" of the costs by a factor of 3.5 to 5.0 can be quite misleading. Too much emphasis on the ratio of indirect to direct costs can also direct attention away from what is clearly of greater relevance to the estimation of the real costs of occupational health and safety. That the costs of occupational disease and injury are systematically underestimated was mentioned earlier. Recall that the magnitude of the underestimation is represented, in large part, by the costs that are external to the firm and hence do not enter into the firm's calculation of the costs of occupational injury and disease. It is these external costs that are the primary reason for failure of the market mechanism to provide a level of workplace safety and health that is in any sense "optimal".

There are, first of all, significant costs borne by the injured worker. There are a few injured and many more ill workers who do not receive Workmen's Compensation for reasons explained in Chapter One. Many of those who do receive Workmen's Compensation will typically find that benefits are significantly less than their prior earnings. (Canadian Workmen's Compensation programs have substantially more generous benefit structure than those in the United States, however. For a few workers,

the compensation payments may be equal to or higher than their take-home, after-tax earnings because compensation awards are not income-taxable.) They also miss out on promotions, cost-of-living adjustments, union negotiations and suffer an erosion of the value of the compensation from inflation. For some, this loss in income is temporary. For many, the after-injury employment earnings are reduced on account of their disability. Many of the permanently disabled may not have any employment income. In technical terms, the deterioration of human capital (the health, skill, training of the workers) is a cost borne by the individual and society but not the employer per se. Thus Workmen's Compensation does not restore the worker's income to a level that would have prevailed if he had not been injured nor to a level that is commensurate with the income earned by the worker at the time of injury or disease, let alone compensating him for the intangible pain and suffering.

This loss in income falls ultimately on society at large. The costs of caring for and rehabilitating the victims of occupational disease and injury is not incurred by the employers or the victims themselves. The Workmen's Compensation programs of course do have fine rehabilitative programs but these are only available to those whose compensation claims have been affirmatively adjudicated. It should also be noted that self-employed persons are not covered by these programs. Both victims and their dependents have legitimate recourse to social-welfare services in terms of the costs of medical care, retraining, direct income maintenance or supplements, etc. Incidentally, whether the families of workers at risk should be viewed as "third-parties" is not clear. For instance, if workers and their families are fully aware of and understand all the risks involved then the whole family as a decision-making unit would presumably take account of these risks and demand compensating wage-premiums or risk-reducing investment--a highly unrealistic assumption for most families. The more usual case is surely that workers fail to consider all the possible losses their families might suffer from job-related hazards in which case families would be viewed as third-parties.

A related and particularly troublesome form of externality is the hazards faced by pregnant women or women in child-bearing age exposed to mutagenic carcinogens.

It might be argued that medical, hospital and rehabilitation services needed by the injured and the sick are financed by the Workmen's Compensation Board. This is largely but not entirely true. The Workmen's Compensation laws are an example of liability laws that attempt to internalize some but not all of the external costs of occupational injuries and disease. As was shown earlier, the Workmen's Compensation program does not recognize all work-related disease nor does the program pay for the health care costs that are minor or of short duration even if they are work-related. Medical problems and the costs resulting from injuries after the principal injury are not charged to the program. Health premiums for the disabled may be waived but are not financed by the Workmen's Compensation Board. In short, a portion of the benefits provided by various elements and programs of the welfare state but have of the corresponding costs accrue to the employer.

These are only some of the externalities that militate against the full recognition of occupational health and injury costs by employers. To the extent that this is so, it fails to generate the proper incentives to employers and the self-employed to promote and invest in the reduction of occupation health and safety hazards. When an activity imposes external costs, private, self-interested decision-making will lead to an excessive level of that activity (i.e., hazardous occupation conditions).

In those instances where work hazards pose joint threats (i.e., to workers and third parties), government intervention may be required even when workers are fully paid for the risks to which they are exposed. However, in practice the protection offered third parties will usually also benefit the workers and vice-versa. This is evident in instances where the occupational hazard also generates pollution (for example air, water and noise) hazardous to the health of the public at large. Toxic metals, such as mercury and lead, the use of chemicals, such as PCB and PVC, pesticides, radiation and noise are among the risks that are present

in the workplace and intrude on the general environment. Consequently, workers and other third parties are inevitably affected by such hazards. Environmental and occupational hazards overlap and are often inextricably intertwined. Indeed, one very important reason why occupational health and safety issues are receiving so much attention currently, in contrast to its long neglect, is because the larger ecological and environmental concerns have forced us to look at the sources of these problems. Many environmental hazards emanate from the work place, raising an important equity issue in that workers are under double jeopardy resulting from longer and higher levels of exposure. The important public policy implication of the existence of such joint threats is, however, that the wage-premiums or hazard-reducing activities worked out between fully informed workers and employers is not sufficient to assure optimal levels of health and safety activities. Private decision-making may still be found wanting and will not solve the problem of externalities.

5.3.3 Imperfect Labour Markets

A crucial assumption upon which the presumed efficiency of the market paradigm regarding occupational safety and health rests is that there is sufficient information and mobility among workers and competition among employers to make labour markets competitive.

Earlier we commented upon the informational limitations and problems resulting in market failure, so we limit our commentary to other aspects of the labour market that represent additional sources of market failure.

A number of authors have documented the aspects of labour markets that make them significantly less than perfect (Ashford, 1976). Workers may not be mobile between jobs with different risks for a variety of reasons: fear of unemployment, pension plans, seniority rights, limited opportunities, search costs, specialized employer specific skills, moving costs, social or familial factors that induce inertia to job changes, etc. Consequently, there may well be a high degree of geographic and occupational immobility that makes risk premiums unlikely or insufficient at best. These limitations are compounded in "company towns" or single-

industry communities such as mining towns in Northern Ontario or Quebec where workers not only have few, if any, viable alternative job opportunities but face monopsonistic or oligopsonistic employers. There is no reason to presume that monopsonistic power is exercised in only one dimension (wage rates) by employers. More to the point, such power can be deployed in any and all dimensions of the real wage such as fringe benefits, job security, and occupational health and safety. The firm can profit by keeping the risk premium below the expected losses to workers for injury and disease, which would imply not only an inefficient substitution of labour for capital but also a sub-optimal investment in the reduction of occupational hazards.

5.3.4 Interdependent Utility Functions

It is quite conceivable that there may be a demand by individuals who themselves may not be at risk for improvements in the occupational health and safety of others. These people are presumed to experience disutility from the knowledge that many workers die each year or are at risk for injury or disease and may be willing to pay for reductions in these hazards or even forego the benefits (output) of these jobs. For example, such attitudes are apparent in relation to the nuclear industry, where it is not uncommon to find individuals, who are not workers in the various plants, protesting against the real and suspected danger to workers, and occasionally more forcefully than workers themselves. Such situations may well be described as paternalistic or altruistic from the viewpoint of the concerned citizenry. But this is surely only partly correct since public demands for a reduction in health and safety risks probably emanate from a self-motivated desire to reduce work-related hazards that intrude on the general environment and thereby represent a danger to the health or safety of the general population.

In any case, the resulting demand for risk reduction is unlikely to be completely satisfied by the private market place. The principal reason for this is that the market place would have great difficulty in arranging transactions between those who wish to purchase hazard reduction activities or goods and those who can provide or implement them.

One might imagine that the "concerned citizens" might bribe workers to exercise caution in their work or subsidize their demand for risk reductions or bribe firms to install further improved safety equipment and measures. But this solution is rather unrealistic in as much as some individuals will "free-ride" on the purchase of others (i.e., will not reveal their true preferences) and it would be difficult to monitor what "outputs", if any, their bribes would be yielding to them. These problems arise because the product which we rather loosely called occupational hazard or risk reduction exhibits characteristics of collective consumption goods.

Consequently these demands will be sub-optimally satisfied by private markets (if bribes were attempted) in the sense that people's willingness-to-pay for further increments to risk reduction would exceed the cost of providing those increments. Utility interdependence will, in general, give rise to a potential failure of the private market to provide occupational health and safety "goods".

5.3.5 Cost Minimization Objective

The market paradigm outlined earlier is essentially valid for a number of specifications of the firms' objectives. That is, the assumption of cost minimization is consistent with alternative expressions of the firm's objectives, including the maximization of profits, revenue, market share or growth. Economists generally accept the view that firms do minimize costs, especially in the context of the competitive market structure. But there are skeptics, particularly with respect to firms operating in noncompetitive market structures (Cyert and March, 1963). For example, Reder has claimed that "it is 'only' when operating profits turn to losses that management 'of a monopoly or oligopoly' discovers how much inefficiency it has been tolerating" (Reder, 1947, p. 453). The existence of noncost-minimizing firms means that firms may well produce sub-optimal (or supraoptimal) amounts of occupational health and safety levels.

The bias is likely to be that of sub-optimality, however. Firms may well underestimate the full burden of occupational injuries and disease

for reasons cited in Chapter One. But there are other reasons as well. "Top management may be cognizant, in principal, of the long-term benefits of a safer work place, and may intend to direct corporate policy toward the achievement of this objective. Yet, perhaps unintentionally, top managment often evaluates subordinates on the basis of criteria that force them to have an extremely short time horizon with respect to this issue. The incentives operative on middle- and first-line supervisory personnel typically lead them to emphasize smooth, uninterrupted production at the maximum feasible rate, often to the detriment of their subordinates' health and safety. Thus, there is a widespread tendency for managerial practice in regard to occupational health to be geared toward the short time horizon imposed upon middle- and first-line supervision even when top management understands in principle the beneficial consequences of improved work place safety" (Ashford, 1976, p. 345).

Another problem that militates against cost-minimization behaviour is related to the availability of capital required to improve the enviroment in the safer workplace. Large, profitable firms can rely on internal financing or have a relatively cheaper access to external financing and hence undertake large-scale investments with long gestation periods. Furthermore, they are less unwilling to assume privately the uncertainty or risk associated with an investment in risk reduction as long as the expected value of such an investment is high. Smaller firms may not only have trouble raising the initial capital but may be unwilling to undertake the risks, preferring instead to pay the certain and calculable Workmen's Compensation costs (assessments) to the potentially smaller but uncertain costs associated with its own efforts to reduce hazards. The problem of the marginal firm is obviously more serious in this regard. Firms on the verge of bankruptcy or even earning sub-normal profits are likely to opt for deferring further financial pressures and forego investing in improved workplace health and safety in the short run. Thus there is potential to reduce costs were society to assume part of the risks associated with such investments.

The foregoing discussion implies that, even when viewed in terms of private costs and benefits (private to the firm, that is), firms may fail

to minimize costs. As was mentioned earlier there is a real and much more likely case that firms will underinvest in the reduction of occupational health and safety hazards from the viewpoint of social cost and benefits, particularly with respect to diseases in contradistinction to injuries. Firms will naturally discount heavily the disability and diseases that have long latency periods, and this discounting will be more acute in the cases of mutagenic or teratogenic hazards in which the potential harm may not become manifest for one or more generations. In instances where there are significant social costs, particularly when they are manifest after long latency periods, private firms will inevitably use an inordinately high discount rate relative to the "societal" discount rate in evaluating the trade-off between long-run costs of occupational hazards and the short-run costs of hazard abatement and prevention.⁶

5.3.6 Administrative and Timing Failures of Market Solutions

Recently, Baumol and Oates (1975) have justified the use of the one instrument of public intervention that has attracted very few defenders among economists--the direct controls or regulated standards, which are nevertheless popular outside the economics profession. Their argument was made in the context of determining optimal public policies with respect to environmental problems, problems that are characterized by externalities. In our view their argument, however, has equal validity in the occupational health and safety context.

While the usual economic arguments extolling the efficiency advantages of fiscal instruments (taxes and subsidies) is not unsound, they omit some important considerations. Occupational health and safety "problems" do not always develop smoothly and gradually. Instead, they are often characterized by infrequent but more or less serious crises whose timing is unpredictable. Such emergencies may require rapid temporary changes in the rules of the control mechanism, and it is here that tax policy appears subject to some severe practical limitations" (Baumol and Oates, 1975, p. 152).

Whatever their theoretical virtues, fiscal instruments suffer from at least one serious practical drawback as a means of solving the externalities problem in occupational health and safety: they are very difficult to change at short notice. Even if this problem is overcome, say by vesting a substantial degree of authority and flexibility in the fiscal decision-makers, these instruments will still be ill-suited for short-term crises. The problem is essentially two-fold. First, the response to a given level of taxes or subsidy is difficult to ascertain accurately. Secondly, the period of adjustment to attain the new levels of activities is typically uncertain. If taxes and subsidies are used as long-run policies designed to achieve desired standards of occupational health and safety, these problems may be judged to be not serious. However, occupational health and safety conditions in many workplaces (for example, in mines and nuclear reactors) change so suddenly that fees simply may not be able to produce the necessary change in behaviour quickly and predictably enough to avoid serious injury and disease or even death. Indeed, as was suggested in the previous chapter, certain serious hazards are often discovered belatedly and the question then becomes one of how best to prevent further exposure. Direct controls or regulated standards are often recommended because if enforcement is effective controls can induce, with little uncertainty, the prescribed alterations in "hazardous" activities.

"This, incidently suggests another reason for the popularity of direct controls among regulators. Having had little experience in the use of ... taxes, they seem to fear that a program introducing a fee for the first time will fall far short of its intended goal and that a subsequent increase in tax rates sufficiently high for the purpose will prove unacceptable politically" (Baumol and Oates, 1975, p. 155). The determination of an appropriate tax-subsidy structure would require considerable knowledge of the production possibilities of firms. Also, a trial-and-error approach would be rather undesirable not only for the political difficulties involved as mentioned above but "because of the large and differing investments that might be appropriate for different fee structures, so that frequent or even occasional changes in fees could be potentially very costly. Another political difficulty with the tax-subsidy approach is that the public may well interpret the policy as toleration of occupa-

tional health and safety hazards. The public wants prohibitions or quantitative restrictions because they are more reassuring than reliance on mysterious market forces" (Montador and Bauman, 1977, p. 15).

Indeed, it is not uncommon to find a parallel argument made against the very notion of hazard pay by some workers and politicians. There are workers who regard risk-premiums or hazard pay unacceptable, if not odious, because to them they amount to a tacit, if not blatant, tolerance of workplace hazards. The monetary value of the acceptance of these risks in the form of risk-premiums is antithetical to their view that health is priceless, and nothing short of strict standards, vigorously enforced, is acceptable to them.

5.3.7 Equity

The term "market failure" in its usual technical sense is limited to allocative efficiency considerations and ignores the issue of distributional equity. However, there are some who consider distributional inequalities as a form of market failure since, in their view, a more equal or just distribution of income or wealth is simply a particular type of public good (Wolf, 1979). In formal economic analysis whether the equity issue is treated as a market failure or a nonmarket or extra-market failure can make a great deal of difference with reference to the prescriptions concerning desirable public policies and forms of intervention. The typical argument is that distributive objectives should be met through explicit transfers via tax or subsidy policies, where payers or recipients are clearly identified and the justification for the transfer publicly and politically evaluated. The market should be allowed to operate with minimal interference and regulation should be limited to correct for allocative efficiency market failures. But in the real world, the political process does not usually provide for the dichotomous treatment of resource allocation (efficiency) and income distribution so beloved of welfare economists. Indeed, it is naive to attempt to limit wealth transfers to explicit tax-and-expenditure policies since almost every public decision has implications for wealth distribution, whether intended or otherwise.

In any case, it has become increasingly apparent that the concern for equity is of great importance in the making of public policies regarding socially acceptable levels and distribution of occupational hazards. Indeed one may hazard a generalization and claim that this is true for most types of government regulation. There "is a growing disenchantment with the usefulness of the traditional role of regulation in economic analysis as a *deus ex machina* which eliminated one or another unfortunate allocative consequence of market failure. The creeping recognition that regulation seemed seldom to actually work this way, and that it may have engendered more resource misallocation than it cured, forced attention to the influence which the regulatory powers of the state could have on the distribution of wealth as well as on allocative efficiency" (Peltzman, 292, 211). In an examination of why regulations exist and proliferate, Trebilcock et al. (1978, p. 35) concluded that "no individual or interest group has any interest in allocative efficiency as a primary goal or even a secondary, or instrumental good except to the extent that it maximizes the individual's or group's self-interest, which often such a goal will not. In other words, allocative efficiency is generally a means to the end of increasing an individual's or interest's share of the social product". Increasingly, regulation is seen as a powerful engine for redistribution and as a fulcrum upon which competing interests seek to exercise leverage in their pursuit of wealth.

An important implication of this view of regulation is that it may be misconceived and irrelevant to criticize regulation as allocatively inefficient, given that this is not often its primary, and even less frequently, its only purpose. Rather than allocative evaluations, it is perhaps more relevant to examine who wins and who loses--and by how much--from regulations. The distributional impact of legislation is a difficult undertaking⁷ and it is a question about which far too little research has been undertaken.

It is also said that redistribution via regulation is less subject to political accountability than through the tax-expenditure system. While this seems plausible it is not obvious because it must be remembered that a) it is very difficult to determine the real incidence of tax and expen-

diture policies, and b) it is common for a benefit that is conferred to one group in one context being "traded" by politicians against benefits (which may or may not be offsetting) to other groups in other contexts. That is, "apparently unrelated benefits may be politically interdependent" (Trebilcock et al., 1978, p. 35).

In this section, several equity issues germane to occupational health and safety will be raised. Equity, being inherently a political or judgemental concept is difficult to define precisely or consistently. Notions of equity change over time and with changing circumstances. Before the Workmen's Compensation systems were introduced, the prevailing view, at least as embodied in the legal systems and manifest in the "assumption-of-risk" doctrine, held that workers freely and willingly accepted the risks inherent in their jobs. The Workmen's Compensation system in this country and elsewhere can be viewed as a response to the inequities in the common law and employers' liability laws, though as was explained in Chapter One there is much more to the introduction of these schemes than the reason cited here.

While it is generally true that occupational health and safety hazards are pervasive in Canadian workplaces, it should be remembered as pointed out in Chapters Two and Three that a disproportionate amount of this risk is shouldered by workers in especially hazardous occupations, industries or processes. A fair proportion of those exposed to the most hazardous substances frequently belong to the lowest socio-economic groups and live closest to the plant (National Commission on Materials policy, 1973, p. 73, England and Bluestone, 1971). These workers are subject to a double jeopardy--risk of both workplace and environmental (off-the-job) hazards.

The fact of unequal risks raises very important equity issues. For instance, farm workers face an unusually large number of hazards, accounting for a rather high mortality and accident rate, so that the rest of society can enjoy relatively abundant food supplies. Asbestos workers are known to experience an excess mortality rate so that ships and buildings may be properly insulated and automobile brakes function efficiently.

Such situations may well be perceived as inequitable by the public at large, though the perception in and of itself, says nothing as to what should be done about the risks faced by these select workers. (This case is very much like the one described earlier as the "inter-dependent utility function" type of market failure.) In any case, principles of equity and fairness may "rule out justifying institutions on the grounds that the hardships of some are offset by a greater good in the aggregate. It may be expedient but it is not just that some should have less in order that others may prosper" (Rawls, 1971, p. 15).

This is all the more true in those cases where the existence of workplace hazards are experienced by workers who are not adequately compensated via "hazard pay" or if when injured or ill are not adequately compensated for loss of earnings and suffering (both of which may be quite common as argued before). The workers may be said to be "subsidizing" the employer and/or the consumers of his product. For example, farm workers typically face a greater number of hazards and experience an exceptionally high accident and sickness rate. Whatever the ultimate cause(s) for the lack of hazard-reducing investments by employers, it translates into either higher profits or lower prices to consumers or a combination of the two. The income distribution impact of such a situation *ceteris paribus* is one in which the workers lose and the employers and/or customers gain. Indeed the demands by workers for more legislative protection through standards, inspection, enforcement, etc., and more risk-reducing activities from employers can be viewed as an attempt to redress this inequity; that is, workers wish to redistribute income in their favour via greater protection against occupational disease and injury.

Can this equity problem not be resolved between the workers and the employer? It has already been argued that for reasons of the lack of information, transaction costs, occupational hazard pay or wage premiums do not necessarily compensate for workplace risks. Furthermore, as Ashford has stated, "the argument that wage differentials in hazardous industries incorporate the appropriate level of workplace risk is about as convincing as the argument, no longer made, that the price the consumer is

willing to pay incorporates the risk he is willing to take on being injured by the product he buys" (Ashford, 1976, 360).

In any case, if left to the outcomes of private agreements between workers and employers, other inequities may appear. It is probable that large unions may be more successful in negotiating for job safety and health than smaller unions and, most importantly, unorganized workers. There is some empirical evidence that in "very risky" occupations at least, unionism has succeeded in increasing the risk premiums paid to workers (Thaler and Rosen, 1975).

Unorganized workers constitute about two-thirds of the Canadian labour force, a proportion which is not likely to change radically in the near future despite the current organizing effort. There is, of course, considerable variation in the extent of unionization among industries and occupations. Some particularly hazardous industries such as mining and construction are heavily organized whereas agriculture, which is also a rather hazardous industry, remains largely unorganized.

The equity issue arising with respect to the unorganized workers is simply that they have little or no effective control over decisions which can have momentous consequences for them. These workers can and do benefit from gains made by organized workers when management "voluntarily" initiates health and safety practices in an attempt to forestall unionization. But this is slow, uncertain and can hardly be said to constitute an effective solution to the formidable problems faced by the unorganized sectors of the labour force. Thus they suffer severely from a lack of information regarding the nature, extent and seriousness of occupational hazards as well as their rights under the various statutes and laws designed to protect them. They have an abysmally low level of access to expertise that could assist them, not only in resolving the informational problem, but also in reducing transaction costs the search for advice could entail.

The pursuit of equity for the reasons cited above and others to be discussed later may conflict with the attainment of other social objectives such as economic efficiency. There is an implicit trade-off between

the twin objectives of equity and efficiency. If society places positive values on equity per se, one implication would be larger allocation of resources to reduce occupational health and safety hazards than would be dictated by efficiency considerations alone.

Some have argued against this position, claiming that resources used beyond that required for the attainment of efficiency is indefensible because risks are inherent in all kinds of activities.⁸ There is risk in driving an automobile, or not purchasing safety devices such as smoke detectors, in flying in an airplane, in using a lawn-mower, etc. These risks are voluntarily assumed by people. The implicit question posed by this viewpoint is why treat occupational health and safety differently?

One may assess the nature of risk in terms of three important elements or characteristics: a) the degree to which the decision to undertake the risk is collective or individual; b) the extent to which there is voluntary choice in avoiding the risk; c) the extent to which there is randomization versus selective victimization of harm that results from the risk.

The decision to drive an automobile is in principle an individual decision, voluntarily made and the victims of accidents represent in most respects a randomly selected cross section of the driving population and thus one may assume more or less an equality in the level of risk confronting all drivers. By contrast, if society collectively decides to use asbestos wherever it will reduce costs, a (nonrandom) selected group of asbestos workers pay for this decision by assuming greater risks to their health. Another example is the collective decision to rely more on coal or nuclear sources of energy. Moreover, it can't always be readily assumed that the worker's decision to assume the attendant risks (if known in the first place) is voluntarily made because of many factors that restrict his mobility as discussed before.⁹

Ashford (1976, p. 362) has argued that "at the present time, nonrandom victimization is the norm for exposure to occupational hazard ... that is, the 'population at risk' may come to represent a less and less accurate cross section of the general population. Many working people--espe-

cially the poor and unskilled, members of discriminated-against minority groups, and the geographically and occupationally immobile--are presently subjected to the cruel dilemma of a very sharp trade-off between their health and the economic well-being of their families. Considerations of equity and social justice dictate that a daily assumption of undue risk not be a prerequisite for their claim to reasonable job security and a decent wage. Of course, different people view what is fair differently, but this fact makes the considerations of equity no less important."

Government intervention in the provision of occupational health and safety "goods" may be viewed as achieving certain income redistributive objectives, especially if these interventions are selective and geared to jobs held by the poor. Whether in-kind transfers could actually increase the real income of the poor depends upon the extent to which wages reflect the risks assumed by workers and the employment effects resulting from the intervention in the industry. Improvements in occupational health and safety could be accompanied by a reduction in money wages and may be offset fully or partially by the expected real income gains from the improvements. Lay offs could occur since the intervention will presumably increase production costs, which is translated into higher output prices, reduce the quantity of output demanded and the level of production and employment. These negative employment effects may themselves be viewed as inequitable in that some workers may be involuntarily unemployed or forced to take a less preferred job, etc., due to the intervention while other more fortunate workers continue working in the now safer jobs.

Arguments for income redistribution via government intervention in the form of standards, information programs, etc., commonly presuppose that the poor tend to get jobs which are low-paying, unpleasant, dirty and dangerous. While this does seem plausible both from anecdotal evidence and some select studies cited earlier, there is, however, a lack of well-documented evidence showing a clear systematic relationship between incomes or earnings and workplace hazards.

Finally, another reason why the market provision of occupational health and safety may be judged to be socially undesirable is related to certain notions of horizontal equity. A violation of horizontal equity

may well occur when we take into account ex ante and ex post concepts of equity. A situation which is apparently fair on an ex ante basis, in that all the workers face equi-probabilities of suffering an economic loss, may, however, be deemed to be unfair on an ex post basis when a few workers suffer very large losses and many go unharmed. If ex post horizontal equity is an important social goal and if private insurance markets are less than "perfect" an intervention in the market may be warranted. However, complete and universal ex post equity can only be attained by eliminating all the hazards or through complete compensation. The former is an impossible task and the latter, however desirable, would provide incentives to feign work injuries and reduce any incentives for workers to exercise caution in their workplaces. The realistic position is clearly for government to improve ex post horizontal equity outcomes either through compensation via Workmen's Compensation laws and/or through a reduction in injuries and disease via standards, information programs, economic incentives (subsidies), or disincentives (taxes).

In conclusion, we would like to emphasize that far too little is known about who benefits and who pays for the programs which are in operation currently. It is perplexing to find the predominance in the noneconomic literature (and the one, we suspect the government either believes or at least seems to accept without questions) that the incidence rests with the employer--which is only true in statutory but not in economic burden terms--or is passed forward to consumers via higher prices in its entirety. This is in contrast to at least the theoretical consensus among economists that the incidence of such taxes rarely falls on a single group. The assumption that workers are not burdened with these compensation costs is widely believed, even though it can be shown that this view is unwarranted in the absence of full perception of risk by workers (Gregory and Gisser, 1973).

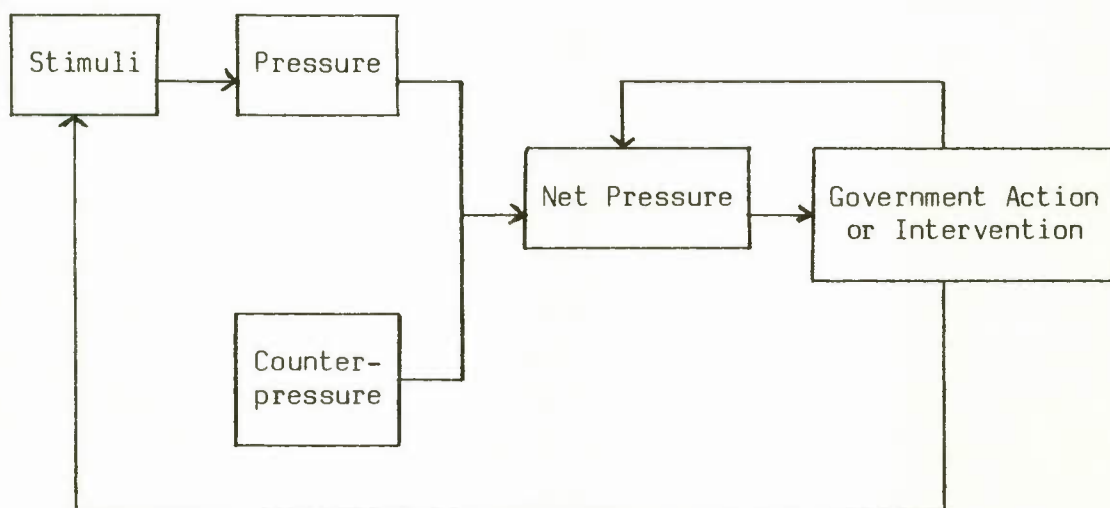
Justifying government intervention for reasons of equity or income redistribution is one thing but it is quite another matter to determine whether the techniques and instruments used by government to pursue these objectives actually succeed in doing so and if they do, at what cost.

Chapter 6: FACTORS INFLUENCING GOVERNMENTAL INTERVENTION

6.1 Framework of Analysis

As seen in the previous chapter, failures of the market mechanism result in an underinvestment in health and safety as well as a hazardous work environment. The purpose of this chapter is to develop a framework within which responses to a hazardous work environment and the involvement of government in the area of occupational health and safety might be analyzed. In Chapter 7 we employ the framework to analyze the government intervention in the areas of occupational health and safety in the mining industry of Ontario and Quebec. It should also be noted that the framework developed below will be couched in general terms so as to accommodate other sectors and issues to which government action concerning occupational health and safety has been directed.

At the risk of over-simplifying, we might view governmental intervention in the area of occupational health and safety as the product of the process which is shown schematically below. Here, we might



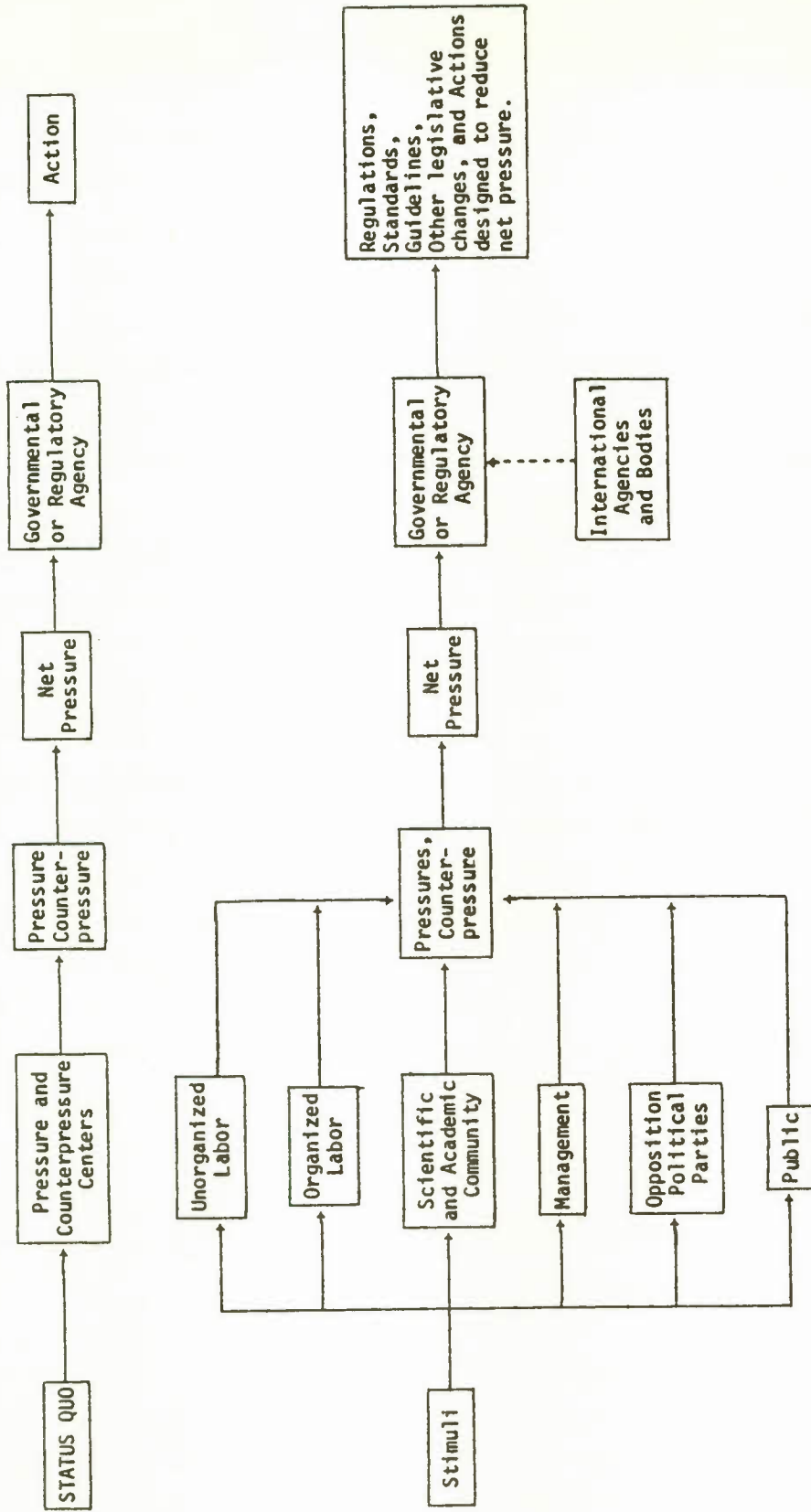
assume that the process is initiated by the presence of a given stimulus or a set of stimuli which might emanate from a catastrophic event, the discovery of a new technology, the discovery of a new health or safety hazard, the existence of adverse working conditions, a deterioration in an

existing work environment, divisions in jurisdictional responsibility or inadequacies in the administration and enforcement of existing legislation. In turn, the stimulus or set of stimuli evokes pressures and counterpressures for governmental action or intervention. As seen above, then, the net pressures exerted by interested parties induces the governmental or regulatory agency to intervene by taking action which is intended to reduce the net pressure for change or by implementing policies or programs that directly address the stimulus or set of stimuli which evoked the pressures and counterpressures. It seems reasonable to assume that the actions of government create a new stimulus or set of stimuli which in turn evoke different pressures, counterpressures and net pressures for additional governmental action or intervention. As such, one might view governmental intervention in the area of occupational health and safety as the product of a dynamic evolutionary process which is influenced by a multiplicity of various constituencies.

That the evolutionary process is influenced by a variety of interested parties may be seen by referring to Figure 6.1. In this case, we might assume that the stimulus emanates from a condition of employment which is potentially hazardous or is known to exert deleterious effects on the health and safety of an identifiable segment of the work force. In response to the known or potential hazard, organized labour, the political representative of labour and, to a lesser extent, unorganized labour, is assumed to exert pressure on management or on government to implement action designed to reduce or eliminate the condition which poses a threat to the health and safety of the work force. In response to these pressures we might expect management to react by exerting counterpressure on organized labour or the appropriate governmental agency. In this case, management might attempt to discredit the views expressed by labour, minimize the importance of the occupational hazard or emphasize the adverse economic consequences of reducing or eliminating the hazard.

Also note that the academic community lays a direct and indirect role in exerting pressure for governmental intervention. With respect to the indirect role, the scientific and academic community has been engaged by labour as well as management to provide scientific expertise in matters

Figure 6.1



concerning occupational health and safety. The advice, recommendations and the research efforts of the academic and scientific community have provided the foundation for management and labour to develop the substantive arguments on which demands for governmental intervention are based. On the other hand, the academic and scientific community has also performed research from which recommendations and the formulation of the public policy have evolved directly.

The other major sources of pressure identified in Figure 6.1 are opposition political parties and the public. With respect to opposition political parties, it is common knowledge that the New Democratic Party views itself as the spokesman for labour, while the Progressive Conservative Party appears to advance policies and programs which favour industry. In addition, the public at large may also exert pressure for governmental intervention in the area of occupational health and safety, particularly when adverse conditions in the workplace also affect or pollute the general environment.

The final institutional source of influence identified in Figure 6.1 is a set of international agencies and regulatory bodies in other nations. Of particular importance in this regard are the World Health Organization, The International Labour Organization and regulatory agencies in the U.S., Great Britain and Scandinavia. In general, research, technological advance and catastrophic events occurring elsewhere are in effect exported to Canada where they influence the development of public policy concerning occupational health and safety. As will be seen later, the close economic association between the U.S. and Canada has exerted a significant influence on the nature and type of legislation promulgated with respect to the mining industry in Quebec and Ontario.

6.2 The Pressures for Governmental Intervention

As mentioned earlier, governmental intervention in the area of occupational health and safety is induced by the net pressure exerted by a variety of constituencies. To couch the argument in more analytic terms, we might assert that the initial pressure to which we referred earlier is

dependent on not only the stimulus, but also on the political and economic environment. In turn, the counterpressure exerted by other groups is dependent on not only the initial pressure, and hence the original stimulus, but also on the political and economic environment. Concerning the initial pressures, then, we might posit that

$$\text{Pressure} = f(\text{stimulus, political environment, economic environment})$$

On the other hand, the counterpressure exerted by opposing groups might be summarized by

$$\text{Counterpressure} = q(\text{pressure})$$

which implies that

$$\text{Net pressure} = h(\text{pressure, counterpressure})$$

Each of these functional relationships is examined in greater detail below.

6.2.1 The Initial Pressure

Consider first the dependence of the initial pressure on the stimulus or set of stimuli as well as the political and economic environment. Assume that the stimulus evoking the initial pressure emanates from an adverse working condition or a deterioration in the current environment of the workplace. Suppose further that the adverse working conditions are associated with a highly organized sector of the economy and that the labour union assumes the role of exerting initial pressure for an improvement in the environment of the workplace.

In such a situation, the response of organized labour depends not only on the traditional role of trade unions but also on: 1) the importance of the hazardous conditions relative to the fundamental economic concerns of labour; 2) the extent to which the hazardous conditions represent an immediate and direct threat to the health and safety of the work force; 3) the extent to which the hazardous conditions are perceived as representing an immediate and direct risk to health and safety; 4) the extent to which the conditions are perceived as representing a long-term

threat to the health of the work force; and 5) the extent to which political and economic factors are permissive or restrictive.

As implied above, the goals of labour might be regarded as being either economic or noneconomic in nature. Traditionally, the labour union movement has focused on improving wages, fringe benefits and job security as opposed to inducing mechanisms designed to reduce the hazards in the work place. As a result, we might argue that the primary role of the trade union movement has been one of addressing the fundamental economic concerns of labour through the collective bargaining process. On the other hand, we might regard the attainment of improvements in the work environment as one of the primary "noneconomic" goals of labor and, in this regard, the union has relied primarily on political pressures and processes to achieve desired objectives.

The reliance of the labour movement on the collective bargaining process as a vehicle for achieving economic as opposed to "noneconomic" objectives is related to several factors. The first emanates from the traditional role of the labour union movement as well as the relationship between the membership and the leadership of the union. In particular, we might argue that the union leadership pursues a set of organizational objectives, as defined, in part, by the rank and file, so as to achieve the personal objective of maintaining power in the union. Since the origins of the labour union movement are traceable to the conditions of employment and the level of wages prevailing during the period of industrialization, it is not surprising to find that the collective bargaining process has been used as the institutional vehicle by which the leadership discharges the primary function of redressing the economic injustices perpetrated on the work force by employers.

Historically, the rank and file has placed a high priority on wages, fringe benefits and, during periods of high unemployment, on improving job security. By obtaining favorable wage settlements the union leadership attains a goal that exerts a direct and immediate effect on the economic welfare of the membership which, in turn, solidifies, the position of the leadership and enhances the prestige of the labour union. Economic gains

obtained through collective bargaining are embodied in a contract that is: 1) administered or monitored with relative ease; 2) enforceable through grievance, judicial or economic processes; and 3) capable of reflecting changing economic conditions throughout the life of the collective agreement. As will be seen below, it is difficult, if not impossible, to subject issues concerning occupational health and safety to a collective bargaining process that culminates in a contract that satisfies the three conditions identified above.

By way of contrast, consider the adverse working conditions or the deterioration of the work environment to which we referred earlier. In order to obtain an improvement in the environment of the workplace, it is frequently necessary to sacrifice economic gains so as to reach agreement. For reasons cited earlier, however, the rank and file may not recognize that a reduction in occupational health and safety will generate a direct and immediate benefit which is comparable to the foregone economic gains. For example, it is quite possible for an individual to work in an unimproved environment without sustaining an injury or contracting an occupationally related disease. To the extent that the benefits resulting from a reduction in occupational health and safety hazards are not fully appreciated by the rank and file, sacrificing economic gains for improvements in the environment of the workplace may result in disenchantment which, of course, might erode the position of the current leadership.

Of particular importance in this regard are deficiencies in the quality, dissemination and understanding of information concerning real and potential hazards in the workplace. These deficiencies not only influence the identification of existing or potential occupational hazards but also the extent to which risks present in the workplace are perceived as a serious threat to the health and safety of the work force. Unless such risks are recognized or perceived as representing a serious threat, neither the membership nor union leaders are likely to attach a high priority to the goal of eliminating or reducing occupational hazards. These observations suggest that the risk-averse union leader would probably prefer to maximize economic gains through collective bargaining and rely on alternate processes to improve conditions in the environment of the workplace.

In addition, the nature, magnitude and wide range of known and potential occupational risks reduces the likelihood of resolving all health and safety issues within the context of collective bargaining. It is well-known that the probability of a rapid and successful culmination of the collective bargaining process declines as the number of "real" items on the agenda increases. In addition, we might argue that the outcome of the negotiation process depends, in part, on the relative bargaining power of management and labour. As a result, if issues concerning health and safety are resolved by collective bargaining, the negotiation process is likely to result in different outcomes which may increase the inequities that are associated with differential exposures to occupational hazards. Furthermore, the introduction of new and potentially hazardous materials and production processes results in frequent and dramatic changes in the environment of the workplace. As a result, the very nature of the work environment poses rather obvious problems when viewed from the perspective of monitoring and controlling occupational health and safety hazards within the context of the collective agreement and the grievance process. In addition, the provisions of a given collective agreement are in force for a specified period of time and at the time of ratification it is difficult if not impossible to foresee all changes in the work environment that are likely to occur during the life of the contract. These considerations also reduce the usefulness of collective bargaining as a process by which health and safety issues might be comprehensively and successfully resolved.

In summary, the discussion presented above suggests that the labour union movement has relied on collective bargaining to achieve the economic goals of improving the wages, fringe benefits and the job security of the rank and file. On the other hand, the collective bargaining process does not appear to represent an acceptable mechanism by which health and safety issues might be successfully and comprehensively resolved. As a result, the labour union movement has relied on political pressures and the political process to improve the environment of the workplace.

The effectiveness of labour unions in achieving noneconomic goals through political pressure is dependent on a number of considerations. Perhaps one of the most important of these factors is the extent to which the source of pressure is centralized. We might argue that the more centralized is the source of pressure, the greater is the influence that is exerted by a change agent which, in this case, is the labour union. More specifically, centralization enables the change agent to mobilize required resources, to coordinate the use of resources in exerting pressures for improvement and to develop a unified position concerning the hazards present in the work environment.

In a similar fashion, we might argue that the more centralized is the focus of pressure, the more effective are demands for improvements in the work environment. In this case, fragmented responsibility has frequently been cited as an excuse for governmental inaction. In addition, centralization of the focus of pressure enables the governmental or regulatory agency to accumulate relevant information as well as mobilize and coordinate the resources required to formulate, implement and administer changes in legislation concerning occupational health and safety.

As implied above, the political environment also plays a significant role in influencing the nature, magnitude and effectiveness of pressure exerted for improvements in the environment of the workplace. Here, we might argue that the party in power is probably more susceptible and responsive to pressures for reducing real or potential hazards in the work place when: 1) political support is deteriorating; 2) the labour union is able to manipulate public opinion; and 3) during periods of impending elections, the union is able to influence the voting behaviour of a significant proportion of the electorate. Concerning the third of these factors, the ability to manipulate public opinion and mobilize public support is enhanced when occupational risks present in the workplace also pose a real potential hazard to the general environment. The potential for widespread exposure to radiation and the effects of "acid" rain are excellent examples of such a situation.

It is also possible to argue that the economic environment may represent either a permissive or a restrictive factor which influences the nature and magnitude of labour pressure for improvements in the environment of the workplace. For example, during periods of high unemployment the trade union is not likely to exert vigorous and persistent pressure for a reduction in the risks present in the workplace, particularly when dealing with a firm that employs a large or significant proportion of the rank and file. In such a situation, the employer might claim that the costs of improving the work environment are excessive and would force the permanent cessation of economic operations which, of course, would jeopardize the job security of a large proportion of the membership and, in turn, union support for the existing leadership. On the other hand, vigorous and persistent pressure for improved working conditions is more likely during periods of low unemployment, or vigorous product markets and excessive demands for labour. In addition, labour is more likely to exert vigorous pressure when addressing the work environment of a large number of firms, each of which employs a small proportion of the union membership.

6.2.2 The Counterpressure

In response to the initial pressure exerted by the labour union or another change agent (e.g., an opposition political party), management is likely to pursue one or more courses of action. Although a variety of alternatives are available we assume that management might: 1) agree with the basic position of the change agent; 2) attempt to discredit or minimize the claims or allegations of the change agent; or 3) introduce evidence that suggests that compliance with the demands of the change agent will result in deleterious economic or political consequences.

As before, the response of management depends not only on the initial pressure, and hence the original stimulus or set of stimuli, but also on the political and economic environment. In this regard, we might employ the ratio

$$r = \frac{\text{Costs of agreeing with the change agent}}{\text{Costs of disagreeing with the change agent}} \begin{matrix} < \\ \approx \\ > \end{matrix} 1$$

when examining the reaction of management of the initial pressure. In general, the costs of agreeing with the change agent are, in large part, comprised of the increased expenditures required to reduce health and safety hazards to acceptable levels. Conversely, the costs appearing in the denominator of the ratio might be represented by: 1) foregone production resulting from strike action as well as occupationally related injuries and illnesses; 2) foregone profits which result from consumer or governmental reaction to the hazards present in the workplace as well as the general environment; 3) the expenditures required to formulate and implement programs designed to discredit or minimize the claims of the change agent(s); and 4) the expected legal fees associated with potential judicial action. The cost components of the numerator and denominator described above are not collectively exhaustive but are intended only to suggest the nature of the expenditures considered by management.

When r is greater than unity, management is likely to introduce programs designed to discredit or minimize the claims and assertions of the change agent. Moreover, the greater is the value of r , the greater is management's reluctance to comply with the demands for improvements in the conditions prevailing in the workplace. Conversely, when r is less than unity, management is likely to agree with the change agent and introduce programs designed to reduce the health and safety risks present in the work environment.

Other things remaining constant, the ratio is likely to exceed unity during periods of high unemployment, decreasing product demand and declining labour requirements. These observations suggest that during periods of economic decline, management is more reluctant to introduce health and safety programs and more likely to mount programs designed to minimize and discredit the claims of the change agent or to advance arguments outlining the deleterious economic consequences of complying with the pressures for change. Conversely, other things remaining constant, the ratio r is likely to be less than unity during records of low unemployment, vigorous product demand and increasing requirements for the services of labour. In such a situation we might expect management to be more willing to comply with pressures for an improved work environment and to introduce programs designed to reduce health and safety risks.

The presence of more than one pressure group may also influence the response of industry. Consider, for example, a situation in which a known or potential risk in the workplace also represents a real or potential hazard in the general environment. In such a situation, we might expect the general public as well as opposition political parties to join the labour movement in pressing for an improvement in the environment of the workplace which increases the denominator of the ratio r .

6.2.3 The Net Pressure

As seen earlier, the net pressure exerted on a governmental or regulatory agency is a function of not only the initial pressure but also the counterpressure exerted by opposing groups. Further, it was noted previously that the nature and magnitude of the pressures for change and the counterpressures emanating from opposition groups are functionally related to a variety of factors, perhaps the most important of which is the prevailing economic environment.

Consider first a period of economic prosperity. During periods of low unemployment, rising product demand and increasing labour requirements, pressures for improvement in the environment that emanate from the union movement are likely to be vigorous and persistent. Moreover, in those situations in which risks present in the workplace pose real or potential hazards in the general environment, the demands for improvement in the work environment emanating from labour unions are likely to be augmented by those originating from the general public as well as opposition political parties. On the other hand, when viewed from the perspective of industry, it is probable that during periods of economic prosperity the costs of disagreeing with change agents will exceed the costs of complying with pressure for reducing the real and potential hazards present not only in the workplace but also those related risks which may also intrude on the general environment. Under these conditions, then, we might expect a strong and persistent net pressure for improving the environment of the workplace.

Conversely, during periods of high unemployment, a deteriorating product market and a declining demand for the services of labour, we would

not expect labour to exert strong and persistent pressures for improvements in the work environment. Further, when viewed from the perspective of management, it is reasonable to expect the costs of compliance to exceed the costs of disagreement during periods of economic decline. As a result, management might be expected to exert a strong and persistent counterpressure in response to the relatively weak pressure for improvements in the work environment. As a result, during periods of economic decline, it is probable that the pressures exerted by industry will exceed those exerted by change agent(s).

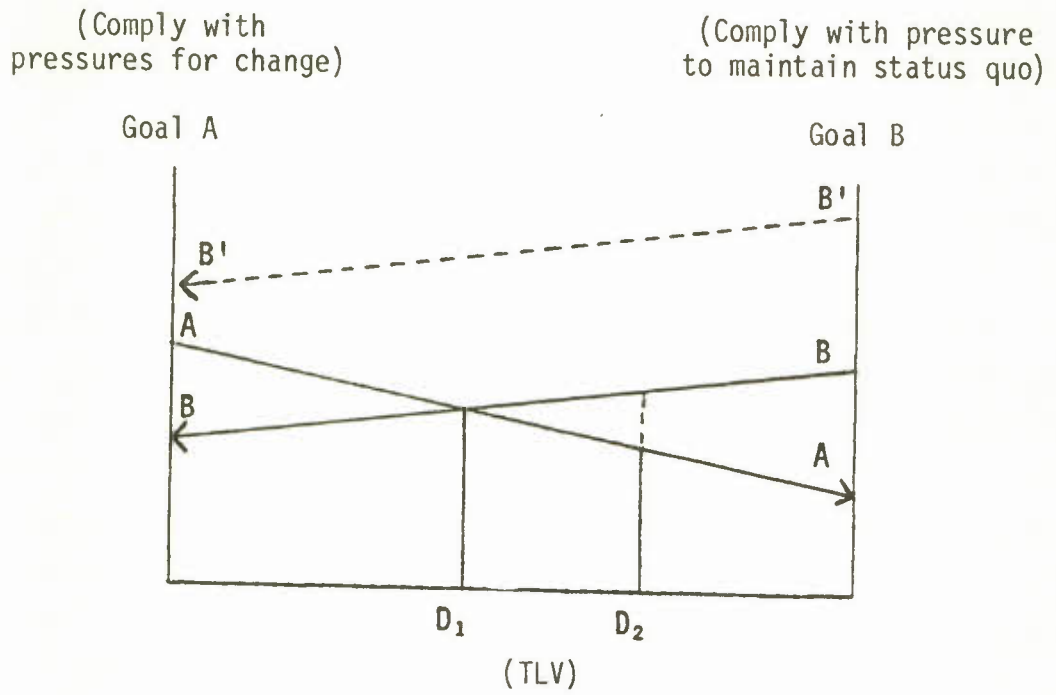
6.3 The Response of Government: An Avoidance-Avoidance Model

The response of government to demands for an improved work environment might be examined in terms of an avoidance-avoidance model. For purposes of illustration, suppose that Figure 6.2 refers to the different views of the business community and labour concerning the threshold limit value (TLV) of a toxic substance that will be permitted in the workplace. In this case, we assume that labour demands a reduction in the TLV while the business community prefers to maintain the status quo.

As a result, governmental authorities are faced with a conflict choice situation in which the objective is to avoid the political penalties that might emanate from complying with the initial and counterpressures described earlier. Notice that goal A (complying with the demands of the change agent) and goal B (complying with the demands of industry) might be viewed as negative goals since promulgating regulations designed to improve the environment of the workplace is likely to alienate the business community while electing to maintain the status quo is likely to alienate labour. As a result, governmental authorities are induced to avoid both goals.

In the following discussion, we shall employ the concept of an avoidance gradient which assumes that the tendency to avoid a negative goal is a declining function of the distance from the goal. Referring to Figure 6.2, notice that function AA is the avoidance gradient associated with goal A while function BB is the avoidance gradient associated with goal B. At position D_1 the strength of the tendency to avoid goal A is equal

Figure 6.2 An Avoidance-Avoidance Model



to the strength of the tendency to avoid goal B. Conversely, at a position such as D_2 the strength of the tendency to avoid goal B exceeds the strength of the tendency to avoid goal A and, as a result, authorities are induced to return to position D_1 .

Suppose that authorities initially occupy position D_1 but, due to additional information concerning the toxicity of the substance, the avoidance gradient associated with goal B shifts to position $B'B'$. In this case, the avoidance gradient associated with goal B lies above the avoidance gradient associated with goal A. As a result, there is a net tendency to avoid goal B and comply with the demands of the change agent.

Observe that the approach outlined above determines essentially two variables: 1) the distance of authorities from each of the two goals in equilibrium; and 2) the strength of the tendency to avoid both goals which is the same for each in equilibrium. An important implication of the avoidance-avoidance model is that, if there are compromise solutions available, authorities are likely to adopt such an alternative rather than one of the two negative goals.

When viewed from the perspective of the change agent(s), essentially two sets of tactics might be identified. The purpose of the first set is to raise avoidance gradient BB while an application of the second lowers avoidance gradient AA . For example, the adoption of goal B might precipitate a strike action which will not only threaten the economic well-being of a significant portion of the electorate but will also reduce tax revenues and the value of the dollar in international markets. Consequently, any tactic which increases estimates concerning

- 1) the probability of a strike action, or
- 2) the economic and political consequences of adopting a less stringent approach to health and safety hazards,

raises the avoidance gradient associated with goal B. On the other hand, anything that reduces estimates concerning the political and economic costs of complying with the demands for an improved work environment lowers avoidance gradient AA .

Consider next a more general situation in which the tactics employed by constituencies demanding an improvement in the work environment prevail. In this case, governmental authorities may react to the pressures exerted by the change agent(s) by funding a study on which future legislation might be based. Alternatively, governmental authorities might promulgate guidelines, standards or regulations which directly address the stimulus or set of stimuli that evoked the initial pressure. In addition, governmental authorities may introduce incentive schemes or other institutional arrangements designed to reduce hazards present in the workplace.

On the other hand, suppose that the tactics employed by the business community prevail. In this case, government might decide to maintain the status quo or, in the extreme, to relax or rescind guidelines, standards, regulations and other institutional arrangements promulgated earlier. In addition, it is also possible for government to relax the enforcement of existing legislation. For example, regulatory agencies may reduce: 1) the frequency of inspections; 2) the number of violations cited; 3) the thoroughness of inspections and 4) the level of fines imposed for non-compliance with existing legislation.

6.4 The Role of International Agencies

Throughout the discussion presented above, we focused on the role of labour, management, the scientific and the academic community in stimulating legislative changes. However, it is also important to note the role played by international organizations in formulating standards and regulations. Among the more important of these agencies are the World Health Organization (WHO) and the International Labour Organization (ILO). Each of these organizations is briefly discussed below.

6.4.1 WHO

The World Health Organization has been involved in promoting occupational health since 1948. Similar to the International Labour Organization, WHO believes that occupational health not only encompasses the prevention of occupational disease but also the preservation of physical,

mental and social well-being in the workplace and off the job. As a result, WHO believes that occupational health and general health care should be integrated into a single centralized health authority.

Unlike the ILO, all members of the World Health Organization are governmental and the Canadian representative to WHO is the Department of National Health and Welfare. More specifically, the Environment Health and Directorate serves as the Canadian representative to the Occupational Health program of WHO.

This program assists member countries to develop occupational health programs by distributing information, conducting research, operating development projects and enacting resolutions and standards at World Health Assemblies. In addition, WHO has demonstrated an interest in and provided support for the development of occupational health manpower.

6.4.2 ILO

The International Labour Organization has been involved in the area of occupational health and safety since 1919, when it was established by the Treaty of Versailles. Since its inception, the ILO has promulgated a number of Recommendations and Conventions concerning occupational health and safety. When a convention is ratified, the government is in effect stating an intention to align its laws so as to conform with that convention. Among the more important conventions enacted by the ILO is the development of governmentally sponsored and operated factory inspection systems. Among the more important recommendations of the ILO is the establishment of occupational health services and the control of occupational hazards. Through the various conventions and recommendations, the ILO has facilitated the development and establishment of international standards. In addition to facilitating the exchange of information, the ILO also operates technical assistance programs, publishes documents concerning occupational safety and health, operates courses as well as symposia for professionals, employers and employees and compiles international injury statistics.

Unlike the WHO, the International Labour Organization is a tripartite formed by government, employers and employees. The government of Canada is represented by the Department of Labour through the International and Provincial Relations Branch. Further, the Environmental Health Directorate of National Health and Welfare provides Canadian information to the International Occupational Safety and Health Information Centre (CTS) which is operated by the Central Library and Documentation Branch of the ILO.

Chapter 7: GOVERNMENTAL INTERVENTION IN CANADA: SELECTED CASE STUDIES

The purpose of this chapter is to employ the general frame of reference developed earlier in an examination of governmental intervention in the area of occupational health and safety in Canada. More specifically, this chapter will be developed in essentially three phases. The first presents an historical overview of governmental intervention in the area of occupational health and safety while the second and third sections focus on the intervention of government in the mining industry of Quebec and Ontario respectively.

7.1 Governmental Intervention: An Overview

In order to understand the evolution of public policy concerning occupational health and safety, we consider first the historical context within which events and the pressures exerted by interested parties resulted in governmental action. As seen below, the origins of governmental legislation may be traced to the conditions of employment that prevailed prior to the emergence of the labour movement in Canada. Following a period of inaction, pressures from labour resulted in the adoption of Factory Acts, Employer Liability Acts, Workmen's Compensation Acts, as well as the emergence of industrial hygiene as an area of public concern. The modern era of occupational health and safety has been influenced significantly by a growing involvement of the scientific and academic community as well as an increased awareness of the need to improve administrative mechanisms and conditions prevailing in the workplace.

7.1.1 Preunion Period

That the process of industrialization is frequently accompanied by deplorable conditions of employment is well-known and Canada was not an exception to this generalization. Prior to the emergence of the union movement in Canada, the labour force was unorganized and dominated by employers. As such, labour was unable to redress the most pressing economic problems represented by unemployment, long work days, meager wages as well

as unsafe, unsanitary and unhealthy factories and work shops. Perhaps the most deplorable aspect of industrialization in Canada and elsewhere involved the use of child labour. In Montreal, Cornwall, Ottawa and Toronto, children as young as 8 years old toiled as long as 12 hours a day for as little as 25 cents a day (French, 1962). Given that children were required to operate dangerous and unguarded equipment, many were disabled by a loss of fingers, a hand or an eye. Since employers were not required to assume responsibility for such an injury, disabled workers were frequently unemployable and dismissed without compensation or judicial redress.

In the absence of legislation establishing the employer's responsibility in the event of illness or injury, workers formed voluntary organizations which were originally intended to assist disabled members. Gradually, however, the number and influence of these groups increased which, in turn, permitted workers to voice their growing dissatisfaction with prevailing economic injustices and conditions of employment. From these voluntary organizations emerged the trade-union movement in Canada and, in 1872, labour unions were legalized. In fact, many would argue that the emergence of the labour union movement in Canada ushered in a new era characterized by growing pressures for a reduction in occupational hazards and an improvement in the conditions of employment.

7.1.2 Factory Acts

Following several years of protest and agitation, the first Factory Act in Canada was passed by the Province of Ontario in 1884, and, one year later, the province of Quebec enacted the Establishment Act. The basic purpose of these acts was to improve the conditions of employment by forbidding the employment of children, providing for the inspection of factories, establishing sanitation standards and restricting the hours of work as well as limiting the types of employment for women (Kingston, 1967, pp. 17-24).

With the exception of Prince Edward Island, all provinces had enacted Factory Laws by 1917. All of the acts provided for the appointment of a factory inspector and addressed the issues of industrial cleanliness, san-

itation, as well as heating and ventilation. However, it should be noted that, with the exception of Quebec, none of the acts required the appointment of a medical inspectorate. As a result, the health and safety of workers were the primary responsibility of factory inspectors who were appointed by Provincial Labour Departments.

The factory acts did not redress the basic economic injustices emanating from common law that required the workers to bring suit against the employer in order to secure compensation for a work-related injury or illness. Under Common Law, the employer was liable for damages resulting from injury only in those cases in which it was possible to demonstrate employer negligence. However, the "assumption of risk" rule, the "fellow servant" doctrine and the "defence of contributory negligence" were the primary legal vehicles by which the employer avoided the financial responsibility of compensating the worker for damages resulting from occupational injury.

7.1.3 Employer's Liability Acts

In an effort to redress the injustices perpetrated under common law, early trade unions attempted to establish the responsibility of employers to compensate workers for industrial injuries. After years of pressure from labour unions, Ontario enacted the first Employers' Liability Act in 1886.

Between 1886 and 1911, a number of provinces adopted legislation which modified the common law defences mentioned earlier. However, with the exception of Quebec, where an Act adopted in 1909 established the worker's right to compensation regardless of fault, the laws continued to require the workers to prove employer negligence before receiving compensation. Thus, rather than establishing the employer's financial responsibility for industrial accidents, the employers' liability acts simply required the employer to insure risks with a private insurance company (Logan, 1948).

7.1.4 Workmen's Compensation Act

One of the basic problems associated with insuring risks through a private insurance company involved the uncertainty surrounding the premiums that were paid by the employer. Preferring a certain insurance assessment, many employers favored a governmentally sponsored scheme by which the risks of occupational injury might be insured. On the other hand, organized labour continued to exert pressure for an improved mechanism for compensating workers for damages resulting from occupational injury or disease.

In response to these pressures, the Ontario government appointed Sir William Meredith to examine the workmen's compensation systems employed in Europe and the United States. Meredith recommended a system of workmen's compensation that was based, in large part, on the social insurance scheme implemented in Germany by Bismark. On the basis of the recommendations advanced by Meredith, Ontario enacted the first workmen's compensation act in 1914 which was a no-fault insurance scheme that was financed through employer contributions to a state accident fund. The Ontario Act provided the basis for the development of similar programs in other provinces (Kingston, 1967).

7.1.5 Industrial Hygiene

As mentioned earlier, the factory acts provided for an inspectorate which was primarily responsible for ensuring that the workplace was sanitary, heated, ventilated and relatively free of dust, gas and other emissions. Unfortunately, the factory inspectorate was inadequate and additional efforts were exerted to improve industrial hygiene in Canada.

In an attempt to place greater emphasis on working conditions in Canada, Health Acts frequently provided the legal framework for the creation of Divisions of Industrial Hygiene by several provincial governments. The first of these divisions was formed in Ontario in 1920. Similar divisions were created in Quebec (1936), Manitoba (1937), British Columbia (1942), Nova Scotia (1945) and Saskatchewan (1945). In conjunction with

the creation of Divisions of Industrial Hygiene, collaboration with the factory inspectorate, worker's compensation boards and accident prevention associations was initiated. Moreover, health and safety hazards present in the workplace were analyzed and selected groups of workers were subjected to periodic medical examinations.

In addition to these efforts, professionals interested in occupational health and safety began to organize as exemplified by the formation of the Industrial Medical Association of the Province of Quebec in 1928. In 1944 industrial medical groups in Toronto and Hamilton formed the Section of Industrial Medicine of the Ontario Medical Association. Further, in 1943 the University of Toronto established a program leading to a Diploma in Industrial Hygiene.

The interest in industrial hygiene was not limited to provincial governments as the Federal government created the Division of Industrial Hygiene in 1938. The primary purpose of the division was to: 1) examine the effects of working conditions on the labour force; 2) conduct air contamination studies; 3) distribute information concerning occupational health; and 4) coordinate the efforts of other groups interested in industrial hygiene.

The Canadian involvement in World War I and World War II served to highlight the need to maintain a safe and healthful workplace. During the war years, military demand for manpower resulted in a relatively scarce supply of labour which, in turn, accentuated the need to conserve an increasingly scarce resource by improving conditions in the workplace. The importance of controlling occupational hazards was also increased by the necessity of ensuring a flow of military equipment and by the large scale introduction of materials and processes that were potentially harmful to the health and safety of the work force.

In response to these conditions, many of the war contracts issued by the federal government contained clauses that required the employer to maintain a safe and healthful workplace. Moreover, in order to secure government contracts, employers were also required to make medical ser-

vices available to the work force. In particular, the clauses contained in many of the war contracts provided a stimulus that resulted in the development of employer-sponsored occupational health services during World War II.

7.1.6 Post War Years

During the period immediately following World War II, the rate of growth in employer-sponsored health programs declined and there is evidence which suggests that the number of health services and the proportion of the labour force covered actually declined. However, safety programs continued to grow and improve in response to pressures exerted by workmen's compensation boards as well as by labour and governmental authorities (Kingston, 1967).

The involvement of the federal and provincial government in occupational health and safety also grew during the post war years. For example, in 1945 the federal government expanded the department of National Health and Welfare to include the Civic Service Health Division and by the late 1940's and early 1950's the provincial governments in British Columbia and Ontario operated employee health and safety programs. Further, in 1953 the Federal Division of Industrial Hygiene became the Division of Occupational Health. Until its dissolution in the early 1970's, this division provided consultant services concerning industrial hygiene and occupational health, upon request, throughout Canada. In addition, the division was instrumental in performing research and surveillance as well as in developing a central information library.

At the provincial level, persistent pressure from organized labour to reform the mechanism of awarding compensation for occupational disease resulted in major revisions in the workmen's compensation program in Ontario in 1947. Rather than limiting the illnesses for which a worker was entitled to compensation to a schedule of disease, the workmen's compensation board recognized that all work-related diseases are compensable. However, even though all work-related diseases were regarded as compensable, the

onus of proving that a given illness emanated from occupational origins remained with the worker.

During the 1960's, several events are worthy of note. In 1968 the first national health and safety legislation was enacted by Labour Canada. The legislation, known as the Canada Labour Code, is applicable to those industries that are subject to national jurisdiction. Of particular importance in this regard is PART IV--Safety of Employees--which promulgates regulations that are based on performance criteria rather than detailed specifications and procedures.

7.1.7 The 1970's

During the 1970's a growing interest in occupational health and safety was manifest in Canada by: 1) increased pressure for improvements in the administration of existing legislation; 2) the enactment of new legislation; and 3) an expanded or broadened view of occupational health. Each of these developments is briefly described below.

In earlier years and during the 1970's organized labour demanded an increased emphasis on prevention in contradistinction to compensation. These demands have been reflected, in part, by increased pressures to: 1) expand occupational health and safety regulation; 2) improve the enforcement of existing legislation; and 3) improve the systems of monitoring and controlling the hazards present in the workplace. In this regard, the functioning of the occupational health and safety inspectorate is of particular concern to organized labour. In addition, the functioning of the occupational health and safety inspectorate and, more importantly, the system in which they operate, have been criticized by commissions of inquiry in recent years (the Ham Report, 1976; the Gale Report, 1974; Science Council of Canada, 1978; the Beaudry Report, 1976; the Finn Report, 1972). We describe very briefly the major shortcomings and problems identified in these and other studies.

These studies invariably stressed that the multiplicity and the division of jurisdiction within a province among the departments of labour,

mines, health, the Workmen's Compensation Boards, as well as a scattering of certain responsibilities in departments or agencies such as agriculture, environmental protection and fisheries, some of them with unclear or vague mandates, created a bureaucratic labyrinth which was an excuse for government inaction.

The Commission reports unanimously pointed out that the inspectorate were understaffed, underequipped and underfinanced. The enforcement and inspection capability simply did not measure up to their regulatory responsibilities.

Furthermore, the inspectors were often inadequately trained, lacking expertise and experience. They were heavily oriented towards work accidents and were ill-equipped to deal with occupational health hazards. In-service training programs were generally inadequate which was compounded by the serious underdevelopment of occupational health and safety research and educational centres in Canada. Also, inspectors were not accorded a high status in the public service which made it difficult to recruit and retain qualified and experienced persons.

It also appears that the inspectorate believed or assumed that government intervention and enforcement should be kept to a minimum; that industry was capable of regulating itself and willing to do so. In any case, the inspectors typically had a great deal of discretion due to laws and regulations which were imprecise, insufficient and difficult to apply. A number of commissions have found many instances in which serious health and safety hazards were overlooked or not cited by inspectors. Phrases such as "all reasonable means", "as far as is reasonably practicable", "suitable and efficient means" are common place. In many important areas, basic standards were not established but were in the form of guidelines or voluntary codes, utilizing such a vague criteria that successful prosecution was a very remote possibility. Guidelines (such as those established for polyvinyl chloride in Alberta, British Columbia, Ontario and Quebec, for example) are essentially unenforceable in law.

A further problem involves the lack of incentive to prosecute. Penalties likely to result from successful prosecution bore no relationship to the seriousness of noncompliance, were usually very small and could not be expected to deter future noncompliance. We will argue later that, given the extent and nature of the problems cited here, even a substantial expansion of the inspectorate will not necessarily increase management compliance with regulation and standards (Gleason and Barnum, 1978).

A sympathetic view of the inspectorate would regard them as victims of an unwieldy, unsatisfactory system without any teeth which had made their task an impossible one. However, there is another view. Senior members of the inspectorate defended their policies and operations before commissions of inquiry suggesting that they were not wholly dissatisfied with the situation. Labour representatives complained that the inspectors cultivated and maintained an exclusive relationship with management on matters relating to inspection and regulation. They observed that inspectors all too frequently reported their findings to management but rarely to them. They suspected "at best an accommodation of interests and at worst collusion", in the words of the Ham Report. The Gale Report, the Finn Report and the Beaudry Report noted numerous examples in which the use of discretion by the inspectorate led to an almost total lack of enforcement in instances of persistent and blatant noncompliance with regulations.

But there are changes in this dismal picture. The Finn Report cites some positive, innovative measures at the federal level including Labour Canada's adoption of the safety audit, upgrading accident prevention programs and improved safety and technical surveys and hazard evaluations. Many provincial inspectorates questioned the wisdom of relying on routine inspection and have adopted more selective and concentrated inspection programs. In most provinces, the level of maximum fines has been raised and in some provinces may include a prison sentence. The provinces also appear to be committed to increasing the number as well as improving the training and educational levels of their inspectorates.

Two solutions to the problems of the inspectorate are particularly significant. Saskatchewan was the first province to deal with the problem of divided and overlapping jurisdictions which hampered effective enforcement by rationalizing and strengthening its existing laws and regulations, a process it began with the Occupational Safety and Health Act of 1972. Similar legislation and administrative reorganization has also been taking place in other provinces (Alberta, Manitoba and Ontario) and is expected to occur elsewhere (Quebec) in the near future. The administrative and operational reorganization has allowed for a more effective deployment of manpower because of such factors as the availability of in-house consultation and the development of group inspection using the complementary and varied skills and massed in one centralized unit.

Perhaps the most significant change pioneered by Saskatchewan was the more substantial and meaningful involvement of labour and management in the tasks of inspection and enforcement. The Saskatchewan legislation of 1972 provides for mandatory joint management/labour health and safety committees and gave them the duty to participate in the identification and control of workplace hazards. The role and responsibilities of the labour/management health and safety committees (which we will describe in more detail later) not only means a regular inspection and review of conditions in the workplace but is expected to permit a better use of scarce government resources. The active participation of labour is precisely what labour spokesmen were demanding for a long time and what every commission of inquiry has recommended in recent years. There are of course several other important reasons why these joint committees have been established or proposed in the recent legislations (for example in Alberta, Ontario, Quebec) as was mentioned earlier.

At the federal level, the focus of government has been more on developing standards or guidelines and expanding the role played by federal agencies than on the reorganization of administrative structures. For example, in 1974 Labour Canada proposed the adoption of a noise code which was, in large part, a response to the persistent demands of organized labour and the scientific community.

Finally, the 1970's witnessed a broadening of the definition and scope of occupational health. For example, National Health and Welfare sponsored the First National Conference on Employed Physical Fitness (Proceedings of the National Conference on Employee Physical Fitness, 1975). The expanded view of occupational health was also reflected by the Conference on Occupational Health sponsored by the Canadian Public Health Association in 1976. Further, the expanded view of occupational health is also represented by the formation of the Working Group on Occupational Health under the Federal-Provincial Subcommittee on Environmental Health. The primary objective of this group is to examine and assess specific occupational health hazards. As an additional indication of the broadened interest in occupational health, the Accident and Compensation Branch of Labour Canada was renamed the Occupational Safety Directorate in 1975.

The basic objective of the following section is to analyze the response of governmental authorities to pressure for regulatory reform in the mining industries of Quebec and Ontario. This sector of the economy was selected as the unit of analysis for essentially two reasons. As mentioned in Chapters Two and Three, hazards influencing the health and safety of the work force are present in the mining industry. Further, the mining industry is subject to regulatory agencies of both the federal and provincial governments. As a consequence, this sector of the economy represents an excellent basis for examining the multiplicity of pressures that are exerted so as to influence the regulatory actions of both levels of government in the area of occupational health and safety.

7.2 The Mining Industry in Quebec

The governmental response to the health and safety risks in the mining industries of Ontario and Quebec are traceable to a set of stimuli that emanate from the occupational hazards to which uranium miners and asbestos workers have been systematically exposed as well as to the legislative inadequacies associated with the mining industry in general. The stimuli to be considered later resulted in the formation of the Ham Royal Commission on the Health and Safety of Workers in Mines in Ontario in 1974 and the establishment of the Beaudry inquiry into health in the

asbestos industry in Quebec in 1975. These reports not only substantiated the views long expressed by labour but also reflected the realities revealed by the Robens Committee in Great Britain, the Alberta Gale Commission, the passage of the Saskatchewan Occupational Health Act of 1972 and the "Policies and Poisons" study conducted by the Science Council of Canada.

Consider first the asbestos industry in Quebec. The now famous asbestos strike in the 1940's resulted in a more militant labour movement with the Quebec Confederation of National Trade Union (CNTU) forming its nucleus. It should be noted, however, that the strike was precipitated more by basic collective bargaining rights than by occupational hazards even though the risks associated with exposure to asbestos were well-known by management and governmental officials (Doern, 1977).

Of particular importance to our analysis is the 1975 strike action of asbestos mine workers in the Thetford area. In this case, the strike action was precipitated not only by basic economic issues to which we referred earlier but also by an attempt to secure a clause in the collective agreement that would enable the membership to stop work if the asbestos threshold limit value (TLV) exceeded 5 fibers per cubic centimeter in the work environment. It is noteworthy that the TLV of 5 fibers per cubic centimeter was a contentious issue during a period in which it was increasingly well recognized that any exposure to asbestos was potentially hazardous.

That the CNTU was able to support its case concerning the presence of health hazards in the workplace cannot be seriously contested. For example, in 1974 officials of the Ministry of Natural Resources obtained dust measurements which revealed that exposure rates were several times greater than the 5 fibers level. Also, the results of the study were originally made available to management but not to the union or the workers affected by such exposures. In addition, the CNTU commissioned a study which was performed by the Mount Sinai School of Medicine in early 1974. Under the direction of Dr. I. Selikoff, the study indicated strong linkages between

lung cancer and exposure to asbestos fiber in the workplace as well as in the general environment.

The study performed by the Mount Sinai research team represented an attempt to refute earlier epidemiological results reported by McGill University which had been funded, indirectly, by the Quebec Asbestos Mining Association. The results of the McGill study seemed to suggest that the mortality rates experienced by a cohort of workers engaged in chrysolite mining were lower than those prevailing in the general population of Quebec of the same age (Doern, 1977). These findings seem to lead us to the rather ludicrous conclusion that the risks of cancer are reduced by an exposure to asbestos fiber.

In addition to the occupational hazards present in the work environment, the set of stimuli to which the labour movement responded also included the following. First, labour claimed that management prevented the dissemination of information concerning the risks of asbestos exposure to union officials and to the affected worker. In the absence of such information, it was contended that alerting workers to the real and potential risks associated with exposure to asbestos was a difficult, if not impossible, task. Moreover, the labour union movement contended that inadequacies in inspection and compliance procedures were in part responsible for the hazards present in the work environment. Complicating the inspection and enforcement process was a division of responsibility among jurisdictional units. In particular, the union movement argued that conflicts between the labour, social affairs, environmental protection, natural resources and Workmen's Compensation departments of the Quebec government permitted the de facto self-regulation of the mining industry.

To understand the governmental response to the economic and political pressures exerted by the labour movement, it is first necessary to consider the economic environment and the importance of asbestos to the economy of Quebec, to the national economy and in international markets. Of the thirty generic types of asbestos, only six are of economic importance and chrysolite represents 95 percent of the world's production of these six major types. To document the economic importance of asbestos we need only

observe that Canada provides 40 percent of the world's supply of chrysotile and Quebec produces 80 percent of this total (Doern, 1975). These observations suggest that the asbestos industry represents a sector of the economy in which a prolonged strike action could not be tolerated by governmental officials. Obviously, these considerations tended to strengthen the position of the labour union.

On the other hand, it should also be noted that unemployment has traditionally been higher in Quebec than in other parts of Canada. Moreover, in many communities such as Thetford, the mining industry represents the primary source of employment and any action resulting in the permanent cessation of economic activity would have exerted deleterious effects on the economic well-being of the rank and file. The discussion presented earlier suggests that these factors tended to weaken the position of the labour union.

Given the economic environment, management responded to the economic and political pressure exerted by the labour union by attempting to discredit or minimize the claims concerning the hazards associated with exposures to asbestos fiber. As an example of these efforts we need only refer to the McGill study mentioned earlier. In addition, management also asserted that the costs associated with reducing the level of asbestos fibers present in the workplace would be excessive. The response of management to the announcement of a 5 CC standard is instructive in this regard. Paul Filteay, Director of the Quebec Asbestos Mining Association, agreed with the standard but claimed that it would be "unrealistic" to promulgate a standard of 2 fibers per cubic centimeter as in Ontario and recommended later by the Beaudry Commission, since such a standard would involve excessive costs. On the other hand, despite the prolonged strike, the operating profits earned during 1975 were substantial. For example, Asbestos Corporation reported an operating profit of \$7.6 million while United Asbestos earned profits amounting to \$4.5 million (Doern, 1977).

Faced with mounting pressures for improvements in the work environment as well as the necessity of terminating a costly and damaging strike, the government of Quebec was forced to establish the Beaudry inquiry as a

compromise solution. In exchange, labour abandoned the demand for the occupational health clause as a condition for settlement.

In general, the basic findings of the Beaudry report substantiated the concerns that had been expressed by labour. In particular, the report concluded that:

- 1) the asbestos industry, to include mines, mills and processing plants, were not equipped to maintain concentrations of dust within levels which are safe to the health of the work force;
- 2) the technical means to ensure a safe and healthy work environment existed and were readily available;
- 3) the existing compliance and inspection procedures were inadequate;
- 4) the exposure standard should be lowered to 2 fibers per cubic centimeter;
- 5) management intentionally prevented labour from obtaining information concerning the effects of asbestos exposure;
- 6) jurisdictional conflicts among the various departments and agencies of the government of Quebec permitted self-regulation in the asbestos industry;
- 7) labour unions had not provided adequate information concerning the risks of asbestos exposure to the work force and the general public; and
- 8) health professionals had also failed to evaluate and disseminate information concerning the occupational risks present in the workplace.

The Commission also advanced the view that the absence of research and technology were not factors which prevented regulatory reform. As mentioned above, the commission also felt that a standard of 2 fibers per cubic centimeter was essential to a healthful work environment and that such a standard was technologically attainable.

Recall, however, that the government of Quebec promulgated a compromise standard of 5 fibers per cubic centimeter which was to have been

satisfied by 1978. The relaxation of the recommendation advanced by the Beaudry Committee appears to be related to essentially two sets of factors. First, the adoption of a standard that was less stringent than those suggested by the Beaudry inquiry was related, in part, to the assertions of management concerning the excessive costs associated with satisfying the 2 fibers standard. It is important to recall that the primary objective of management is to maximize profits, sales or the market share of the firm. On the other hand, management frequently claims that occupational health expenditures represent a cost which, at least in the short-run, results in higher prices or lower profits. Apart from the implications resulting from marginal analysis, the response of industry to pressure for improvements in the work environment is frequently couched in terms of sunk capital costs. In this regard management is reluctant to replace old equipment with a new technology which results in additional costs rather than increased efficiency. Since the plant and equipment associated with the asbestos industry in Quebec was relatively old, the issue of sunk capital costs was employed to bolster the argument which asserted that satisfying the 2 fibers per cubic centimeter standard would involve excessive expenditures (Doern, 1977).

The second set of factors is related to the close association between labour unions in Canada and the United States as well as to the ownership structure in the asbestos industry in Quebec. Concerning the latter point, it is important to note that the asbestos industry is foreign-owned and operated for foreign markets. As a result, enforcing standards that are more stringent than those imposed internationally might have placed the Canadian asbestos industry at a comparative disadvantage. In particular, since the lion's share of the production occurring in primary industries such as asbestos is destined for American markets, the influence of the regulatory process in the U.S. is of particular importance to the area of occupational health and safety in Canada. Accentuating this dependence is the close association between American and Canadian labour unions. In fact, it seems more than just coincidental that, at a comparable point in time, the prevailing U.S. standard was also 5 fibres per cubic centimeter.

Of particular importance to the evaluation of regulatory reform in Quebec was the concern of the Beaudry Commission regarding the division of jurisdiction responsibility in the area of occupational health and safety. It is possible to argue that the criticisms of the Beaudry Commission stimulated a broad-based review of the administrative, regulatory and compliance procedures in Quebec. In response to the recommendations of the Beaudry Commission, governmental officials are considering the consolidation and integration of occupational health and safety in the form of a tripartite consisting of government, management and labour.

7.3 The Mining Industry in Ontario

That the mining industry poses serious threats to the health and safety of the worker in Ontario was also documented in Chapters Two and Three. In particular, the stimuli that resulted in the formation of the Ham Commission involved inadequacies in the process by which the mining of asbestos and uranium as well as the presence of lead and mercury in the workplace and the general environment were regulated.

In this situation, the basic criticism and pressure for reform did not emanate from the organized labour movement per se. Rather, Stephen Lewis, the Ontario leader of the NDP, responded to inadequacies in the regulatory process by leveling an attack on the Minister of Natural Resources, Léo Bernier. The pressure exerted by Lewis was intensified during the debate in the Committee on Supply in May, 1974. Faced with deteriorating political support, the Ontario Cabinet elected to create the Ham Commission in an effort to diffuse criticism and to reduce pressures for immediate governmental action.

In this situation, it is possible to argue that inadequacies in the regulatory process were in large part, responsible for the hazardous conditions prevailing in the Ontario mining industry. For purposes of illustration, we might employ the Matachewan case as a microcosm of the occupational health and safety problems that were present in Ontario mines. In contrast to the Quebec situation, the Matachewan case involved the regulation of a new asbestos plant in an area in which asbestos is not as

important as in Quebec. Under these circumstances, one would expect a far less inadequate regulatory process but, as will be demonstrated below, the situation in Ontario paralleled conditions existing in Quebec.

In 1975, the United Asbestos Company's plant began operations in Matachewan near Kirkland Lake, Ontario and represented a major source of employment in the area. Of particular importance was the role of the ministry of Natural Resources in approving construction of the mine. In this situation, the involvement of the ministry was focused on electrical apparatus and on other aspects of physical safety. On the other hand, potential health hazards were largely ignored by the ministry during the construction phase.

In response to the earlier pressures exerted by Lewis, an inspectorate from health and natural resources visited the mine and prepared a report which was extremely critical of mining operations at Matachewan and conditions in the workplace. The report was sent to the Ministry of Natural Resources and also made available to management. On the other hand, the union and the affected workers did not initially have access to the report or its contents.

By February 1976, Lewis had been in contact with Dr. I. Selikoff, to whom we referred earlier, and had obtained the report which was originally prepared by the ministries of health and natural resources. At this point, it is important to note that comprehensive information concerning conditions prevailing in the workplace were simply not available to the officials of the United Steel Workers. This phenomenon was related to several factors. The first involved the dissemination of the report to which we referred earlier. In addition, communication between the membership, the local union and the headquarters of the United Steel Workers was complicated by several factors. First, many of the workers employed in the plant were new to the asbestos industry and were unaware of the hazards posed by exposure to asbestos fibre. In addition, many of the workers were employed on a probationary basis and were reluctant to report the unhealthy conditions present in the workplace which in turn might jeopardize a job security that was at best tenuous.

By late February 1976, however, the union began to press for improvements in the work environment. After a period of inaction by management, workers engaged in a "walk out" action and refused to work on April 8, 1976. In response to mounting pressure, Bette Stephenson, Acting Minister of Health, directed management to improve conditions in the work environment or face a mandatory closure of the plant. After additional tests revealed average readings of 12 to 14 fibers per cubic centimeter, the apparent intervention of Premier William Davis resulted in the Ontario Government closing the plant on April 12. Moreover, operations were not permitted to resume until extensive improvements and specific technological changes were implemented by management.

In this case, the influence exerted by the NDP and organized labour was accentuated by extensive coverage by the media as well as by the existence of a minority government. Further, the relatively weak position of asbestos production in Ontario represented a permissive factor in the decision to force a temporary cessation of economic activity. On the other hand, the division of jurisdiction responsibility between two ministries impeded the implementation of remedial action by governmental officials.

The latter point was highlighted by the Ham Commission which focused on the major failings of the "responsibility system". In particular, the Ham Commission argued that

"The responsibility system seems to have been lacking in two significant ways. First, divided jurisdictions have made it unclear where the initiative necessary to deal with problems is to be taken. Second, the worker as an individual and workers collectively in labor unions or otherwise have been denied effective participation in tackling these problems; thus the essential principles of openness and natural justice have not received adequate expression."

With respect to the problem of divided jurisdictional responsibility the Ham Commission recommended the integration of the regulatory function in a new occupational Health and Safety Authority located in the department of labour.

The latter recommendation assumes a greater importance when viewed from the perspective of the framework of analysis developed earlier. As described above, the historical focus of pressure has been decentralized and located in one of several provincial ministries. In addition, the Federal government also assumes the responsibility of promulgating regulations to improve "the Peace, Order and good Government of Canada". More specifically, these so-called "enumerated powers" permit Parliament to deal with environmental hazards resulting from interprovincial trade. Consider, as an example, the case of asbestos. The Federal government does not have jurisdiction over the extraction, local use or local conditions in the workplace. However, the federal government discharges jurisdictional responsibility over those products that are traded interprovincially which, in turn, permits Parliament to exert an indirect influence over those products which are not involved in interprovincial trade (Franson, Lucas, Giroux and Kenniff, 1977).

As another example, consider the jurisdictional responsibility for promulgating and enforcing regulations concerning radiation. At the federal level, radiation is unique since the regulatory function is centralized and performed by the Atomic Energy Control Board (AECB). Regulations concerning radiation are promulgated under the Atomic Energy Control Act and, in the case of the mining industry in Ontario, the AECB issued operating licenses under provincial legislation concerning health and safety, subject to the regulations promulgated under the Atomic Energy Control Act. Since miners were not defined as atomic radiation workers by AECB, standards concerning the exposure of uranium miners to radiation were those embodied in provincial regulations. In Ontario, these regulations were established by the Ministry of Natural Resources with the advice of the Ministry of Health, industry and the scientific community. In this case, jurisdictional responsibility for the development of regulations and standards has been divided among the federal government, the provincial government as represented by the ministries of natural resources and health, the scientific community and industry. It should be noted that the views of labour were rarely represented in the process of formulating standards and regulations. Moreover, given the multiplicity of agencies and vested interested groups, labour undoubtedly experienced difficulty in

identifying the most relevant group or agency on which to exert pressure. In terms of our earlier discussion, the decentralized focus of pressure reduced the effectiveness of labour's efforts to improve conditions in the working environment.

Until recently, the decentralized nature of the Canadian labour movement has also reduced the effectiveness of pressures for improvements in the work environment. In this regard, Doern (1977) observes that: 1) only one third of the nonagricultural workers and one-quarter of the labour force is unionized, two-thirds of Canadian unions are affiliated with international unions and the remainder are associated with national unions; 2) at the macro level, the CNTU and the CLC are the major centers of union power; 3) both the CNTU and the CLC are local confederations of strong locals and constitute unions; and 4) the union movement in Canada has not challenged the fundamental pressures of capitalism, preferring to engage in practices usually associated with "business unionism". These characteristics suggest that the source of pressure emanating from the labour movement has been historically decentralized, resulting in the difficulties mentioned earlier. Moreover, most workers in Canada are unorganized and are employed in small or marginal firms which place a low priority on health and safety issues. With regard to organized labour, only the United Steel Workers, the United Auto Workers, the Oil, Chemical and Atomic Workers and the United Rubber Workers have developed expertise in the area of occupational health and safety. As a consequence, the pressures for improvements in the work environment emanate from several sources within the labour movement.

In addition to the problems mentioned earlier, the effectiveness of these unions is influenced by several organizational characteristics. More specifically, the national offices are dependent on locals for information concerning conditions at the plant level and, as mentioned previously, the lack of timely and accurate information has represented a serious impediment to the development of programs designed to redress hazards present in the workplace. In this regard, the problem of internal communications of information is compounded by the presence of immigrant workers as well as the mobility of labour. These factors have also im-

peded the growth in the proportion of workers who are formally affiliated with the union movement, which, of course, reduces the effectiveness of the economic and political pressure exerted by labour. It should also be noted that the national office cannot intervene extensively in the affairs of the local union which also reduces the ability of the labour union movement to accumulate required resources, coordinate the use of such resources and project a unified view concerning occupational health and safety issues.

7.4 Summary and Conclusion

The discussion presented in Chapter Five suggested that the set of market failures results in a less than optimal investment in occupational health and safety programs. In turn, we have argued that the less than optimal investment in occupational health and safety results in a socially unacceptable level of risk in the workplace as well as an incidence of illness and injury which exceeds the socially optimal rate of disease or injury.

Further, we identified hazards in the workplace as one of the factors that leads to pressures for improvement in the work environment. In addition, such pressures are more likely to result in a governmental action during periods of economic prosperity than during periods of economic decline. In such a situation governmental authorities may introduce plans designed to diffuse the net pressure for change or policies or action designed to address the basic stimuli which initially evoked the pressure for reform.

In summary of our discussion concerning the mining industry in Ontario and Quebec, we identified regulatory inadequacies and the presence of health hazards in the workplace as the set of stimuli that evoked pressure for reform. In response to the initial pressure, management employed the McGill study in an attempt to reduce or minimize the extent to which hazards were perceived as posing a serious threat to the health of the work force. In addition, management in Quebec asserted that the costs of reducing the risks present in the workplace were excessive and

those arguments appeared to result in the adoption of a TLV of 5 fibers per cubic centimeter rather than a TLV of 2 fibers per cubic centimeter.

The response of the government in these two situations is also instructive. In Quebec, where the asbestos industry is an important component in the local economy and plays a significant role in international markets, government diffused the net pressure for reform by appointing the Beaudry Commission. In Ontario, where the asbestos industry is not as important as in Quebec, government not only attempted to diffuse criticism by appointing the Ham Commission, but the mounting pressure for reform also forced the government to close offending plants. The latter action was probably permitted by the less important stature of the asbestos industry in Ontario.

On the basis of the discussion presented in this chapter, we consider next the role and response of government in regulating and controlling occupational health and safety hazards present in the workplace. In this regard, we shall focus on Saskatchewan, to which we referred earlier, as well as Ontario, British Columbia and the federal government.

Chapter 8: THE FEDERAL REGULATORY FRAMEWORK

8.1 The Legislative Foundation

As specified by the British North America Act, legislative jurisdiction in Canada is divided between the Dominion Parliament and the provinces. In this regard, most of the federal powers are contained in section 91 of the B.N.A. Act while those of the provinces are specified by section 92. In the following discussion, we consider the legislative foundation that has played a major role in shaping the roles and responsibilities assumed by the two levels of government.

8.1.1 The Federal Jurisdiction

Section 91 of the B.N.A. Act empowers Parliament to "make laws for the Peace, Order and good Government of Canada". In addition, the section enumerates the powers of Parliament with respect to specific areas. Many of the enumerated powers of parliament extend to specialized areas such as fishing, shipping, navigation and banking. As described in more detail later, occupational health and safety legislation pertaining to those industries that are subject to federal regulation is contained in Part IV of the Canada Labour Code.

In addition to the enumerated powers described above, section 91 of the B.N.A. Act also extends several general powers to Parliament. In terms of controlling hazardous substances, the criminal law power as well as the trade and commerce power are perhaps the most important of the general powers extended to Parliament.

The criminal law power of Parliament has been traditionally applied so as to prevent behaviour that might be harmful to others. As a result, it would seem that both the production and distribution of hazardous substances are subject to the criminal law power of Parliament. Essentially two limitations to the criminal law power of parliament should be mentioned. First, the courts have not allowed Parliament to intervene in

areas that are subject to the jurisdictional control of the provinces. In this regard, however, the courts have been more interested in preserving exclusive provincial jurisdiction over local trade than in limiting the federal regulatory role concerning the production and distribution of hazardous substances. Second, the ability of Parliament to exercise its criminal powers in controlling hazardous substances is limited by the availability of sanctions. More specifically, the sanctions which might be imposed are restricted to those that either penalize the guilty or prevent future criminal activity (Franson, R. and Lucas, A., 1977).

The trade and commerce power is usually regarded as a vehicle by which Parliament may regulate the economic affairs of the nation. More specifically, once hazardous substances enter into interprovincial trade, they are subject to federal legislation. Moreover, even though intra-provincial transactions involving hazardous substances are not directly regulated by the federal government, legislation promulgated by federal authorities exerts an indirect impact on such transactions. Perhaps the major limitation of the trade and commerce power of Parliament is the extent to which legislation is designed to address health and safety issues as opposed to purely economic considerations. However, a successful challenge requires the individual to prove that the legislation is motivated by noneconomic concerns and is therefore unconstitutional. As a result, the likelihood of mounting a successful challenge is reduced significantly by the difficulties encountered when attempting to determine the real objective or intent of the legislation (Franson, R. and Lucas, A., 1977).

In addition to the powers outlined above, Parliament also enjoys the general power to promulgate legislation for the peace, order and good government in Canada. Included in the general powers are: 1) an emergency power; 2) a power to address issues that influence the national interest; and 3) a residual power. When viewed from the perspective of controlling hazards present in the workplace, the second of the general powers is perhaps the most important since the courts have ruled that the federal government is empowered to promulgate legislation with respect to: 1) aeronautics; 2) telecommunications; and 3) atomic energy. As a result,

atomic energy and ionizing radiation are hazards that might be exclusively controlled by the federal government.

8.1.2 Provincial Jurisdiction

Section 92 of the B.N.A. Act empowers the provinces to exercise jurisdictional control over such matters as manufacturing, labour relations, the work environment and waste disposal. In fact, with the exception of the limitations outlined below, the major authority to enact legislation that is related to occupational health and safety is reserved for the provinces.

The limitations imposed on the provinces to promulgate health and safety legislation are essentially three-fold. First, provinces may not enact legislation that pertains to matters which extend beyond their borders. Second, the provinces are unable to enact legislation that pertains to federal crown property or to any other area subject to the jurisdiction of the federal government. For example, the provinces may not promulgate legislation in the areas of criminal law or interprovincial trade and commerce. On the other hand, the courts have ruled that provincial legislation is applicable to those enterprises which are subject to the exclusive control of the federal government so long as the legislation does not relate to an essential function of the enterprise. In this regard, the provinces may not enact legislation which relates to the labour relations in such enterprises even though the courts have ruled that Workmen's Compensation is subject to provincial jurisdiction. The final limitation involves the possibility that federal and provincial statutes might be in conflict. In such a situation, the federal legislation predominates and the provincial statute is inoperative.

8.2 The Role of the Federal Government: An Overview

As seen above, the federal government is empowered to enact legislation with respect to subjects that are of an international, national or interprovincial nature and for the general advantage of Canada. These powers have been exercised by the federal government in the development of

essentially three sets of occupational health and safety statutes. These jurisdictions consist of:

- 1) federally regulated industries that are subject to Part IV of the Canada Labour Code which is administered by Labour Canada;
- 2) the Federal Public Servant program of the Financial Administration Act which is administered by Treasury Board; and
- 3) The Canadian Armed Forces which are subject to the National Defence Act, administered by the Department of National Defence.

Even though federal legislation applies to labour residing in all provinces, the members of the work force identified above are excluded from the major occupational health and safety statutes that have been enacted by the provinces and territories.

In general, the federal government plays essentially two roles in the area of occupational health and safety. The first is a regulatory function which pertains to those areas of jurisdictional authority that have been established by legislation. The second is facilitative in nature and includes the direct operation of nonregulatory programs, the provision of financial support for relevant research and the stimulation of interest and activity in the area.

8.3 The Regulatory Role

The regulatory function performed by the federal government is complex in that it extends to identifiable or specific segments of the population and to different geographic areas. In addition to identifiable segments of the population, all members of the Canadian labour force are influenced by such legislation as the Unemployment Insurance Act, the Food and Drug Act, the Clean Air Act and the Social Assistance Act. Moreover, other members of the labour force are directly or indirectly influenced by federal legislation such as the Hazardous Products Act, the Motor Vehicle Safety Act, the Aeronautics Act and the Motor Vehicle Tire Safety Act. The primary purpose of many of the aforementioned acts and their related regulations is to protect the general public. More specifically, those

acts that address occupational health and safety issues are now regarded as "background" legislation which supports more comprehensive legislative efforts designed to control illness and injury emanating from occupational origins.

The basic regulatory role of the federal government consists of:

- 1) legislative mandates and programs that pertain to sectors which are external to government and to those employees who are employed internally by the federal government (e.g., public servants);
- 2) external mandates or programs that pertain to the nation or to specific regions (e.g, the Territories and federal land located in provinces);
- 3) federal acts, regulations and codes that are related to the workplace;
- 4) federal acts, regulations and codes that are considered to be "background" mandates; and
- 5) federal acts, regulations and codes that are explicitly related to occupational health and safety (e.g., Canada Labour Safety Code) or are implicitly related to occupational health and safety (e.g., Radiation Emitting Devices Act).

In summary, then, the jurisdictional influence of the federal government is directed internally or externally and is focused explicitly or implicitly on health and safety problems present in the workplace.

Although a number of different departments and agencies are either explicitly or implicitly responsible for occupational health and safety, the focal point of federal activity is located in Labour Canada, which performs the regulatory and facilitative functions specified by Part IV of the Canada Labour Code, and the Department of National Health and Welfare which provides supportive services to the various federal and provincial acts and programs.

8.3.1 The Regulation of Industry

At the national level, federal activity is focused on specific industrial sectors and related substances. Among the important industrial sectors which are subject to federal regulatory powers are railways, highway transportation, telephone, telegraph and cable systems, pipelines, canals, shipping and shipping services, air transportation, radio and television broadcasting, banks, grain elevators, flour and feed mills, feed warehouses, uranium processing and certain crown corporations. As seen in Table 3.1, Labour Canada, in conjunction with other federal agencies and departments, is responsible for regulating industries in the aforementioned economic sectors.

For example, the Ministry of Transportation, the Canadian Transport Commission and Labour Canada share responsibility for the transportation industries. More specifically, the Ministry of Transportation (MOT) and the Canadian Transport Commission (CTC) are responsible for establishing the standards and regulations pertaining to the issuance of licenses as well as periodically inspecting and reviewing these industries. As in other industrial sectors, Labour Canada assumes the responsibility for administering the provisions of Part IV of the Canada Labour Code (Safety of Employees). As a result, Labour Canada plays a particularly important role in addressing matters that pertain to public safety, hygiene as well as occupational health and safety. In addition to Labour Canada, the MOT and the CTC, Environment Canada are responsible for emissions, discharges, land usage and other environmental aspects of the transportation industry. Moreover, the Department of National Health and Welfare also controls activity in several sectors of the transportation industry. For example, the Department of Health and Welfare is responsible for enforcing the provisions of the Quarantine Act which, in large part, pertains to air and sea transportation while Civil Aviation Medicine is responsible for providing advisory services to the air transportation industry.

As seen in Table 8.1, the problems which emanate from allocating jurisdictional responsibility among many departments or agencies is not limited to the transportation industry. In fact, all of the industrial

Table 8.1 National Jurisdiction and Related Roles in Occupational Health and Safety - By Industry

PRIME OCCUPATIONAL HEALTH AND SAFETY CONCERN

INDUSTRY	OCCUPATIONAL			COMPEN- SATION	PUBLIC SAFETY	PUBLIC HEALTH	ENVIRON- MENT
	SAFETY	HYGIENE	HEALTH				
FEDERAL REGULATED							
SHIPPING	MOT/LABOUR			LABOUR (1)	MOT	NHW (3)	ENVI R
AVIATION	MOT/LABOUR		NHW (2a)		MOT/CTC	NHW (3)	
RAILWAYS	MOT/LABOUR		NHW (2b)		CTC	NHW (2b)	
ROAD TRANSPORT	MOT/LABOUR				CTC/MOT (4)		
PIPELINES	NEB/LABOUR				NEB		
COMMUNICATIONS	CRTC/LABOUR						
BANKS	DF/LABOUR						
GRAIN ELEVATORS AND MILLS	CGC/LABOUR		NHW		CGC		
URANIUM MINES AND PROCESSORS (5)	AECEB/LABOUR				AECEB	AECEB	
CROWN CORPORATIONS e.g., DEVCO (including coal mining)	EMR		NHW	LABOUR (6)	AECEB		
PROVINCIAL REGULATED							
MINING (except uranium)	EMR						ENVI R
ROAD TRANSPORT					MOT		

LEGEND

AECD Atomic Energy Control Board
 CGC Canadian Grain Commission
 CRTC Canadian Radio and Television
 Commission
 CTC Canadian Transport Commission
 DEVCO Cape Breton Development Corporation
 DF Department of Finance
 DREE Department of Regional Economic
 Expansion
 EMR Energy, Mines and Resources
 ENVIR Environment Canada
 LABOUR Labour Canada
 MOT Ministry of Transport
 NEB National Energy Board
 NHW Department of National Health
 and Welfare

FOOTNOTES

- (1) For Merchants Seaman's Compensation Act.
- (2) For Civil Aviation Medicine
- (3) For Quarantine Act
- (4) For Motor Vehicle Safety
- (5) Cooperative arrangement - AECEB licences; provincial inspect and enforce
- (6) Government Employees Compensation Act

_____ regulatory

----- supportive to Federal regulatory bodies

..... Facilitative role nationally wherein legislative authority might rest with provinces

Source: See Figure 5.1

sectors that have been summarized in the table are subject to the regulatory activities of multiple departments or agencies. It is possible to argue that the division of functional responsibility tends to reduce the responsiveness of governmental authorities to the risks that are present in the federally controlled work place. Of particular concern is the potential use of joint responsibility as an excuse for inaction. In addition, the presence of multiple jurisdictions creates a need to coordinate interdepartmental and interagency activity. Even though formal exchanges related to specific topics such as hazardous substances occur, there is no mechanism of coordinating the overall activity of departments or agencies that exert a direct or indirect influence on occupational health and safety.

8.3.1.1 Regulatory Format

Unless superseded by another act or regulation enacted by Parliament, the federally regulated industries are subject to the provisions of Part IV¹ of the Canada Labour Code which is an enabling act that was proclaimed in effect on January 1, 1968. The areas of activity to which the provisions pertain include building safety, coal mine safety, electrical safety, fire safety, noise control, sanitation, elevating device safety and so on.

In general, the regulations promulgated under the Canada Labour Code are based on performance criteria rather than on detailed specifications and procedures. For example, section 3 of the Canada Building Regulations specifies that

"No employee and no employer shall require or permit an employee to use any building in a manner likely to endanger the safety or health of that employee or of any other employee."

Similarly, section 3 of the Canada Machine Guarding Regulations requires that

"Every employer shall ensure to the extent that is reasonably practicable that all machines used by his employees are safe without the use of removable machine guards."

As an additional example, section 6 of the Canada Machine Guarding Regulations specifies that

"Every employer shall ensure that every machine guard is maintained in such a manner that it will operate safely and properly."

In a similar vein, section 4 of the Canada Sanitation Regulations state that

"Every employer shall ensure that each sanitary facility and personal service room used by his employees is maintained at all times in a sanitary condition."

As seen above, the provisions of the Canada Labour Code are of such a general nature that rigid enforcement is a difficult, if not impossible, task.

That the regulatory provisions contained in the Canada Labour Code are subject to discretionary interpretation and enforcement might be demonstrated further by referring to sections 3 and 6 of the Canada Protective Clothing and Equipment Regulations. In this case, we find that

"Where

- (a) it is not reasonably practicable to eliminate an employment danger or to control the danger within safe limits, and
- (b) the wearing or use by an employee of personal protective equipment will prevent an injury or significantly lessen the severity of an injury,

every employer shall ensure that each employee who is exposed to that danger wears or uses that equipment in the manner prescribed by these regulations."

"Every employer shall ensure that all personal equipment worn or used by any of his employees

- (a) is adequate in all respects to protect the employee from the hazards of his employment;
- (b) is otherwise suitable for use by the employee; and
- (c) does not in itself create an employment hazard."

At best, the ambiguities created by the terms "reasonably practicable", "safe limits", "adequate", "suitable" and "employment hazard" create a

wide latitude within which regulatory provisions might be interpreted and enforced.

On the other hand, defenders of performance standards argue that such an approach provides the employer with the latitude required to adjust health and safety programs to changes in technology and the introduction of new substances into the work environment. Further, it is argued that the extent to which terms such as "reasonably practicable" are interpreted arbitrarily is reduced by judicial decisions. However, prior to the interpretations of key phrases by the courts, requirements imposed by performance standards are not well-defined and subject to discretionary enforcement.

8.3.1.2 Health and Safety Committees

The potential importance of health and safety committees in improving the environment of the federally regulated work place emanates from the notion that the responsibility of preventing occupational disease and injury is shared by management and the employee. Traditionally, management has been responsible for controlling the health and safety risks present in the workplace which, in turn, tends to reduce the accident rate and the incidence of occupational disease. On the other hand, it is also possible that accidents and occupational injuries are the direct result of unsafe acts committed by an employee. Since occupational injuries and, to a lesser extent, occupational diseases are the responsibility of management and labour, the health and safety committee constitutes an organizational vehicle by which the employer and employees might act jointly to reduce the prevalence of factors that contribute to occupational disease and injury.

The influence of the health and safety committee on the accident rate and the incidence of occupational disease depends on a number of factors. Among the more important of these factors are:

- 1) the extent to which the formation of health and safety committees is compulsory in all work places;

- 2) the powers and responsibilities assigned to the committee;
- 3) the size and composition of the committee; and
- 4) the right of employees to participate on health and safety committees without a fear of reprisal or reduction in pay.

The purpose of the following discussion is to examine these and other factors as they influence the formation, operation and effectiveness of health and safety committees in the federally regulated workplace.

One of the most questionable policies of the federal government involves the discretionary power of the Minister of Labour to form Health and Safety Committees. In this regard, section 84.1 (1) of the Canada Labour Code states that

"The Minister may, from time to time, by notice in writing require or authorize any employer to establish or cause to be established a safety and health committee for a federal work, undertaking or business operated on or carried on by him or for any parts or parts thereof where, in the opinion of the the Minister, conditions therein warrant the established of such a committee."

Consequently, the creation of Health and Safety Committees in all federally regulated industries is by no means mandatory. In fact, the requirement to establish a committee is subject to the discretionary judgement of the Minister and, as a result, the legislation does not guarantee a uniform opportunity to participate in reaching decisions which might influence the quality of the work environment to all employees.

The provisions concerning the size, composition and operating procedures of those health and safety committees that are required by the Ministry became effective on September 1, 1978 and are summarized below. As specified by section 3 of the Safety and Health Committee Regulations, the size of the committee depends on the number of employees represented. In particular, committees established pursuant to the provisions reviewed above consist of four members when the number of employees represented by the Committee is fifty or less and increases by one member for each additional fifty employees. In no case, however, does the number of members exceed twelve.

Membership in the committee is determined by a simple majority of the votes cast by employees when workers are not represented by a trade union. When workers are represented by a trade union, the employee representatives are appointed by the union. Employers who are required to establish a committee appoint representatives who have managerial functions.

Concerning the composition of the committee, section 7(1) of the regulations require the selection of two co-chairmen of equal standing from members of the committee. One of the co-chairmen is selected by employee representatives and the other is selected by representatives who perform a managerial function. Moreover, a majority of the members of a committee, at least half of whom are employee representatives, constitute a quorum. In short, when required by the Minister, the regulations seem to ensure an adequate representation of both labour and management on the committee.

On the other hand, the responsibilities and powers of the committee are broad in scope and create the potential for reducing hazardous conditions in the federally regulated workplace. As specified in the legislation, health and safety committees are empowered to:

- 1) maintain the records pertaining to the disposition of complaints regarding the health and safety of employees;
- 2) receive, consider and dispose of any safety officer's report, including the cessation of unsafe operations;
- 3) participate in all inquiries and investigations pertaining to matters that involve occupational health and safety;
- 4) develop, implement and maintain programs, measures and procedures designed to protect or improve the health and safety of employees;
- 5) maintain records pertaining to work accidents, injuries and health hazards and monitor the resulting data on a regular basis; and
- 6) obtain any information required to identify an existing or potential hazard.

Unfortunately, the role of the committee in monitoring the work environment as well as in developing, implementing and evaluating remedies to specific hazards is not well-defined by the legislation. On the other hand, issues which cannot be resolved by the health and safety Committee are referred to the safety officer with whom regulatory authority rests.

As implied above, the responsibility of monitoring and controlling the work environment is assigned to the safety officer. More specifically, the safety officer is responsible for conducting inspections and performing tests to ensure that regulatory requirements are satisfied. If a source of "imminent danger" is discovered, the safety officer is also empowered to cease operations or the use of the substances, process or equipment that represents a hazard to the health and safety of employees. As a result, the responsibility for monitoring and controlling hazards in the workplace is effectively exercised by the safety officer rather than by the Health and Safety Committee.

In addition, it should also be noted that the provisions of the Canada Labour Code do not guarantee the right of employees to receive information concerning the hazards to which they are exposed. In fact, the legislation expressly forbids the individual employer from obtaining

"the results of any particular analysis, examination, testing inquiry or sampling made or taken by or at the request of a safety officer,"

pursuant the performance of assigned duties. Consequently, apart from the members of the health and safety committees, individual employees do not have access to information pertaining to health and safety hazards. In such a situation, the employee is prevented from obtaining the information that is required to identify and assess the hazards present in the workplace.

8.3.1.3 Right to Refuse Dangerous Work

The right to refuse dangerous work is limited to situations in which

"The use or operation of a machine, device or thing would constitute an imminent danger to the safety or health of himself or another employee, or a condition exists in any place that would constitute an imminent danger to his own safety or health."

Several observations concerning these provisions are relevant. First, as defined in the Regulation, the term "imminent danger" provides little or no guidance concerning situations in which the employee might legitimately invoke the right to refuse dangerous work. More specifically, the legislation extends the right to refuse work to those individuals who are exposed to hazards present in circumstances that are not "normally" encountered by a worker employed in a given occupation even though the hazards in the workplace pose an immediate threat to health and safety. As a result, the legislation assumes that employees are aware of the risks associated with a given occupation and are willing to accept those risks in the normal course of their employment.

It should be noted that the economic security of employees who invoke the right to refuse dangerous work is not protected by federal legislation. In this regard, the provisions of the Canada Labour Code neither prevent the imposition of reprisals on workers who refuse to engage in dangerous work nor require the payment of compensation for the time the employee refused dangerous work.

Even though the economic security of employees who refuse hazardous work is not protected by the provisions of the legislation, the Canada Labour Relations Board has employed a broad interpretation of the term "imminent danger" and has prevented the imposition of economic sanctions against those who invoke the right to refuse dangerous work.

8.3.2 Regulation of Hazardous Substances

With respect to the use and distribution of hazardous substances, the federal regulatory role is of a general nature and addresses public health and safety rather than a specific occupation, process or industry. The sole exception to this generalization is radiation and radiation emitting devices. Federal regulations that pertain to hazardous substances are

contained in the provisions of the Atomic Energy Control Act, the Radiation Emitting Devices Act as well as the Canada Dangerous Substances Regulations and Canada Materials Handling Regulations of the Canada Labour Code, Part IV. We consider first radiation as a special case and then return to a discussion of the more general provisions of the Canada Labour Code.

8.3.2.1 Radiation

The Atomic Energy Control Act is administered by the Atomic Energy Control Board which was established in 1946. The board controls all matters concerning prescribed substances and equipment through a comprehensive licensing system. As a result, the control exerted by the board extends to the mining and processing of radioactive substances such as uranium as well as the development and use of atomic energy by crown agencies, provincial crown corporations and certain private users.

The Atomic Energy Control Regulations of the Atomic Energy Control Act empower the board to appoint medical and radiation safety advisers as needed. The primary functions of the medical advisers are to make recommendations to the board regarding:

- 1) the nature, extent and frequency of the medical examination of atomic radiation workers;
- 2) the continued employment of a radiation worker who has received an excessive dose of radon daughters or exposure to ionizing radiation; and
- 3) the continued employment of a worker for any medical reason.

In addition, the medical advisor may review the procedures of treating exposed workers as well as perform investigations designed to identify workers who have received an excessive dosage of ionizing radiation or exposure to radon daughters.

At the request of the board, the radiation safety advisor is responsible for making recommendations concerning the issuance of licenses as

well as the conditions that should be specified in a license so as to limit exposures to ionizing radiation. In addition, the safety advisor is responsible for reviewing reports concerning the theft or loss of prescribed substances and situations that result or are likely to result in workers receiving an excessive dose of radiation or exposure to ionizing radiation. On the basis of this review, the safety advisor makes recommendations to the board regarding any changes in the conditions specified in licenses granted previously.

The provisions of the Atomic Energy Control Act also impose regulations on operators of nuclear facilities or undertakings that involve the use of prescribed substances. More specifically the employer must

"Take all reasonable precautions in relation to the nuclear facility or the prescribed substance to protect persons and property from injury or damage;

at all appropriate times provide necessary devices for detecting and measuring ionizing radiation and radon daughters at the nuclear facility or at the place of such business or undertaking;

take all reasonable precautions to prevent an escape of radioactive material from the premises; and

in the event of an escape for radioactive material from the premises, provide adequate warning to any person who may be reasonably affected by such escape."

Similar to our earlier discussion, the terms "reasonable", "appropriate", and "adequate" create a wide latitude within which regulations might be enforced and interpreted.

Somewhat more specific are the regulations concerning the exposure of workers to radon daughters and ionizing radiation. Presented in Tables 8.2 and 8.3 are the maximum allowable doses of ionizing radiation and exposures to radon daughters promulgated under the Atomic Energy Control Regulations. Referring to Table 8.2, notice that the maximum permissible doses of ionizing radiation are specified for different tissues and organs. With respect to female atomic radiation workers, the dosage to the abdomen must not exceed 0.2 rem during a two-week period, and, if the per-

Table 8.2 Maximum Permissible Doses to Radiation

Organ or Tissue	Male Atomic Radiation Workers		Female Atomic Radiation Workers		Others
	Rems per Quarter	Rems per Year	Rems per Quarter	Rems per Year	Rems per Year
Whole body, gonads, bone marrow	3	5	1.3	5	.5
Bone, skin, thyroid	15	30	15	30	3
Hands, forearms, feet and ankles	38	75	38	75	7.5
Lungs and other single organs	8	15	8	15	1.5

Source: Schedule II, Atomic Energy Control Regulations

Table 8.3 Maximum Permissible Exposures to Radon Daughters

Atomic Radiation Workers		Others
WLM per Quarter	WLM per Year	WLM per Year
2	4	.4

Source: Schedule II, Atomic Energy Control Regulations.

son is pregnant, the dose to the abdomen cannot exceed 1 rem during the remaining period of pregnancy.

The use of devices that limit ionizing and nonionizing radiation is subject to the Radiation Emitting Devices Act which is promulgated under the auspices of the Radiation Protection Bureau, the Department of National Health and Welfare. In addition, this bureau serves as a health advisor to the Atomic Energy Control Board, assumes responsibility regarding provisions pertaining to radiation devices as specified in the Canada Dangerous Substances Regulations, operates the Dosimetry and Central Registry, which pertains to ionizing radiation only, and provides specialized medical services in the event that an accident involving radiation or radioisotopes occurs. More specifically, section 33 of the Canada Dangerous Substances Regulations requires each employer to ensure that

"Every radiation emitting device to which any of his employees is exposed in his work is

- (a) registered with the Radiation Protection Division of the Department of National Health and Welfare; and
- (b) designed, constructed, installed, maintained and used in accordance with a standard that is acceptable to the Radiation Protection Division referred to in paragraph (a)."

Observe that the standard which must apply in a given situation is not explicitly specified in the legislation. As a result, the enforcement process is complicated not only by dividing responsibility among several agencies but also by permitting the Radiation Protection Division to assess the "acceptability" of the standards to which an employer must adhere.

The regulatory process is complicated further by the fact that the inspection and enforcement functions regarding radioactivity are performed by provincial authorities. The provincial jurisdiction includes the regulation of prescribed substances, the registration of radiation installations, the voluntary registration radiological technicians and the enforcement of regulations that pertain to accident prevention. Consequently, the frequency and quality of inspections as well as the extent to which regulations that pertain to radiation are enforced differ from pro-

son is pregnant, the dose to the abdomen cannot exceed 1 rem during the remaining period of pregnancy.

The use of devices that limit ionizing and nonionizing radiation is subject to the Radiation Emitting Devices Act which is promulgated under the auspices of the Radiation Protection Bureau, the Department of National Health and Welfare. In addition, this bureau serves as a health advisor to the Atomic Energy Control Board, assumes responsibility regarding provisions pertaining to radiation devices as specified in the Canada Dangerous Substances Regulations, operates the Dosimetry and Central Registry, which pertains to ionizing radiation only, and provides specialized medical services in the event that an accident involving radiation or radioisotopes occurs. More specifically, section 33 of the Canada Dangerous Substances Regulations requires each employer to ensure that

"Every radiation emitting device to which any of his employees is exposed in his work is

- (a) registered with the Radiation Protection Division of the Department of National Health and Welfare; and
- (b) designed, constructed, installed, maintained and used in accordance with a standard that is acceptable to the Radiation Protection Division referred to in paragraph (a)."

Observe that the standard which must apply in a given situation is not explicitly specified in the legislation. As a result, the enforcement process is complicated not only by dividing responsibility among several agencies but also by permitting the Radiation Protection Division to assess the "acceptability" of the standards to which an employer must adhere.

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vince to province. Moreover, as seen earlier, the division of responsibility between the senior levels of government is not only used as an excuse for inaction but also results in a government bureaucracy that is unresponsive to demands for an improved environment in the workplace.

8.3.2.2 Other Hazards

Presented in Table 8.4 is a summary of the federal role in regulating other hazardous substances which might affect the health of employees and the general public. The jurisdictional role of the federal and provincial governments are not mutually exclusive. For example, under the Pest Control Products Act, products must be registered with Agriculture Canada which obtains toxicological evaluations from the Department of Health and Welfare and, on the basis of these results, classifies pesticides so as to restrict their sale and use to persons who are capable of dealing with them safely. On the other hand, most provinces have enacted legislation which specifies the requirements that must be satisfied before a license is issued or pesticides may be used or sold. As a general rule, however, the more restrictive provisions prevail when there is a conflict between provincial and federal legislation.

As mentioned earlier, the federal provisions which pertain to hazardous substances are contained in the Canada Dangerous Substances Regulations and, to a lesser extent, the Canada Materials Handling Regulations of the Canada Labour Codes Part IV. As will be seen below, these regulations are also based on general performance criteria rather than on specific details or procedures.

The regulations that pertain directly to dangerous substances include provisions that are related primarily to ventilation, housekeeping, combustible dusts, piping systems, electrical safety, explosives, the control of airborne contaminants and, as mentioned previously, radiation devices. The general responsibilities of the employer with regard to the use of dangerous substances is specified in section 4 of the regulations as follows:

Table 8.4 National Jurisdiction and Related Roles in Occupational Health and Safety - By Hazard*

HAZARD	OCCUPATIONAL			COMPEN- SATION	PUBLIC SAFETY	PUBLIC HEALTH	ENVIRON- MENT
	SAFETY	HYGIENE	HEALTH				
RADIO-ACTIVE MATERIAL ⁽¹⁾	AECB		NHW				
OTHER RADIATION ⁽¹⁾		NHW					
INDUSTRIAL CONTAMINANTS			NHW ⁽²⁾			NHW ⁽²⁾	ENVIR ⁽³⁾
EXPLOSIVES					EMR		
BUILDINGS					NRC		
CONSUMER PRODUCTS					CCA		
						NHW	
PESTICIDES						AG	
						NHW	

SOURCE: See Table 5.1.

LEGEND

- AECB - Atomic Energy Control Board
- AG - Agriculture
- CCA - Consumer and Corporate Affairs
- EMR - Energy, Mines and Resources
- ENVIR - Environment Canada
- NHW - National Health and Welfare
- NRC - National Research Council

FOOTNOTES

- (1) Complex arrangement federally and provincially
- (2) Emissions, discharges etc both internal and external to work site
- (3) Emissions, discharges etc external to work site

———— regulatory

----- supportive to federal regulatory bodies

* does not include role of Labour Canada for hazards within federally - regulated industries falling under Canada Labour Code Part IV - Safety of Employees.

"No employer shall use in his operations, a dangerous substance or radiation emitting device, if it is reasonably practicable to use a substance or device that is not dangerous."

"Where it is necessary for an employer to use a dangerous substance or a radiation emitting device in his operations and more than one kind of such substance or device is available, he shall to the extent that it is reasonably practicable use the one that is least dangerous to his employees."

As in our earlier discussion, the phrases "to the extent that it is reasonably practicable" and "if it is reasonably practicable" might be broadly or narrowly interpreted and render the regulations pertaining to the general obligations of the employer difficult, if not impossible, to enforce.

Similarly, section 9 of the Canada Dangerous Substances Regulation requires the employer to

"Ensure that any dangerous substance that may be carried by the air is confined as closely as is reasonably practicable to its source."

while section 10 requires the employer to

"Ensure that the concentration of any dangerous substances that may be carried by the air in any area where an employee is working

- (a) does not exceed the threshold limit value recommended by the American Conference of Governmental Industrial Hygienists in its pamphlet 'Threshold Limit Values for Airborne Contaminants 1978' as amended from time to time; or
- (b) conforms with any standard that
 - (i) follows good industrial safety practice and
 - (ii) is acceptable to the Division Chief."

As before, the term "reasonably practicable" reduces the extent to which the provisions of section 9 of the Canada Dangerous Substances Regulations are rigorously interpreted and enforced. Similarly, the provisions of section 10 are also ambiguous and permit a wide range of discretionary decisions concerning the concentration of airborne contaminants. The discretionary nature of the regulations concerning airborne contaminants

is also revealed by section 13 which permits the employer to monitor the work environment by using a method recommended by the American Conference of Government Industrial Hygienists, the National Fire Protection Association, the American Society for Testing and Materials or any other method which is consistent with "good" industrial safety practice and is acceptable to the Division Chief.

Of perhaps greater concern is the relative importance assigned to the problem of ensuring a healthy and safe work environment as opposed to the problem of avoiding disruptions in the production process. "To the extent that is reasonably practicable", the employer is required to ensure that quantity of a dangerous substance does not exceed the amount which is either consistent with "good industrial safety" or required in the area for one work day. Notice that the terms "reasonably practicable" and "good industrial safety" are, at best, ambiguous while the quantity of resources required to avoid disruptions in the production process may be determined with relative precision. As a practical matter, then, it seems reasonable to argue that the quantity of dangerous substances present in the workplace is determined more by desires to maintain a continuous production process than by concerns regarding the health and safety of employees.

Apart from the general provisions of the Canada Dangerous Substances Regulations, the most conspicuous omission is the failure to promulgate standards that pertain to dangerous substances that are ingested or absorbed by workers. In this regard, the employer is required to ensure that "his premises are, to the extent that is reasonably practicable" designed and maintained in a manner which prevents the accumulation of "dust and waste from dangerous substances from accumulating in dangerous quantities". In addition, the employer is required to remove "all dust, waste material and any spill of a dangerous substance" as frequently and in a manner which will ensure a "safe and healthy environment for his employees". Notice that these regulations refer to waste and spillage rather than to all sources of exposure to dangerous substances. Thus, even though the employer satisfies the ambiguous requirements described above, it is conceivable that the presence of dangerous substances in the

production process results in an exposure which contributes to an injury or the onset of disease.

In addition, the regulations contain no provisions for either the assessment of the health risks posed by known dangerous substances and combinations of known dangerous substances or the identification, evaluation and control of new substances which are introduced in the environment and the workplace daily. Concerning the latter point, one of the most difficult and perplexing problems confronting national agencies is the selection of controlled substances from the multitude of potentially toxic substances which should be subjected to investigation and assessment. In Canada, the provisions of the Environmental Contaminants Act authorize the publication of a List of Priority Chemicals which is compiled by the Department of Environment and National Health and Welfare. In compiling the list, a committee evaluates substances in terms of toxicity to human health or the environment, persistence and the quantity of the substance in use (Somers, 1979, p. 7). Unfortunately, however, the evaluation of substances occurs after, rather than before, their introduction in the workplace and/or the environment. In order to protect the health and safety of workers as well as the general population, it seems reasonable to argue that the use of members of a given chemical family should be authorized only after the evaluation process has been completed or, to the extent that is possible, the members have been shown to exert no deleterious effects on health and safety.

In addition, the provisions pertaining to hazardous materials do not require the employer to provide employees with information concerning the adverse effects of chemicals or substances. In the absence of such information, workers are neither able to assess the risks to which they are exposed nor evaluate the extent to which preventive procedures, policies or programs are adequate. The ability of employees to improve the work environment depends on the extent to which information is readily accessible and the regulatory requirement to disseminate information concerning the health risks posed by dangerous substances is one of the most obvious omissions in the federal legislation.

8.3.4 The Territorial Role of the Federal Government

The provisions of the Northwest Territories Act and the Yukon Act enable the Governor-in-Council to appoint as the head of the territorial government a commissioner who is responsible to the Governor in Council or the Minister of the Department of Indian Affairs and Northern Development. In turn, the members of the Territorial Council are either appointed or elected and the Commissioner in Council is empowered to enact ordinances regarding private property, civil rights, the public health, welfare and so on. In general, the power to enact ordinances represents the vehicle by which the territorial governments play a role in the area of occupational health and safety.

In addition, the federal government has retained jurisdictional authority over matters which pertain to occupational health and safety. In addition, under the Territorial Lands Act and related mandates, the legislative jurisdiction of the federal government encompasses all natural resources and pertinent health and safety matters.

Presented in Table 8.5 are the territorial ordinances which pertain to public health and safety as well as those that are related to occupational health and safety. Even though territorial governments are primarily responsible for the ordinances summarized in the table, they frequently rely on the federal government to provide administrative, regulatory and consultant services. For example, the Medical Services Branch of the Department of National Health and Welfare provides technical services to both territories under the auspices of the Public Health Ordinance. Similarly, the inspection of mines is performed by the Department of Indian Affairs and Northern Development under the auspices of the Mining Safety Ordinance.

8.3.5 The Federal Public Service

The federal public service consists of over 300,000 employees which represent a cross section of the principal industrial occupations and trades as well as others which are not found elsewhere. The federal re-

Table 8.5 Territorial Ordinances Pertaining to Occupational Health and Safety

Yukon Territory	Northwest Territories
Blasting	Boilers and Pressure Vessels
Civil Emergency	Electrical Protection
Electrical Protection	Emergency Measures
Elevator and Fixed	Explosives Use
Conveyances	Fire Prevention
Fire Prevention	Forest Protection
Forest Protection	Mining Safety*
Gasoline Handling	Pesticide
Mining Safety*	Petroleum Products
Motor Vehicles	Public Health
Noise Prevention	Public Utilities
Public Health	Snowmobile
Steam Boilers	Vehicles
Workers' Compensation*	Workmen's Compensation*

* These are considered oriented towards occupational health and/or safety; the remainder are general health and/or safety "background" Ordinances.

Source: Adapted from Directory - Safety and Health Legislation in Canada, The Labour Safety Council of Ontario, Ministry of Labour.

responsibility for the health and safety of these employees is established by the Financial Administration Act which authorizes the Treasury Board not only to develop policies and establish standards but also to implement and evaluate the Public Service Health and Safety Program. As might be suspected, the administrative structure of the program is quite complex. In general, Treasury Board is responsible for establishing policy while the individual departments and agencies administer the program. Also note that technical support is provided by Labour Canada and the Department of National Health and Welfare.

As implied above, the policies developed by the Treasury Board represent the vehicle by which departmental managers are provided with the responsibility to implement programs that influence the health and safety of the Public Service. As such, the policy statements of the Board are mandatory and represent the basis for the development of internal policies and programs by individual departments or agencies. Among the more important safety provisions to which the departments or agencies must adhere are:

- 1) the incorporation of health and safety as a responsibility of operational managers;
- 2) the investigation of disabling injuries;
- 3) the identification of factors contributing to accidental injury;
and
- 4) the implementation of corrective action.

In addition, the Board has also specified requirements concerning the formation of health and safety committees as well as the involvement of employees or their representatives in safety programs implemented by departments or agencies.

The provisions of the Canada Labour Code do not apply to the Public Service even though many of the safety codes and standards promulgated in this legislation have been adopted by the Board. The standards established by the Board pertain to dangerous substances, pressure vessels, elevating devices, operation of motor vehicles, machine safety, noise con-

trol, pesticides as well as operations that might pose risks to health. Moreover, the policies established by the Board also require the provision of health counselling, emergency medical services, as well as first aid facilities and training.

In support of existing programs, the Treasury Board has encouraged management and labour to participate in a cooperative campaign designed to reduce injury rates. One feature of the campaign involves the cooperation of managers and employees in investigating and eliminating factors that contribute to disabling work injuries. Moreover, supervisors are required to investigate injuries and report the results to employees as soon as the investigation has been completed. In turn, employees are involved in the development and implementation of corrective action.

In conjunction with the cooperative campaign, the Board has asked the supervisor to become more involved in the absentee status of disabled workers. The stated purpose of this component of the program is to ensure that the employee receives disability benefits and to obtain information concerning the possibility of the employee returning to work or performing less demanding duties.

Each federal department or agency also is required to maintain a healthy work environment and to monitor the health status of public servants. Among the features which must be included in departmental programs are the management of personal health problems as they relate to work; the evaluation and control of the work environment; the provision of preplacement and periodic health evaluations; the provision of medical services to personnel located in foreign countries and programs designed to promote personal health.

Regarding the evaluation and control of the work environment, one of the most persistent problems involves the introduction of new and potentially hazardous substances as well as dangerous and complex processes in the work place. In response to these hazards, the work environment is inspected by environmental health officers who are responsible for enforcing

established standards as well as investigating known or suspected health hazards.

Once the inspection or investigation has been completed, the results and recommendations, if any, are forwarded to the appropriate supervisor. It is important to note that the directives of the environmental health officer are mandatory and the inspector is given the right to order a cessation of operations when sources of "imminent danger" are discovered. Moreover, work may not be resumed until the hazardous condition has been rectified. A similar set of procedures are employed in monitoring and controlling safety hazards in the workplace.

Of continuing concern to the health program are those hazards which emanate from the sedentary nature of the work performed by the Public Service as well as behavioural problems such as the excessive use of drugs and alcohol. In response to these hazards, an Employee Assistance Program is available to the Public Service. The stated purpose of this program is to encourage employees to seek assistance without fear of stigma or prejudice regarding continued employment or promotion.

8.4 The Facilitative Role of the Federal Government

As implied throughout the foregoing discussion, the federal role in the area of occupational health and safety has been characterized by the promulgation of fragmented legislation and complex organizational inter-relationships. Until recently, these problems have been compounded and perpetuated by inadequate attempts to generate, collect and disseminate information pertaining to occupational health and safety.

With the passage of Bill C-35 on October 1, 1978, Parliament provided the legislative basis for the formation of the Canadian Centre for Occupational Health and Safety. The primary objectives of the Centre are to:

- 1) promote health and safety in the workplace as well as the physical and mental health of Canadian workers;
- 2) facilitate consultation and cooperation among the various legislative jurisdictions;
- 3) encourage cooperation between management and labour in establishing a high standard of occupa-

tional health and safety; 4) assist in the development of policies or programs designed to reduce or eliminate occupational hazards; and 5) serve as a national centre for statistics and other information pertaining to occupational health and safety. As such, the centre not only represents a vehicle for the accumulation of relevant information but it also constitutes a possible focal point for the development of a unified policy concerning occupational health and safety in Canada.

Of particular importance to the achievement of stated objectives is section 18(1) of the Canadian Centre for Occupational Health and Safety Act which states that

"(t)he Centre is not an agent of Her Majesty" and, except as provided in subsection (2), the Chairman and President, the other governors and officers and the employees and agents of the Centre are not part of the public service of Canada,"

where subsection (2) entitles those associated with the centre to the provisions of the Public Service Superannuation Act, Government Employee Compensation Act and Section (7) of the Aeronautics Act. As a result, the Centre is neither a federal agency nor a component of the federal infrastructure and may function as an independent forum for the presentation of divergent views as well as proposals concerning the rationalization of the health and safety programs operated by the various jurisdictions.

In order to achieve stated objectives, the Centre is empowered to:

- 1) promote, assist and evaluate research;
- 2) establish and operate systems of facilities for collecting, recording, analyzing, evaluating and disseminating statistics or other information;
- 3) publish scientific or technical information;
- 4) provide advice, information and service pertaining to an existing or potential health and safety problem to workers, unions, employers, the public, government as well as national and international organizations;
- 5) support and facilitate the training of personnel in the field of occupational health and safety;

- 6) support and sponsor public meetings, seminars and conferences;
and
- 7) perform other functions required to achieve stated objectives.

Even though the responsibilities outlined above are broad in scope, the Centre is not empowered to perform the enforcement function or to issue statutory requirements.

As seen above, one of the primary functions of the Centre is to collect and disseminate information concerning occupational health and safety. Pursuant to achieving this goal, the Centre is expected to play a role in determining TLV's which, in turn, provides the basis for promulgating regulations concerning the presence of health hazards in the work environment. In addition, the collection and dissemination of information also serves the goal of providing the worker with information required not only to assess the risk present in the workplace but also to contribute to the development, implementation and evaluation of programs or procedures designed to reduce the presence of occupational hazards in the workplace (Currie, 1977, 11-13).

Of considerable importance to the functioning of the Centre is section 21 of the Act which requires the submission of an annual report detailing the activities of the Centre to the Queen's Privy Council of Canada. The primary purpose of this regulation is to ensure that interested parties are provided with information regarding the disposition of concerns or views conveyed to the Centre. In addition, section 22 of the Act states that

"The results of research assisted or initiated by the Centre shall be made available to the public by the Centre within ninety days after becoming available to the Centre."

Notice that this provision pertains to results which are controversial or inconclusive. Both provisions recognize the autonomous nature of the Centre and the need to establish mechanisms by which it is held accountable to the public.

Perhaps the most challenging task of the Centre is to provide a forum for the presentation of divergent views and to encourage cooperation among the various legislative jurisdictions. It is in this sense that the Centre might be instrumental in formulating a set of unifying principles which provide the foundation for the development of national policies and programs concerning occupational health and safety.

8.5 Summary

As seen in the foregoing discussion, federal regulations concerning occupational health and safety are ambiguous and subject to discretionary interpretation. As such, the enforcement of federal legislation is a difficult, if not impossible task. Moreover, the effective administration of existing legislation is impaired by a complex organizational structure in which jurisdictional responsibilities are, at best, poorly defined.

These observations suggest that the federal program is in serious need of revision. More specifically, the extent to which federal authorities are able to control occupational hazards would be enhanced by the promulgation of a set of regulations that are not only unambiguous and, hence enforceable, but are also applicable to all federally regulated workplaces. When viewed from the perspective of organizational rationalization, the divided jurisdictions that emanate from existing inter-departmental and interagency relationships might be eliminated by consolidating the responsibility for administering the federal program in a single department.

Chapter 9: A WORKMEN'S COMPENSATION BOARD MODEL: BRITISH COLUMBIA

9.1 The Workmen's Compensation Model

Prior to 1970 most of the provincial governments in Canada administered major portions of their occupational health and safety programs through their workmen's compensation boards. During the last decade, however, all of the provinces, with the exception of British Columbia, have removed responsibility for administration of these programs from their workmen's compensation boards and consolidated the administration in other departments. The British Columbia programs have been consolidated within the Workers' Compensation Board, and, because British Columbia is unique in this respect, we have included its program among our case studies.

Responsibility for administering occupational health and safety regulations has always rested in the hands of the Workers' Compensation Board in British Columbia. Why is it an exception? Why have the other provinces and the federal government opted for different jurisdictional arrangements? Before examining the British Columbia approach in detail, we will consider some of the factors which have been influential in causing other provinces to remove jurisdiction from compensation boards.

As we observed earlier, the changes in the other provinces have been heavily influenced by the Saskatchewan program, which we examine in the next chapter, and by the reports of the Beaudry, Ham and Gale commissions. In addition, the transfer of authority in other provinces probably reflects an historic distrust of workmen's compensation boards by organized labour. Let us comment briefly on some of these reasons for distrust.

Labour's concern is attributable, in large measure, to its perceptions about the reasons boards exist, how they have functioned in the past, and how they are controlled. Workmen's compensation boards were first introduced and have always served primarily as insurance agencies for employers. The programs have permitted employers to limit their legal liability for industrial injuries (Ashford, 1976, p. 388). They are seen

by labour as the employer's insurance agencies and are viewed as being at least as interested in protecting the employer as in serving injured workers.

Since, until recently, industrial disease was rarely compensated under the schemes, there existed a tendency for the boards to emphasize safety and to pay insufficient attention to occupational health hazards. The tendency to downplay or ignore industrial disease reinforced labour's fears that the boards only worried about minimizing their customer's--the employers--claims liability.

Inspection procedures followed in the past by board inspectors did little to alleviate these concerns. Inspectors provided every impression of identifying with management by their socialization patterns while on inspections and by their demeanor toward workers. Prior to 1974 in British Columbia, workers rarely accompanied inspectors during inspection tours. Based on our interviews with former inspectors employed by the three western provincial boards, it appears that until the mid-1970's the inspectors rarely spoke to employees during inspections. Inspection reports were seldom made available to employees. Thus, the seeds of distrust were sown.

When infractions were found, or when accidents occurred, boards rarely supported prosecution of employers for industrial safety and health violations; at times, employees were prosecuted. Generally, workers perceived that the WCB tended to attribute accidents to worker carelessness or ineptitude, and failed to place proper weight on the failures of management to invest in safety.

The composition of the membership of the boards does little to alleviate labour concerns. The legislation creating the boards provide for employer appointments to the boards and, as a result, the process of appointment, in practice, turns out to be very political. Consequently, the management of a board is more likely than not to be politicized. This politicization must reflect on the attitudes of management within the organizations. The question arises whether the administration of occu-

pational health and safety programs should be politicized to this extent. It is one thing to have a program administration directed by popularly elected individuals, and quite another to have control in the hands of employers or significantly affected by employers who may very well see it in their interests to underinvest in occupational health and safety.

Most of these arguments deserve critical review. It is not obvious at this point in time that an administrative unit responsible for programs of accident and disease prevention cannot be as effectively operated under the authority of a workmen's compensation board as, for example, under the authority of a department of labour. The problem with pointing to the weak programs of the past and attributing their failures to the structure and orientation of compensation boards is that until the current decade the public simply did not place a high priority on reducing industrial injuries and disease, and the public knew little--or desired to know little--about industrial disease. Had program administration been in other departments, it is not clear that the administration would have been significantly different.

It is not obvious that a compensation board will be less sensitive to industrial disease than a provincial department of labour controlled by the same provincial government. The efficiency and effectiveness of regulation depends more on the powers given to a regulatory agency, the individuals appointed to it, the financial resources provided, and the priority placed on industrial health and safety by government than on the precise placement of the organization. This is not to say that placement is irrelevant. Placement does reflect current priorities and will influence future priorities; however, placement is not the critical factor in determining effectiveness.

To the extent that a board is an insurance agent and a monopolist, it is reasonable to assume that it will be interested in minimizing claims costs. There are two general ways it minimizes claims costs. One is to prevent industrial injuries and disease, and the second is to be restrictive in allowing claims and to limit benefits when settling the claims that are allowed. While the latter policies may justify public concern,

the desire to reduce the incidence of industrial injuries and disease is certainly consistent with the objectives of any government agency working in this field.

Thus, the performance of workmen's compensation boards in the past may be primarily a reflection of the low priority placed on industrial health and safety in general by the public and government; the personnel appointed to the boards as a result; the staff subsequently employed; and the lack of knowledge about health hazards.

Workmen's compensation boards possess some characteristics that should permit them to operate accident and disease prevention programs in a manner superior to other government agencies. These advantages include an ability to determine the payments that employers must make to the insurance fund, direct access to detailed statistical data on injuries, and an established educational role. The first of these is the most important. It is possible, with proper enabling legislation, for a board to impose financial penalties on firms that fail to undertake effective health and safety programs. These penalty assessments can provide economic incentives for employers to reduce industrial injuries and eliminate health hazards. The advantage derived from having direct access to the statistical base on injuries is potentially important. If the organization that collects, tabulates and analyzes data is to use the data, there should be greater incentive to match the data collected to needs than if the data and benefit of analysis go to an outside user who does not bear the assembly cost. Finally, employers may be more receptive to an insurance agency providing educational services than to some other agency. The importance of this advantage should not be exaggerated.

Thus, for a variety of reasons there is a potential for a properly structured and motivated compensation board to administer a program in occupational health and safety as effectively as any other agency in government. We reject the notion that such schemes must fail.

9.2 The British Columbia System

We have included British Columbia in our case studies for these reasons. The province was the only one with preventative services placed under a workmen's compensation board at the time this study was initiated.

In general, the occupational health and safety program in British Columbia has remained unchanged since 1967. The regulations have been revised periodically, but the revisions have been more in form than in substance. The board has relied on a traditional administrative approach to regulation. However, the program does go beyond the traditional administrative model in its use of economic incentives and work site committees.

Our analysis of the British Columbia system must be prefaced on an understanding of the importance of organized labour in the province. British Columbia is the most highly unionized province in Canada, and this has resulted in concerted pressure on government to adopt effective occupational health and safety programs. Administrators, whom we interviewed, repeatedly emphasized the "pressures" which they feel from organized labour and the tendency of management at unionized work sites to be more conscious of occupational hazards than would be the case in the absence of unions. The political influence of organized labour is probably matched by its influence at work sites in ensuring compliance with regulations. Irrespective of the nature of a safety program, its impact should be enhanced by the presence of unionized workers who will not be as reluctant as nonunionized workers to demand that work hazards be lessened or eliminated. Unfortunately, no empirical studies using paired work sites have been performed which will permit a reliable measure of the impact of unionization of work sites on injury rates.

9.3 The Prevention Services Division

The Prevention Services Division of the board has responsibility for industrial health and safety. The division is divided into two departments: Inspections, which is responsible for accident prevention, industrial hygiene and first aid services; and Research and Education which is

responsible for education, research and laboratory services. We desire in this study to concentrate on the activities of the Inspections Department. That department accounts for in excess of 60 percent of the division's budget and is responsible for performing all regulatory functions. While the educational activities of the division have the potential to reduce the incidence of industrial injury and disease, the impact of the British Columbia program has not been studied by the division and we do not propose to evaluate those programs.

9.4 Regulations: Formulation, Structure and Enforcement

The process of formulating safety regulations in British Columbia involves: soliciting and receiving briefs from employer and employee organizations; drawing on the experience of inspectors; reviewing past claims; and surveying publications by independent researchers and other regulatory agencies. The frequency and cost of accidents are major considerations in identifying areas where existing regulations are inadequate.

The procedure followed in formulating health standards is very similar. The first part of the process involves looking at the standards set for other organizations such as OSHA. If variations are found among these, then ACGIH standards are likely to be used. In a very few instances separate testing occurs, and standards are set based on board tests. An example is cedar dust. The B.C. standard has been set at 3 PPM for continuous exposure, while the OSHA standard is 10 PPM. In general, the health standard exposure limits set in British Columbia are the same as standards recommended by the ACGIH. In the case of noise exposure, the limit for eight hours is 90 DBA and is the same as that of OSHA in the United States.

The Act¹ places responsibility on the board to make regulations for the protection of workers from injury and disease. Section 60 of the Act is general and does not detail the criteria which are to be applied in establishing regulations. It directs the board to make regulations for the prevention of injuries and industrial disease and allows the board to issue orders and directions detailing the methods to be adopted.

The law does not make references to cost-benefit studies, and the government has never directed the board to consider benefits and costs of regulations. While the legislation and regulations do not require economic impact analysis, consideration of economic feasibility and practicality does occur. The board uses an approach not unlike OSHA's affordability test. At the public hearings in which new regulations are considered, economic impact evidence is allowed. The board currently requires that administrators, in drafting new regulations, consider whether a proposed standard is technically achievable and whether the regulation is economically feasible in the sense of whether the industry can afford it.

In practice, the board does not prepare comprehensive cost-benefit studies. The executive director of the Preventative Services Division was able to point to only one cost-benefit study. That was a study of proposed regulations affecting roll-over protection systems (ROPs) on vehicles. In the case of those regulations, introduced in 1972, the board reviewed OSHA and State of California regulations, and proposed a standard for new and existing equipment. The hearings revealed that 14,000 to 15,000 off-highway vehicles would be affected at an average cost of \$800 for a total of \$11 to \$12 million. Benefits were measured in terms of saved compensation benefit payments and were estimated to exceed costs. The executive director noted that "many other factors were considered". Unfortunately, the study was treated as an internal working document and never made available to the general public or the industry, and no transcript is available of the public hearings.

The Board claims a willingness to consider economic factors, but little formal analysis is undertaken, and none made public. All benefit measures are made in terms of reduced compensation liability. Consequently, all benefit measures are significantly understated.

In summary, the Board's occupational health standards are set for most substances and airborne materials which are recognized in the United States as hazardous. The public hearings involve an examination of the standards applied by OSHA and other regulatory agencies. If economic factors are considered, the process is informal and, apparently, undefined.

The main considerations are technical and economic feasibility. Furthermore, the Board is reluctant to close an industry down. Most senior people in the department acknowledged that in setting health standards they would not close down an industry unless clearly identifiable "killer" conditions existed.

It is also clear from our interviews that the senior officials will not shut down a work site if evidence is presented by affected companies which reveals a "genuine" effort to meet standards. Officials did not define what constitutes a "genuine" effort, or what was considered a reasonable time period. Senior officials did agree that three years would be considered unreasonably long. The Board, on one occasion, has imposed a special levy on a company (Cominco at Trail) to provide an incentive for it to develop a feasible technology to deal with a health hazard.

While the Board, in setting regulations, is expected to be free from political pressures, there can be little doubt that the freedom is limited. For example, Terence Ison, Chairman of the Board from 1972 to 1976, resigned the day following the defeat of the New Democratic government. Additionally, all senior officials interviewed were sensitive to the problem of capital mobility and the competitive problems of the forestry products industry. The level of that concern must be interpreted to reflect political sensitivity.

9.5 The Format of Regulations

The Board relies primarily on performance-type regulations. With a few exceptions in the accident prevention area, the inspectors are provided with broad discretion in interpreting and enforcing regulations. Section 8.02 of the B.C. safety regulations includes a general duty requirement for employers. It sets the tone for all OHS regulations in British Columbia:

(1) The employer shall ensure that:

- (a) machinery and equipment are capable of safely performing the functions for which they are used, and
- (b) all buildings and permanent and temporary structures

are capable of withstanding any stresses likely to be imposed upon them.

- (2) Except as provided elsewhere in these regulations, the safe working load of any equipment shall be that specified by the manufacturer.
- (3) The safe working load shall be certified by a registered professional engineer where:
 - (a) the manufacturer's specification or other acceptable warranty cannot be produced, or
 - (b) the equipment has been modified in a manner which will change its safe working load, or
 - (c) wear, corrosion, damage or signs of fatigue are found which may reduce the safe working load, or
 - (d) the equipment is used in a manner or for purposes other than that for which it was originally designed, when such use will change the safe working load, or
 - (e) in the opinion of the Board, the provision of such certification is deemed to be necessary.

A similar general regulation applies to employee training. Section 8.18 requires that: "Every employer shall ensure the adequate direction and instruction of workers in the safe performance of their duties" (emphasis added).

In a similar general vein, S.8.04 requires that: "All buildings, excavations, structures, machinery, equipment, tools and places of employment shall be maintained in such condition that workers will not be endangered".

The discretion provided in the system is pervasive: curbs on floating docks "shall be of substantial construction" (S.10.04); "standard guardrails" are required "where practicable" (S.10.04(2)); "safety nets shall be rigged..., except where the ladder or gangway and approaches thereto are so circumstanced that safety nets are unnecessary, or where the rigging of a safety net is impracticable" (S.10.06(ra)). Similarly, guardrails must be designed to "effectively perform" (S.16.04) their intended functions; some machinery must "be guarded" (S.16.06), other machinery parts "effectively guarded" (S.16.16), and other machinery "fitted with guards which will effectively protect" (S.16.20).

When the regulations are specific, they frequently allow management flexibility in selected "appropriate measures". For example, under S.13.21, the employer is directed to "take appropriate measures" to reduce noise levels to permitted levels. Where he cannot reduce the noise below the prescribed levels, he can "take such steps as are feasible from time to time to reduce the noise at source" (S.13.21).

Employers are frequently allowed to select from a variety of standards. For example, under S.32.02 the employer may select scaffolds which meet any of four different sets of Canadian and American standards or "other standards acceptable to the board, or written requirements of a professional engineer".

The regulations include "grandfather" clauses (S.8.64) which exempt old plants from new regulations if its safety features conform to different earlier specifications, and if effective protection is provided.

The foregoing examples are representative of those found in the two-hundred pages of British Columbia regulations. We have provided a large number of examples in an attempt to emphasize the vague and general nature of the regulations. This ambiguity provides administrators of the program wide latitude in enforcement. If the inspectorate is not large, well-trained and free of political influence, these performance standards will prove ineffectual. Furthermore, the ambiguity invites legal problems. It seems unlikely that the judiciary will readily convict or readily impose large penalties on employers charged with violating such ambiguous regulations.

As we noted in the earlier chapters, performance standards are attractive to economists because they permit employers to seek out the most cost-effective solutions to particular safety problems. Unfortunately, at least in the case of safety regulations, their ambiguity invites weak enforcement by the inspectorate and the judicial system. We turn now to an analysis of the inspectorate and the inspection process.

9.6 The Inspectorate

In 1978 the division employed 25 professional people in education, 65 inspectors and supervisors in accident prevention, 20 inspectors in industrial hygiene, and 11 in first aid. The division serves a labour force of one million and oversees 74,000 work sites. The staff is sufficiently large to permit inspections ranging from a frequency of once every six months to once every four years.

Inspectors normally possess at least two years university training in an engineering discipline and five years work experience in industry. Three months intensive training is provided. The majority of inspectors are generalists. Normally, the industrial hygienists have special training. For accident prevention inspectors, the beginning salary is \$27,000 per year (1980) and is viewed by the Board as adequate.

The performance of inspectors in the field is measured by the quality of their reports, by the number and type of complaints about them, and by the general impressions of management.

9.7 The Enforcement Process

The division is capable of undertaking 35,000 to 38,000 inspections per year. Each inspector is seen as capable of undertaking just under 500 inspections per year. In most cases, the number of actual inspections will be fewer. At most, two inspections per day are expected under normal conditions, which implies 450 to 500 inspections per year per inspector. The inspectors also perform educational functions.

The targets and frequencies of inspections are determined by point scores on previous inspections, inspector's judgements and hazard index. During 1977-78, the Inspections Department experimented with a computer program in order to rationalize the use of its resources. However, attitudes toward the program were mixed and the program was modified. The majority of senior administrators viewed the system as a good idea, but a failure. The theoretical concept envisioned identification and rating of

eight target hazards in industry and the classification of industries by the presence of those hazards. The program did not reliably pinpoint problem worksites. While the hazard indices for different industries are positively correlated with accident rates in those industries, the relationships identified have not been statistically impressive.

The board, in late 1978, decided to shift from the computerized system to a system which places more emphasis on the subjective assessments of "need to inspect" determined by the inspectors themselves. Under this system, inspection frequencies are determined by the individual firm's safety record, the presence of high hazard conditions and cyclical considerations. Fundamentally, for problem firms the measure is the claims cost disbursement ratios. Under this approach the division has concentrated on higher hazard industries and firms, and undertaken fewer--but more intensive--inspections. As we will note below, the injury statistics for 1978 and 1979 do not indicate that this approach has been successful in reducing injuries. It is not clear that in practice this "new" method for identifying inspection targets is very different from "older" methods.

Once a worksite is selected for inspection, the procedure followed is straightforward and routine. The inspector enters without pre-notification and seeks out a management representative. Prior to August 1974 employee representatives normally were not sought by the inspector. Indeed, prior to 1974 an employee was only allowed to participate in the inspection tour if management approved; not surprisingly, such approval was rarely granted.

Since September 1974 (S.8.08(4)) workers have had a right to have a representative accompany the inspector. This was one of the major policy changes introduced by Mr. Ison as chairman of the board. The representative preferably is drawn from the members of the Industrial Health and Safety Committee at the worksite. Where there is no committee, if a union is present the union will designate a representative. Where there is no union, the inspector selects a worker representative. In practice, where there is neither a committee nor a union, the inspector selects an em-

ployee from the group exposed to the greatest job hazard. The employee is compensated at normal rates while on the inspection.

If the inspector observes an imminent hazard, then he may issue a formal order directing that the hazardous activity be stopped. However, he will rarely shut down the entire plant. Normally, parts of the operation are closed by an informal order. The inspector prepares an inspection report on site which directs that no work shall be undertaken until remedial action occurs.

Only one or two formal stop work orders are issued per year in British Columbia. However, "informal orders are issued daily." An informal order involves the inspector directing that immediate remedial actions be taken. Apparently formal orders are issued only when "it appears to the board officer that the employer may not undertake the remedial action without delay." Heavy reliance on informal orders may suggest either intelligent flexibility or laxity of enforcement. If a hazard is present and a company is not in compliance with a regulation, and indeed it does respond immediately to an informal order, then why distinguish between the two. There is perhaps, a difference in the impact of the two orders on the relationship of the inspector and manager. The informal order, while potentially as effective, is viewed as less intrusive by management and creates less hostility as a consequence.

In British Columbia when a formal stop work order is issued, the employer must pay the workers involved the amounts that they would have earned, or been likely to have earned, for the day of the closure and for the next three working days during which the closure order is in effect. Under this regulation introduced by Chairman Ison, the employee is protected from being penalized by the failure of the employer to conform to regulations.

If compliance does not occur, or is not expected, the inspector may issue a formal stop work order (in some cases, such as unsafe shoring, a formal order is required). He may also recommend a penalty assessment under S.61.1 of the Workers' Compensation Act. This penalty assessment is

set as a percentage of the normal annual assessment of the board on the firm. Additionally, if an accident investigation reveals that an accident resulting in a compensable claim occurred primarily due to the failure of the employer to comply with regulations, then a penalty levy may be imposed on the employer up to the full cost of the compensable claim. There was a limit of approximately \$16,000 (1979) on these levies, but the maximum is adjusted annually to reflect changes in the consumer price index. Obviously, the ceiling is quite inadequate in the case of a major injury.

The process of imposing penalty assessments can be briefly outlined. Following an inspector's recommendation, a superintendent in the Preventative Services Division reviews the employer's file and may recommend to the WCB a special assessment, or levy, or both. Typically, before an assessment is made, warning letters are sent. If the infraction is serious or involves a repeat violation, then the inspector will recommend a penalty which may be implemented by the executive director. A letter is sent to the company involved, and a hearing may be requested before the board. If no hearing is requested, then the penalty is imposed as in the current case with Cominco which faces a special assessment of \$30,000 per month. On average, three penalties per month are imposed. An employer may appeal these assessments and levies to the full board. A senior administrator describes the system as follows:

Warning letters do not always precede penalty assessments. Sometimes, the warning letter is sufficient to alert the employer to his sins of omission. Warning letters are sent where it is felt that a situation is deteriorating but that a reminder will alert the employer to his responsibilities. Show Cause letters are always sent prior to the imposition of penalty assessments. Show Cause letters outline the violations observed by an officer and request that the employers "show cause" as to why a penalty assessment should not be levied. In some cases, the response, by an employer, to a Show Cause letter is sufficiently convincing in terms of:

- (a) Mitigating circumstances at the time of observation of non-compliance;
- (b) Sincere regret and promise of continuing future compliance;

that a decision is made not to impose the penalty assessment. This course of action then results in the employer being advised that further failure will produce a penalty assessment.²

The law also provides for issuance of citations to employees who are in willful noncompliance with regulations. A copy of the order goes to management and the union. A second notice can result in prosecution. In 1976, three employees were prosecuted and two convictions obtained. No prosecutions occurred in either 1977, or 1978.

The division may also prosecute employers who remain in willful non-compliance. If a decision is made to prosecute a firm or individual, the prosecution is undertaken by, or arranged by, the board's own legal department. These prosecutions are undertaken under the Summary Convictions Act and the board officer, who has observed the infraction, swears out the information. No employers were prosecuted in 1977; in 1978, three prosecutions occurred.

While failure to comply with a formal stop work order can result in prosecution, administrator perceptions of hostile judicial attitudes clearly serve as a deterrent; special assessments are the preferred route. Few formal stop work orders are issued; most are informal or voluntary. A penalty is almost assured if a second order does not result in compliance. This is easily understood when it is recognized that under S.62 of the Act anyone failing to comply with an order is guilty of an offence and is liable to a fine not exceeding fifty thousand dollars, up to six months in jail, or both. However, most senior officials agreed that the courts are hostile to occupational health and safety cases and present little threat unless there is an actual victim. This argument does not adequately explain failure to prosecute cases where failure to comply has resulted in an accident. However, senior WCB officials argue that the courts in British Columbia will not impose significant fines unless a dead body can be produced.

The B.C. board does make extensive use of the special assessment option available to it. Table 9.1 summarizes assessments reported in the twelve-month period June 1977 to July 1978.

Table 9.1 Special Assessment and Levies in British Columbia:
1 July 1977 - 30 June 1978

Offence	Number	Average Fine	Largest Fine	Average Fine as a Percentage of Average Assessment
Inadequate: Guarding	6	\$3,485	\$15,548	6.8
Shoring	15	532	1,798	7.7
Scaffolding	8	880	3,596	6.8
ROPS	7	298	764	8.0
Other AP	34	616	2,893	5.8
Industrial Hygiene Offences	9	991	2,098	10.0
Noise	1	889	889	3.0

Source: Compiled from various issues of the bi-monthly B.C. WCB News (Vancouver).

It is doubtful that the existing system of fines provides an economic incentive to employers to adopt safe operating procedures. Of the 80 special assessment fines reported above, in only eight instances did the penalty assessment exceed 10 percent of the regular assessment. The average fine for all cases was \$832--or three weeks' pay for the average industrial worker in British Columbia. To the employer, the expected cost of a fine is equal to the probability of a fine being imposed times the size of the average actual fine. Since several warnings and violations usually precede the imposition of a fine, employers may be inclined to attach a low probability to being penalized.

It is revealing to contrast the use of penalty levies during the 1977-1978 period covered in Table 9.1 with the more recent period. As we will note below, injuries and fatalities rose dramatically in British Columbia in 1978 and again in 1979. The board has responded to these marked increases by raising the level of penalty assessments. We can benefit from a review of the more recent activities of the division.

Certain trends in program administration are clear from the data in Table 9.2 as well as data for the first six months of 1979. The number of penalties and levies imposed for safety reasons fell by 50 percent between 1977 and 1978. However, the size of the average penalty increased three-fold. These trends continued into the first six months of 1979. For example, during the first six months of 1979, there were twelve penalties imposed under Section 61(1)³ with an average value of \$5,004. During the last six months of 1978 there were twenty-three penalties imposed under the same section with an average penalty of \$1,291.

The 29,024 inspection contracts in 1978 were much lower than the 38,808 in 1977. We are informed that this trend is continuing in 1979.

Finally, while the number of safety inspections is declining, and the number of penalties imposed failing and the average size of penalties rising, we find that the relative severity of the average penalty is declining. Of the 24 Section 61(1) penalties imposed in the last six months of 1978, nine (37.5 percent) were in excess of eight percent of the employers normal workmen's compensation assessment rate. Of the twelve penalties imposed under the same section during the first six months of 1979, only one (3 percent) amounted to in excess of eight percent of the normal class assessment. During both periods the median value for penalty assessments was identical at 5 percent of the normal class assessment. Penalties exceed the percent of normal class assessments in only two cases over the year July 1978 to June 1979.

An analysis of these trends permits us to draw conclusions about the current direction of the British Columbia program. First, it is clear that since 1977 there has been a move toward fewer safety inspections and fewer penalties for safety regulation infractions. Where penalties are imposed, the average size has risen, but the median size and the relative size have not risen. The division must be concentrating its safety enforcement efforts on larger employers. Second, given that the division maintains that it has been concentrating on firms with relatively high accident frequencies in high hazard industries, these statistics should not be surprising. However, if penalty assessments are to be used effectively, we might have expected the relative size of the average penalty

Table 9.2 Inspection Activities in British Columbia in 1977 and 1978

	1978	1977
Inspection contacts (including consultations and follow-up visits)	\$ 29,024	\$ 38,808
Complete worksite inspections	18,164	22,957
Partial inspections (specific worksite areas or equipment)	677	784
Accident investigations (including fatalities)	336	284
Orders written (including closure orders of less than 24 hours duration)	26,928	32,822
Closure orders of more than 24 hours duration	0	1
Penalty assessments (Safety)*	38	89
Penalty levies (Safety)**	3	7
Total amount of safety penalties	114,663	89,154
Average safety penalty	2,797	929
Observation reports (on workers in willful violation of Regulations)	43	73
Prosecutions (employer) (for failure to comply with Regulations and orders)	3	0
Prosecutions (workers) (for willful violation of Regulations)	0	0
Completed industrial hygiene inspections	939	1,129
Orders written	1,546	1,128
Penalty assessments	8	9
Amount of penalty assessments	304,715***	80,612
Worker injuries	162,068	149,653
Fatalities	208	176

* Section 61(1) of the Workers' Compensation Act.

** Section 61(2) of the Workers' Compensation Act.

*** Of this amount, \$298,288 was paid by Cominco.

Source: Annual Reports of the Workmen's Compensation Board of British Columbia.

levies--expressed as a percentage of normal class assessment--to have risen as the division concentrated on more negligent employers; this has not occurred. We can only conclude that since the penalty assessments are the major instrument available to the division, that enforcement efforts have actually been relaxed in the safety area. This observation is consistent with the statistical trends. The injury and fatality rates have both been rising in British Columbia since 1977. The injury rate rose by 11 percent in 1978 and by 16.6 percent in 1979.

It is both revealing and disturbing that the division's executive director has focused on the growth in absolute size of penalty assessments rather than the relative size. In explaining the increase in absolute size of penalties, Mr. Paton observed that:

We found that small penalties were not having the effect that we desired them to have. It was too easy to pay a small penalty and not be concerned. But now the penalties are large enough that it immediately shocks them into doing something.

Clearly the division is aware of the importance of penalty assessments; however, the frequency of their use has declined and their relative size, in fact, has not been increased.

Our preceding discussion has focused on industrial injury prevention efforts; let us now consider industrial hygiene. Statistics supplied directly by the board, reveal that the number of penalty assessments for industrial hygiene offences declined from nine in 1977 to eight in 1978. The number of orders has continued to rise slowly.

The average penalty assessment, expressed in absolute terms, did rise from 1977 to 1978. However, this increase was attributable wholly to the effect of a large ongoing monthly penalty imposed on Cominco in late 1977.

During 1977, nine penalties were imposed. The smallest was .5 percent of the normal annual assessment, and the largest was 15 percent. The median value was 10 percent. Six of the nine penalties were 10 percent or more.

During 1978, eight new penalty assessments were imposed for industrial hygiene offences. The smallest was .01 percent and the largest was 10 percent. The median value was 5 percent. Only two of the eight penalty assessments exceeded five percent.

Thus, in 1978, a trend toward less frequent and less severe use of penalty assessments was clearly evident. This trend carried into 1979. The first three issues of the board's WCB News reported no new penalty assessments for the first six months of 1979. The editors of Canadian Occupational Health and Safety News, after reviewing the relatively small number of special assessments, concluded (April 30, 1979) that these statistics "reflect relatively low attention to industrial hygiene matters."

9.8 Additional Finance Incentives: Experience Rating

Under the B.C. systems there are three plans for performance rating permitting either penalty rate increases or merit rate reductions. All three plans include basically the same elements for applying demerits or penalty assessments. However, the maximum penalty possible is only 30 percent.

Merits are permitted under the plans for superior performance. While the plans vary, the maximum reduction possible is 31 percent. This seems like a small, hence ineffective, incentive. Additional reductions under the plan are permitted if much above average performance can be achieved over a five-year period. Mr. Justice Tysoe (Tysoe, 1966, pp. 107-9) observed several shortcomings of a merit system in his 1966 report on the workmen's compensation system in British Columbia. He noted some of the disadvantages of the system:

- 1) It is a deviation from the principle on which an insurance scheme of the type of workmen's compensation is based--namely, collective responsibility.
- 2) In Plans A and B, as noted above, there is too great a lapse of time between the conduct and the reward or punishment and, hence, the sole purpose of the plan tends to be defeated. How is the receipt of a demerit charge, for example, during a period when you are having a good accident record be an incentive to continue with that record?

- 3) An employer is frequently penalized for something he cannot control. Mention has already been made of inability to control cost of an accident--at best one has some control over whether or not it occurs.
- 4) It is not really suitable for the relatively small operation.
- 5) In Plans A and B as presently constituted, and as is usual in such plans, the merits far outstrip the demerits, so that there is a considerable deficit which must be charged [against all firms].

The B.C. system is not a true experience rating system and this explains the ceiling which is placed on penalties. It is an incentive system. That the incentives themselves are rather small is clear when the total cost of injuries is considered.

Finally, as an actuarial consultant (Eckles, 1976) recently noted, the system is arbitrary and "the formulae for determining merit and demerit ratings have no theoretically sound basis."

9.9 Injuries and Fatalities

British Columbia injury statistics are probably more accurate than those in many other provinces and states. The fine for the employer can be as high as \$5,000 and the supervisor involved can face a personal fine of \$1,000 if an injury is not reported. More important is the attitude of organized labour (in a highly unionized province) toward the "walking wounded." However, while injuries must be reported, the board itself places little credence to accident rate statistics which relate accidents to number of employees or hours worked.

Table 9.3 provides a statistical summary of employment, injuries, and fatalities for British Columbia for the years 1969 to 1979. The nonagricultural employment series are estimates of person years of employment covered under the WCB Act. Estimates for the years 1972 to 1976 were made for us by Mr. Keith Mason of research department of the board. We prepared estimates for the other years based on the ratios used by Mr. Mason. The board does not prepare a record of the number of insured employees; its assessments are based on insured payroll. Since the percentage of the

Table 9.3 Statistical Summary for Occupational Injuries and Fatalities for British Columbia, 1969 to 1979

Year	Total Non Agricultural Covered Employment ^a	New Injuries Reported		Wage Loss Injuries		Fatalities Incurred	
		Number	Incidence ^b	Number	Percentage ^c	Number	Incidence ^d
1969	614,661	99,412	16.17	31,840	5.2	232	3.47
1970	621,361	96,432	15.52	30,386	4.9	213	3.43
1971	647,121	108,964	16.84	31,968	4.9	222	3.43
1972	675,000	116,991	17.33	40,881	6.1	220	3.26
1973	743,000	129,042	17.37	50,712	6.8	240	3.23
1974	804,000	145,666	18.12	56,124	7.0	242	3.01
1975	814,000	135,078	16.59	54,464	6.7	246	3.02
1976	844,000	142,088	16.84	56,260	6.7	182	2.16
1977	869,335	149,477	17.19	60,443	7.0	176	2.02
1978	893,955	161,860	18.11	66,233	7.4	208	2.33

- a. 1972 to 1976 are board estimates. Other years are based on ratios used by the board.
- b. Per 100 person years.
- c. Wage loss injuries as a percentage of all reported injuries.
- d. Fatalities per 10,000 person years of employment.

Source: Data from Statistics Canada, "Estimates of Employees by Province and Industry", Catalogue No. 72-008; and the Workers' Compensation Board of British Columbia.

labour force covered by the compensation insurance scheme has varied over-time, the use of total nonagricultural employment can introduce a bias due to injuries and fatalities being reported only for insured workers. New injuries reported, wage loss injuries, and fatalities are taken from annual reports of the board.

The injury statistics are influenced by many factors and users are cautioned accordingly. New injuries and wage loss injuries will be responsive to shifts in the composition of the work force, shifts in the structure of industry, worker attitudes toward reporting injuries, compensation board policies on what constitutes a compensable injury, appeal times, and the business cycle. Consequently, it is desirable to be cautious in drawing general conclusions about program effectiveness from the statistics and in undertaking inter-provincial comparisons.

With these caveats in mind, we hazard a few observations. The incidence of new injuries reported--as measured by new injuries per hundred employees--has not changed materially in the last five years; however, the long-term trend has been upward. Unfortunately, this apparent trend may be attributable to improved accident reporting; we do not know.

More serious injuries appear to be rising as a percentage of total injuries. However, the measure we use for this is not entirely acceptable. We have used the ratio of wage loss injuries to total injuries. To the extent that workers in recent years have been less willing to continue working with minor injuries, this ratio would be expected to rise. There is some evidence from comments of program administrators and labour representatives that this is the case.

The incidence of fatalities--measured by the number of fatalities per one hundred workers--has declined continuously over the last decade. Clearly, the British Columbia board has experienced success in reducing the most dangerous work hazards. Unfortunately, it is difficult to determine the extent to which these reductions are attributable to shifts in the composition of the work force, activities of organized labour, and actions of the board.

The board attributes recent increases in injuries and fatalities to several factors, many of which are beyond control. The executive director commented that "... we find the training received by these young employees is really not good enough. Until that is done, you will continue to have these people hurt. So the employers have got to see that to properly instruct a man means just that." He points to the changed social outlook and commitment that young people have as well. Particularly in the forestry products industry which has expanded rapidly during the 1977 to 1979 period. The younger, newer workers are "nomadic"--transient. These young people do not plan to work in the resource industries over an extended period of time. In Director Paton's view:

"Employers do not check them [employees] out too closely. They are just happy to get bodies. They put them to work without ... a good training period ... and the next thing you know they [the employees] get hurt."

Paton also argues--without evidence--that workers may be more inclined today to draw on compensation than they were in the past.

Administrators of the program seem to believe that there exists a threshold level beyond which increasing the frequency and intensity of inspections is unlikely to yield a substantial reduction in accidents. They appear to feel that current inspection levels are near that threshold--as is reflected in the following statement:

It seems to me that until you get better cooperation between management and labour, that no matter how many inspections you carry out you come to a point where you can't improve it [injury rates]."

This frustration with the limited potential foreseen with increased inspection frequencies is reflected in statements by Executive Director Paton that the "hope of the future" must lie in health and safety committees and the related requirement that "management recognize that the employee does have a legitimate voice [role to play] where health and safety issues are involved."

9.10 Industrial Health and Safety Committees

The British Columbia program has provided for a system of safety committees since the early 1920s. More than 3,000 committees are now in existence. The committees are required in high hazard industries. In the case of industries classified as "A" or "B" hazard by the board, an industrial health and safety committee is required if the work force exceeds fifty at a given site. On paper, the committees appear to have the potential for significant impact. However, they are purely advisory; most meet monthly and file their minutes with the board. It is difficult to believe that the board systematically reviews those minutes in spite of the claim that they are "checked over". Since the committees are purely advisory they cannot shut down a worksite. Additionally, in fifty years of operation the board has made no effort to objectively evaluate the effectiveness of these committees.

Currently, committees are not required by statute in British Columbia. They are referred to (S.60A(6)) generically as accident prevention committees. Their authority is determined by regulation.

The composition of committees is set out in Section 4.04(1) of the board's regulations as follows:

- (a) not fewer than four regular members, employed at the operation and experienced in the types of work carried on at the operation, and
- (b) membership chosen by and representing the workers and the employer. In no case shall the employer's representatives outnumber those of the workers, and
- (c) a chairman and secretary elected from and by the members of the committee. Where the chairman is an employer member the secretary shall be a worker member and vice versa.

The committees are directed (S.4.06) to:

determine that regular inspections of the place of employment have been carried out,
determine that accident investigations have been made as required,
recommend measures required to attain compliance with regulations and the correction of hazardous conditions,

where feasible, appoint at least one worker member and one employer member to participate in inspections and investigations, and determine that the structures, equipment, machinery, tools, methods of operation and work practices are in accordance with regulations, and consider recommendations from the work force in respect to industrial health and safety matters and recommend implementation, and hold regular meetings at least once each month for the review of:

- (i) reports of current accidents or industrial diseases, their causes and means of prevention, and
- (ii) remedial action taken or required by the reports of investigations and inspections, and
- (iii) any other matters pertinent to industrial health and safety.

Record the proceedings of the Committee in a form acceptable to the Board, and forward the minutes to the employer, who shall make copies available to those involved in the industrial health and safety program, and forward a copy to the Board. When requested, copies shall be forwarded to the organization representing the workers.

The director of inspections argues that the legislation needs to be revised to provide "representatives of workers a little more authority" if the committees are to possess the status necessary to be effective. The committees must have a "participating role in planning" in a "non-adversary environment." He suggests that the committee members representing labour should be provided with the right to negotiate and ratify special agreements on health and safety with management. This would be one way to provide the committees with greater legitimacy.

While we will compare powers of committees in British Columbia with those in Saskatchewan, clearly there are differences. In our interviews over the last year with the five senior people in the division, we found that one saw serious deficiencies in the committees, and three thought the committees to be ineffectual. Even the one outspoken defender of the committees attributes their successes primarily to unions and not to the committees themselves.

The generally negative attitude toward the committees expressed by senior officials suggests that whatever potential exists for this approach

to occupational health and safety, it is not being realized in British Columbia. One official commented that in the Saskatchewan case the government is moving toward a system of worker monitoring which British Columbia is not. To the extent that the committees have had an impact on accidents in British Columbia, senior officials seem more prepared to attribute the success to the aggressiveness of unions in the province and to instances of "enlightened management."

The attitude of the government toward worker monitoring and toward the effectiveness of the committees may account for the weakness of the committee system. If employees and worker co-chairmen perceive these attitudes, they may not afford the committees the respect they need to be effective.

9.11 Work Refusal Rights

British Columbia regulations have included provisions which permit the worker to refuse unsafe work. The working of 1978 regulations proved not to provide an effective right of work refusal, and changes were introduced in December, 1979.

Under Section 8.24 of the 1978 regulations, an employee could refuse work only if he was prepared to demonstrate objectively that it was "reasonably foreseeable" that work would "create an imminent danger" to his health or the health of any other worker. Moreover, an imminent danger was defined (S.8.24(b)) as a danger "not normal for that occupation."

Since an employee had no formal protection against employer discrimination, and faced a lengthy appeal with wage loss, and had the obligation of proving an imminent danger existed, the right of work refusal was a hallowed right for most employees. Under proposed changes in British Columbia regulations, the employee will be compelled only to demonstrate a belief that work is unsafe.

Chapter 10: THE SASKATCHEWAN PROGRAM

The occupational health and safety program introduced in Saskatchewan in 1972 has become a model for other Canadian programs. While none of the other programs has matched the Saskatchewan program in all details, its imprint is unmistakable.

The Saskatchewan program is different from traditional North American programs in its philosophy and administration. Philosophically it is differentiated from other programs in its theory of accident causation and its sociological view of the workplace. Administratively, it is differentiated by the broad powers and responsibilities that it gives to the individual worker and to organizations over which workers have a significant influence.

The program builds on recognition of three basic rights of the members of the work force: a right to have information; a right to participate; and a right to refuse unsafe work.

Primary responsibility for ensuring safe working conditions is placed on workers and managers at individual workplaces. At all workplaces employing more than ten workers, a joint management and labour safety committee is required. The joint committees are central to the program. Information dissemination, program administration and monitoring functions are performed by these committees.

The Saskatchewan program provides a practical right for the worker to refuse to work when faced by what he believes to be hazardous conditions. Traditionally workers have had the responsibility of proving working conditions unsafe and abnormal when they refused to work. In Saskatchewan the onus is shifted to management to demonstrate that work is safe. Management is presumed to possess the best information on work hazards and to be in the best position to identify alternatives.

An unregulated marketplace is assumed to be incapable of providing work hazard information. Government assumes responsibility to ensure that the employee is provided with information on job hazards in understandable form. When the employee is unlikely to be able to evaluate it himself, or if personal evaluation is uneconomical, government does the evaluation. Where necessary, the government establishes standards.

10.1 The Saskatchewan Philosophy

In order to understand the Saskatchewan approach, it is necessary first to grasp the philosophy which underpins the program. The philosophy may be gleaned from the various writings of the associated deputy minister of labour, Robert Sass¹, and preambles in the legislation. In a general sense, the approach assumes the worker to be intelligent and risk averse. He operates in a work environment in which he has very little information about health and safety hazards. Moreover, the sociology of work environment, typically, deprives him of effective choice. Even if he is superficially aware of hazards, he will be induced to ignore or discount these because of direct or indirect pressures which are operative in the work environment.

The worker is under direct and sustained pressure from management to produce more output. Maximizing output in the short-run frequently is not consistent with the protection of the worker from injury and, certainly, with the preservation of his health. In a phrase, the quickest method is not necessarily the safest or healthiest. The worker may also be under social pressure from fellow workers who are reflecting the direct managerial pressure to produce. Finally, the worker is sensitive to employment opportunities, or the lack thereof, and promotional and seniority aspects of his present job. Collectively, the effect of these work specific factors is to induce employees to work under unsafe and unhealthy conditions.

The Saskatchewan program adopts a theory of accident and industrial disease causation which places work--not man--at the center. Industrial injury and disease are attributed primarily to environment. In the case of occupational health, it is traditional to place work at the center;

however, the more common approach to accident prevention is to place the worker at the center or at fault.

The difference is essential, and has important implications for the determination of optimal prevention policy. The conventional man at the center approach assumes that since individuals are the victims of industrial accidents, they obviously were involved; they must have engaged in unsafe acts; and, therefore, must have been the causal factor. The employee is seen as entering a workplace which might be inherently safe or clearly not particularly unsafe, and then is seen as a result of his accident proneness, his carelessness, or his apathy, to become involved in an accident. The Saskatchewan work at the center concept rejects the idea that workers are inherently careless. The preponderance of accidents are believed to be related to inherently hazardous work environments. The work process may be hazardous because of the machinery or equipment, the speed at which the equipment is utilized, or the production practices which employees are directed or encouraged to follow. The Saskatchewan model does not portray the employee as the village idiot who becomes a victim of an accident because of misadventure on his part; rather, he is viewed as the victim of the hazardous nature of a particular work process or environment.

The work at the center model accepts the idea that an employee's susceptibility to being injured may even vary with time. It recognizes the importance of stress and fatigue which are related to the work process.

The difference in approach reflected by the man at the center and work at the center models is fundamental. Under the Saskatchewan approach, management controls the work center and therefore is seen as clearly responsible for ensuring the safety of the workplace. Labour is presumed to be intelligent and risk averse and, therefore, is given: first, a collective role through committees in identifying hazardous conditions and ensuring that corrective actions are taken; and second, an individual role through the right of refusal to participate in work processes which appear to be hazardous. Management is required to provide

employees and committees with information necessary to make rational decisions and to respond to committee concerns.

Another important, and logical, part of the Saskatchewan philosophy is the belief that the direct role of government over time should be minimal. The government should serve as a referee and as a policeman. It should have a supportive and not a primary role. The government, through its safety and hygiene officers, should provide information, bargain with employers, set some standards, and act as referee between management and the employees when conflicts occur. In time, with many committees, the program envisions the actual role of government becoming merely supportive of committees, particularly in the safety area. The committees are to be the instruments of regulation.

10.2 Health and Safety Committees

In Saskatchewan, occupational health and safety committees are required at all workplaces with ten or more workers. Each committee is composed of between two and twelve members. At least half of the members must be worker representatives. The committee responsibilities include:

- 1) participation in the identification and control of health and safety hazards within the place of employment;
- 2) co-operation with the occupational health service if such a service has been established for the place of employment;
- 3) the establishment and promotion of health and safety programs for the education and information of the workers;
- 4) the maintenance of records with respect to its duties under this section;
- 5) the investigation of any matter referred to in subsection (1) of section 26;
- 6) the receipt, consideration and disposition of matters respecting the health and safety of the workers.²

Worker representatives are protected against discriminatory actions by management. If any discriminatory action is taken against a worker who has served or is serving as a member of a committee, the Act (S.25.2) provides that there is to be:

a presumption in favour of the worker that the discriminatory action was taken against him by reason of his participation in or association with any functions of the occupational health committee, and the onus shall be upon the employer to establish that the worker was discriminated against for good and sufficient other reason. (emphasis added)

The Saskatchewan committee program has been in place since 1973. The system is different from the program found in British Columbia and examined previously because of the formality of the structure of committees; the provision of effective protection against discrimination; the provision for full compensation for labour representatives while on committee business; the requirement that a committee representative accompany an inspector on inspections; the recognized right of the committee to see copies of all correspondence from the labour department involving health and safety in the plant; the right of labour representatives to receive responses from management when management's attention is drawn to conditions which are believed to present work hazards; the recognition that the committee's labour representatives will serve monitoring functions; and the role of the committees as arbiters in cases of refusal to work by individual employees where they believe hazards are present.

In addition, government officials responsible for occupational health and safety insist that all business be conducted through the committees. The inspector deals with management through the committees, at least in the first instance. All agreements between management and the labour department occur subject to committee approval. Administration is important. The administrative procedure, and not the law, accounts for government working through the committees. The committees achieve increased legitimacy and enlarged authority, as a result of administrative practices, and of committees in the arbitration process, and the protections provided to labour members.

Unlike other programs in Canada, all correspondence and directives involving occupational health and safety must be made available to the worksite committee with the exception of personal correspondence involving particular employees.

In November, 1979, there were 3,000 committees with membership in excess of 13,000. The division estimates that over 25,000 people have been involved with these committees since the inception of the program in 1973. Over 7,000 individuals have participated in workshops, seminars and special courses for committee members. The committees currently perform many monitoring functions previously performed by accident prevention (AP) and hygiene officers. While the committees exist at only a minority of work sites--3,000 of 28,000 work sites--they are found at work sites accounting for over 90 percent of the work force.

10.3 The Right of Work Refusal

The second important element of the Saskatchewan program is the right of work refusal. The individual worker may refuse to do any act at work which he has reasonable grounds to believe is unusually dangerous to his health or safety or the health and safety of any other person until sufficient steps have been taken to satisfy him otherwise, or until the occupational health committee or occupational health officer has investigated the matter and advised him otherwise.

The act requires either temporary assignment of the worker to alternative work or time off at no loss in normal pay until a job refusal incident is resolved.

Employers are prohibited from taking discriminatory action against any worker because he has exercised the right. If any discriminatory action is taken against a worker who has exercised the right, there is a presumption in favour of the worker that the discriminatory action was taken against him for that reason, and the onus is upon the employer to establish that the worker was discriminated against for good and sufficient other reason.

Discriminatory action is broadly defined in the act (S.26.2) to include:

an action by an employer which adversely affects a worker with respect to any terms or conditions of employment or opportunity for promotion, and includes the action of dismissal, layoff, suspension, demotion, transfer of job or location, reduction in wages, change in hours of work or reprimand;³

The test in the act is belief that a hazard exists. An employee need only believe that the work presents a hazard. Should he choose to exercise this right, the initial effect would be that the foreman would attempt to allay his concern, eliminate the hazard, or find another employee willing to perform the job. If the foreman fails, then the committee is brought in to referee the dispute. The committee members must be unanimous if they are to overrule the worker. If the committee does not overrule the worker, then an occupational health officer may be called in, and his decision is final. Should he overrule the worker, any further refusal to work by the worker justifies disciplinary measures by management. In the first five years of the program over 1,000 cases of work refusal were reported. There were few cases in which the acts of refusal to work were not resolved by management or by the safety committees. Only three required appeal to the associated deputy minister responsible for the program.

From the earliest days of the program, administrators made it clear to management and labour that conflicts should be resolved within the committees. Management and labour both were inclined to seek resolution in the committees and not by appeal to the labour department.

10.4 Administration of the Saskatchewan Program

In 1972, the administration of occupational health and safety programs was transferred from the Worker's Compensation Board to the department of labour. The division is small with fewer than fifty employees and organized to permit close participation by the associate deputy minister of labour, Robert Sass.

The inspectorate in the division is composed (1979) of twelve occupational health officers, two senior occupational health officers, four industrial hygienists, and five mines inspectors. These inspectors are responsible for approximately 28,000 work sites. Of the fourteen inspectors, twelve prior to 1972 were employed by the Workers' Compensation Board. Most of the inspectors are drawn from backgrounds in industry with many having served as safety officers; they earn \$20,000 to \$23,000 (1979) annually.

This carry over of personnel from WCB days initially created problems in administration due to what has emerged in our studies as an agreement among administrators that there is a WCB "view" of occupational health and safety. As we noted earlier, the WCB outlook is allegedly an employer-oriented view. Under the WCB, in Saskatchewan, many inspectors admit to having never interviewed a worker or labour representative. The WCB viewed itself as an insurance agency for employers. While the problem was recognized by senior administrators, they believe it has been overcome in the Saskatchewan case. They doubt that it would have been resolved if the program had remained under the compensation board.

There is no special method used to evaluate inspector performance; normal personnel evaluation techniques are used. The idea of an inspection quota, however, is specifically rejected.

The size of the provincial work force, the composition of the work force, the relatively few large employers, the full commitment of the government to the program, and the lack of criticism of the program by the official opposition suggest that an administrative approach which is workable in Saskatchewan might not be effective elsewhere.

10.5 Regulation Formulation and Administration

Saskatchewan's safety and health regulations are very similar to British Columbia's in format and in substance. The safety regulations are based on 1972 revisions. Health regulations are very general. Both the

safety and health regulations in Saskatchewan were under review during all of 1979. We obtained a copy of proposed health regulations and assume that the new regulations, which should be approved in early 1981, will incorporate the philosophy and substance of the proposed regulations.

In setting new regulations the division uses a review process similar to that of British Columbia; however, public hearings have not been held prior to the adoption of standards. Rather, drafts are circulated to relevant interest groups. An advisory Occupational Health and Safety Council is provided for in the legislation (S.9). This council reviews and approves all regulations.

The Saskatchewan regulations, like those of British Columbia, tend to be performance-oriented and sufficiently general to provide inspectors wide discretion in their enforcement. We have selected a set of what we believe are representative examples from the regulations. These should provide an understanding of the scope and tenor of the regulations as a whole. In each case the emphasis is ours.

In the case of climbing cranes (S.46.36), employers are required to meet "the manufacturers specifications and instructions." Excavations should be capable of withstanding "imposed stresses (S.14.02)." In general, employers are expected to provide and maintain an "adequate means of ventilation (S.16.00)" at work sites. However, where the transportation of workers is involved (S.30.00) the regulations only demand "some form of ventilation" and require that "some signal device or other method of communication be provided between driver and passengers." Under S.32.02, work areas must be provided with "adequate illumination." When electrical systems are installed (S.32.12) "a sufficient number of men ... [should] ... be present to do the job safely."

The Saskatchewan regulations are equally flexible in dealing with noise hazards. Section 26.00 directs that "the employer shall take appropriate measures to suppress the noise to approved levels," and if it is not "reasonably practicable to decrease the noise, or isolate the workman

from the noise, the workman shall be provided with and wear personal protective equipment."

Section 68.04(1) which also deals with noise abatement, requires that:

At every place of employment the employer shall ensure that the reasonably practicable means are employed to reduce noise levels in the environment where workers may be required to work.

However, S.68.12 provides that:

where at the time it is not reasonably practicable to reduce the noise level at the work area to lower than 85 dBa or to isolate workers from that noise the employer as an interim measure shall provide ear protection devices and shall ensure that workers wear such devices.

As is readily apparent from the preceding examples, Saskatchewan relies primarily on performance type standards. Specification standards are found in the regulations, but they are, in the main, manufacturer's suggested guides, ACGIH standards, and other association codes.

The Saskatchewan division, in setting health regulations, avoids reference to specific TLVs. Where they are used, the standards of the American Conference of Governmental Industrial Hygienists (ACGIH) usually are applied as minimum guides.

Under the regulations, employers are provided with reasonable time periods in which to comply with regulations when violations are detected. On occasion, time periods allowed have exceeded two years, though senior administrators indicate that compliance normally is expected in a briefer period.

In administering the regulations, the standards imposed on new plants sometime are more demanding than those set and enforced for existing plants. This reflects the application of a type of affordability test upon which we will elaborate shortly.

The normal route of appeal for an employer following notification of noncompliance is through the director and then on to the courts. A court appeal usually involves the department bringing a prosecution. In practice, a firm appeals to a regulation by becoming a defendant in a prosecution.

Except in the case of industrial settings presenting the most extreme health hazards, the division will not force changes which will close an industry. What constitutes an extreme hazard is an open question. In the case of blue asbestos, crocidolite, the government has flatly prohibited its use. In the case of Athabasca Foundry Ltd. in Saskatoon, the division closed the business in early 1979 because of the failure of that company to develop systems to reduce dust, smoke and fumes to safe levels and to provide adequate temperature control.

Owners of the foundry which employed thirty members of the Millwrights Machine Erector Maintenance union engaged in protracted negotiations with the division, but ultimately failed to develop adequate systems. In closing the foundry, Mr. Sass, division director, said "all we are concerned about is that the place is cleaned up." And, "time is not the measure. It would be an important factor, but the measure is result --that the conditions be made satisfactory."

This case highlights several aspects of program administration. First, it is one of only a handful of actual closures. Second, the closure followed months of negotiation. Third, the problem was of long-standing; union workers, in October 1977, had walked off the job-site to protest poor ventilation. Time was not the issue. And, fourth, a performance approach was adopted. In effect, the company was told to eliminate the health hazards by whatever means were most cost-effective.

The Saskatchewan regulations are the only ones in Canada which specifically require the equivalent of an economic impact analysis. This is explicit in the new health regulations and implicit in the old safety regulations. Since formal impact statements have not been required, it

must be acknowledged that what occurs in practice is the equivalent of OSHA's test of whether the industry can afford the regulation (Whiting, 1979).

The requirement of what is in effect an economic impact analysis pervades the new health regulations. It takes the form of repeated use of the term "reasonably practicable." While this term appears in some Alberta regulations, it is not defined. In the Sakatchewan case the term means:

practicable unless the person on whom the duty is placed can show that there is a gross disproportion between the benefit of the requirement and the cost in time and trouble and money of the measures to secure the requirement. (emphasis added)

Note the onus is placed on the employer who should have easiest and most economic access to the necessary information to prove the regulation is not reasonably practicable.

The regulations do not provide guidance for determining what constitutes a gross disproportion and are silent on the process by which such a calculation is to be made. In effect, the department of labour will make this determination, subject to appeal by the courts. Our discussions with senior officials in the department left no doubt that this was to be viewed as an economic impact test. This formalizes what seems to be the practice in B.C.; however, given the political economy of Saskatchewan and the relatively low level of industrialization, the employment implications of health and safety decisions are probably less significant than in the other provinces.

The pervasiveness of the test in the proposed regulations is impressive and demands at least brief review. A reasonably practicable test is proposed in the cases of:

provisions and maintenance of plant systems of work that are safe, S.16.00(1)(a);
arrangements and absences of risks to health in connection with the use, of handling, and transport of articles, S.16.00(1)(b);
the use of personal protective equipment, S.16.22(2);
the cleanliness of workspaces, S.26.00(1);

- the prevention of overcrowding of workspaces, S.28.00;
- the ventilation of workspaces, S.32.00;
- the quality of drinking water at worksites, S.46.00;
- the provisions of first aid supplies and services, S.52.00(1);
- the provision of suitable mechanical equipment for handling heavy loads, S.54.00;
- the provision of such information, instruction, training and supervision as is necessary to ensure the health and safety at work of workers, S.16.00(1)(c);
- the maintenance of means of access to and egress from them that are safe and without such risks, S.16.00(1)(d);
- the provisions and maintenance of a working environment that is safe, without risk to health, and adequate as regards facilities for employees welfare at work, S.16.00(1)(e).

The test requirement appears at many other places in the new regulations. Perhaps the point to be pondered is the administrative and legal framework in which such a testing, if it is to take place, should occur. If economic analysis is to be done, if such a test is to be applied, it would seem desirable that the process be as open as possible. In the absence of an open process, the OSHA affordability approach may be preferable. Our discussions with the Saskatchewan administrators of the program suggest that this is just the fashion in which they have been administering regulations to date.

Regulators are concerned that they not allow themselves to become locked into standards, or regulations, which are less than those which are reasonably practicable. The measure of practicality must be allowed to change with time, and the test should be tailored to individual firms. This concern is particularly apparent in the case of TLVs which we examine below.

The division's aversion to published TLVs on hazardous chemical substances is reflected in a philosophy articulated by Dr. L.E. Euinton, the former Chief Occupational Medical Officer, in a 1975 memo. Euinton argued that TLVs should only be viewed as allowable or acceptable; they should only be considered as guides toward good industrial hygiene and not as legal requirements. The division does not have a published set of TLVs for substances which present health hazards. Safe levels are not defined. However, in practice, ACGIH maximum safe exposure levels are sought and enforced.

10.6 The Enforcement Procedure

In the Saskatchewan program, the role of the committees is preeminent. The roles of both inspectors and occupational health and safety experts are down-played consciously, with the intention of maintaining the pre-eminency of the committee role.

The minimization of the role of occupational health officers is understandable, given the view of program designers that the ability to identify problems possessed by the officers is likely to be limited, and the view that in the long-run labour is best capable of monitoring the industrial process itself, given proper institutional backing.

The tendency to down-play the role of medical specialists has led, during the life of the program, to resignations by medical personnel. The rationale for down-playing that role is a concern that medical specialists tend to be curative as opposed to preventative in their approach and tend to criticize workers and fail to appreciate the importance of worker involvement. These actions and attitudes are unacceptable in a program built on the proposition that long-run effectiveness depends on worker involvement. The Saskatchewan system sees the problem of occupational health and safety as more a problem in industrial relations than in medical technology.

While minimizing the roles of medical staff and the inspectorate, the program still provides for an important policing role. The procedure followed in Saskatchewan involves the occupational health officer arriving at a worksite and contacting the committee, labour and management representatives who will accompany him on his inspection. If a notice of contravention is issued involving an imminent danger, the officer will return the same day to ensure that remedial action has been taken. Otherwise, the employer has seven days to remedy the problem and provide a progress report to the committee.

If corrective action is not taken, then the decision to prosecute must be made by the department of labour. Unlike most provinces, the

decision to prosecute is made by the department of labour in consultation with the attorney general's office. Once a decision to prosecute has been made, the control of the prosecution passes to the attorney general's office.

Problems have arisen as a result of the very limited experience a typical crown attorney will have had with these types of cases. A typical prosecutor will have only one of these cases in five years, and the fee likely will be under \$700. He has little economic incentive to apply his talents fully in these cases.

Another problem has arisen with the judiciary who are accustomed to cases involving the criminal law where there typically is a victim. A properly administered occupational health and safety program should be preventative, and the occasions on which an actual victim is presented in court should be in the minority. Program administrators see the judiciary as reluctant to impose significant fines when the defendant can simply be ordered to comply.

We have obtained detailed data on prosecutions from the files of the Saskatchewan government and briefly comment on them. During the period March 1973 to December 1977, there were forty-nine completed prosecutions, which resulted in thirty-five convictions for forty-seven offences. The average fine per offence during the 1973-1976 period was \$186, but this includes two \$1,000 fines and one \$750 fine. In 1977, there were six convictions on six offences which resulted in an average fine per offence of \$210 plus court costs. Prior to 1977, court costs were rarely charged to defendants.

During 1978, only one successful prosecution was undertaken; it resulted in a \$500 fine plus court costs. Four cases were dismissed, one was withdrawn. Five of the cases involved construction companies. The sixth case involved Intercontinental Packers. Charges that the firm had taken discriminatory action against a worker co-chairman were dismissed.

Two cases were brought during the first three months of 1979. Each resulted in a conviction and a fine (\$100 plus costs and \$50 plus costs).

Clearly, potential fines are not a deterrent. However, the probability an employer will be prosecuted for noncompliance is almost 100 per cent.

Saskatchewan legislation provides for special penalty assessments and merit rebates under the workers' compensation scheme. However, they have not been used in recent years. Given the size of most employers, special assessments are not considered actuarially sound.

10.7 Program Orientation: Stress and Work Environment

We have previously emphasized the important roles of the worker and committees in the program. This worker orientation is further highlighted by a recent emphasis by division officials on the cumulative debilitating effects of fatigue and stress which were work-related. It is clear from recent decisions, and from working papers of the division, that its attention will be increasingly in these directions.

There are currently no legal standards regarding stresses in the workplace. This, in part, is attributable to the assumed subjective nature of stress as well as the multitude of ways in which stress is revealed. These social diseases related to stress on the job include fatigue, malaise, headaches, heart disease, ulcers, and depression. Indirect consequences include family breakdown, alcoholism and drug abuse. To date, except in Denmark and Sweden (Gustavsen, 1978), public policy-makers have been reluctant to attempt to regulate in this area. The economic and social costs of job related stress may exceed the costs of many other types of work-related health hazards.

Unfortunately, while some high--but undefined--percentage of stress may be work-related, its consequences are likely to show up last at the workplace (Sass, 1979, pp. 6-8). In effect, the worker will protect his job. The breakdowns--the manifestations of stress--are revealed first off

the job in the private lives of workers. Only later are they reflected on the job. Ironically, the failure of the worker on the job is likely to be attributed to his personal, nonjob related failings.

These kinds of concerns are cogently expressed in a recent working paper (Sass, 1979) issued by the division. In that paper, the author approvingly reproduces section 12 of the new Norwegian Working Environment Act which deals with psychosocial factors in working conditions which are likely to affect worker physical and mental health. Section 12 of that Act reads as follows:

1. General Requirements

Production methods, work organization, working hours (e.g., shift work schedules) and payment systems shall be so designed as to avoid harmful physiological or psychological effects on employees, including any negative influence on the alertness necessary for reasons of safety.

Employees shall be afforded opportunities for personal development and the maintenance and development of their skill.

2. Job design

Full account shall be taken of the need for employee self-determination and maintenance of skills in the planning of work and design of jobs.

Monotonous, repetitive work and machine or assembly line work that does not permit alteration of place shall be avoided.

Jobs shall be so designed as to allow some possibility for variation for contact with other workers, for interdependence between their constituent elements, and for information and feedback to the employees concerning production requirements and performance.

3. Planning and control systems

Employees or their representatives shall be kept informed about planning and control systems, including any changes in such systems. They shall be given the necessary training to understand the systems adopted and shall have the right to influence their design.

4. Dangerous work

(a) Piece-rate and similar payment systems shall not be used where they may be conducive to non-observance of safety standards.

Thus there is evidence that the Saskatchewan program may be moving in more new directions as far as Canadian programs are concerned. In fact, the current regulations and their administration to date reflect a concern about fatigue and stress as industrial health problems.

The concern for worker comfort on the job and worker physical fatigue is demonstrated in sections 48.00 and 38.02 of Saskatchewan regulations which deal with the right of an employee to be permitted to perform a job sitting if he can perform the work as efficiently sitting as standing.

The section only applies when the work can properly be done sitting. Productivity is not challenged; the only challenge is to make work as least damaging to the employee as possible, subject to cost considerations. When work must be done standing to achieve highest productivity, then it will be done standing.

The Saskatchewan legislation permits the department to modify this absolute productivity test should it see fit, since the section treating workers' health is very general. In fact, the legislation is significantly different from that of the other provinces in the emphasis it places on the psychological health of employees. The statute defines occupational health to mean:

The promotion and maintenance of the highest degree of physical, mental and social well-being of the workers.

and

The placing and maintenance of workers in occupational environments which are adapted to their individual physiological and psychological conditions. (Ch. 53, S. 2, Para. k.) (emphasis added).

Thus, as recent cases demonstrate, in Saskatchewan occupational stress will be treated as an occupational health hazard.⁴

10.8 Committee Experience 1973-1977

Since the inception of the committee system in Saskatchewan, the minutes of the committees have been carefully monitored. This information from the minutes has been coded and computerized to permit appraisal of the activities and effectiveness of the committees. Computer printouts covering 17,682 committee meetings from 1973 to the end of 1977 provide the data shown in Tables 10.5 to 10.14. In general, eighty-two percent of those meetings considered specific health or safety concerns. These 14,600 meetings dealt with 59,000 specific problems and resulted in agreement upon, and partial or whole implementation of 55,000 solutions.

Old concerns--those not settled when first considered by the committees and which appeared on subsequent agendas--accounted for 21,000 discussions. Of 80,000 old and new concerns considered by the committees;

- 1) 3,000 involved hazardous materials;
- 2) 11,400 involved environmental conditions or physical agents--lighting, heat or cold, noise, sanitation, crowding, ventilation, etc.
- 3) 6,700 involved work processes or procedures--adequacy of training and supervision, working alone, heavy lifting, etc.
- 4) 51,000, or 64 percent, involved physical safety hazards. Of these, 11,000 involved unsafe equipment; 8,000 involved protective guards; 5,300 involved unsafe footing; and 3,600 involved protective equipment.

These data suggest that the committees have not concerned themselves with frivolous issues, and that most concerns have been acted upon. We have made no effort to judge the adequacy of the actions.

An important function of the committees is arbitration or work refusal actions. We have not examined these actions in depth; however, the

Table 10.5 Occupational Health Committees - Meetings Summary

	1972-74	1975	1976	1977	Total
Number of occupational health committees		2,417		2,552	
Number of meetings	8,048	3,087	3,248	3,299	17,682
Number of no concerns	1,880	491	384	320	3,075
Number of new concerns	18,621	12,587	12,847	15,317	59,372
Number of old concerns	5,823	4,271	5,157	5,568	20,819

Table 10.6 Occupational Health Committees - Origin of Concern

	1972-74	1975	1976	1977	Total
O.H.C. non-specific	21,755	10,388	12,053	14,068	58,264
O.H.C. management	847	1,276	1,214	1,363	4,700
O.H.C. employee	1,225	3,416	2,509	3,197	10,347
Individual worker	179	29	29	9	246
Group of workers	131	31	30	1	193
Union	15	5	14	5	39
Division	31	180	117	96	424
Plant nurse or safety supervisor	96	1,347	1,841	2,014	5,298
Total	24,279	16,672	17,807	20,753	79,511

Table 10.7 Initial Actions by Committee

	1972-74	1975	1976	1977	Total
On shop floor	1,329	248	41	35	1,653
At O.H.C. level	18,010	14,703	16,487	19,506	68,706
Referred to higher management	875	382	75	66	1,398
Referred to higher committee level	101	25	16	16	158
Referred to Occupational Health & Safety Branch	83	82	64	100	329
No action	827	261	105	44	1,237
O.H.C. to investigate further	3,031	929	1,018	1,018	5,996
Total	24,256	16,630	17,806	20,785	79,477

Table 10.8 Solutions to Problems Raised by Committees

	1972-74	1975	1976	1977	Total
Better maintenance	4,427	3,767	3,623	5,269	17,086
Renovating or expanding plant	1,252	282	180	153	1,867
Modified or new equipment	7,105	3,507	4,304	3,748	18,664
New protective equipment	820	420	379	569	2,188
Change in work procedure	1,356	446	610	507	2,919
Better safety training	1,852	2,690	2,515	3,350	10,407
Original solution unsatisfactory, new attempt	522	762	60	23	1,367
Total	17,334	11,874	11,671	13,619	54,498

Table 10.9 Reason No Solution Was Implemented

	1972-74	1975	1976	1977	Total
Lack of funds	54	15	9	7	85
Beyond authority of management	224	4	1	5	234
Delay - back ordered	1,784	2,973	3,083	3,461	11,301
Solution not agreed on	656	37	54	38	785
Committee discussing further	3,242	1,680	2,918	3,656	11,496
Total	5,970	4,699	6,065	7,167	23,901

Table 10.10 Problems: Hazardous Materials

	1972-74	1975	1976	1977	Total
Gases, fumes or vapours not listed	556	270	328	369	1,523
Dusts not specifically listed	206	183	196	221	806
Chemicals not specifically listed	49	67	59	62	237
Mercury, lead cadmium - other toxic metals	59	19	28	30	136
Cleaning solutions	24	26	5	16	71
Chlorine	8	12	23	16	59
Hydrochloric Acid	24	2	3	17	46
Asbestos	20	52	35	47	154
Explosives	4	15	19	13	51
Total	950	646	696	791	3,083

Table 10.11 Problems: Physical Agents

	1972-74	1975	1976	1977	Total
Noise	449	209	224	222	1,104
Vibration	13	6	11	14	44
Extreme cold	131	92	106	97	462
Extreme heat	180	109	129	142	560
Excessive drafts	87	65	61	65	278
Inadequate ventilation	1,116	509	483	604	2,712
Lighting	777	395	410	511	2,093
Radiation	20	24	22	32	98
Stressful or cramped working positions	77	101	123	119	420
Overcrowding	122	25	21	29	197
Sanitation	727	327	345	383	1,782
Excess moisture	167	175	218	259	819
Visability	1		143	182	326
Total	3,867	2,037	2,294	2,659	10,895

Table 10.12 Work Processes and Procedures Raised as Problems

	1972-74	1975	1976	1977	Total
Repetitive work	7	10	1	2	20
Heavy lifting	254	146	106	177	683
Piece work	3	1	2	10	16
Insufficient staff	38	25	20	26	109
Speed of work	3	15		3	21
Work time (shift work, long hours, etc.)	23	2	5	3	33
Working alone	115	106	142	116	479
Lack of adequate safety training & supervision	327	212	343	372	1,254
Unsafe procedure (worker endangering self)	1,034	908	909	1,086	3,937
Total	1,804	1,425	1,528	1,795	6,552

Table 10.13 Safety Hazards Raised as Problems

	1972-74	1975	1976	1977	Total
Boiler and pressure vessels	93	5	7	37	142
Electrical	490	386	433	499	1,808
Elevator	56	39	32	31	158
Fire (actual fire only)	86	27	21	29	163
Gas	23	34	17	41	115
Traffic patterns	501	122	145	147	915
Falling objects	166	327	267	295	1,055
Personal protective equipment	1,219	574	873	1,011	3,677
Unsafe equipment	4,186	2,424	2,184	2,183	10,977
Protective guards	1,825	1,496	1,999	2,801	8,121
Housekeeping	1,302	722	868	1,249	4,141
Unsafe footing	2,081	977	1,072	1,184	5,314
First-aid equipment inadequate	517	236	260	353	1,366
Unsafe access or egress	742	550	679	630	2,601
Storage unsafe	538	430	444	438	1,850
Lack of needed safety signs	753	471	652	743	2,619
Employee caused health and safety hazard	442	363	30	36	871
Excavation and trenching	303	9	22	13	347
Fire safety	936	831	848	1,085	3,700
Structural defects			211	274	485
Total	16,259	10,023	11,064	13,079	50,425

Table 10.14 Specific Requests to Regulators by Committees

	1972-74	1975	1976	1977	Total
For O.H.O. inspection	33	14	14	12	73
For hygiene survey	22	44	20	44	130
For medical consultation	9	1	3	7	20
For general information	37	25	17	16	95
For technical information	23	6	4	6	39
For technical safety inspection	47	10	3	4	64
Total	171	100	61	89	421

nature of the work refusal process is illustrated by the work refusal action of thirty-eight employees of the revenue department of the Saskatchewan Government in February 1979. The employees worked in a basement area one level below an enclosed parking garage in the T.C. Douglas Building in Regina. Most of them operated printing, blueprinting, and other duplicating equipment. One set of fans drew fresh outside air into the parking garage, and another set of fans in the garage was designed to purify air before channelling it into ventilation ducts for the basement level. The workers experienced fatigue, sore throats and other ailments.

A work refusal action led ultimately to the issuance of a notice of contravention by the labour department against the revenue department.

This notice ordered the revenue department to take formal action to attend to the concerns expressed by employees. A medical consultant employed by the labour department had concluded that the complaints of the workers were entirely justified. All of the 19 individuals he saw had symptoms which he was prepared to attribute to the breathing atmosphere in the sub-basement under existing conditions. Subsequent investigation never succeeded in isolating the exact cause of the problems. The conclusion reached was that the symptoms were caused by a combination of environmental factors in the workplace.

10.9 Conclusions on the Saskatchewan Program

The Saskatchewan model, in part, reflects a peculiar approach to the health problem. The program in the long run should be less vulnerable in most basic ways to alterations in financing or in change of philosophy of the administrators. As OSHA in the U.S. (MacAvoy, 1977) has demonstrated, any health program's potential effectiveness can be undermined by the failure by government to provide adequate funding. Additionally, the philosophy of administrators and the quality of the inspectorate can undermine program effectiveness.

In the Saskatchewan case, the system reduces, but does not eliminate, the vulnerability of the program to these threats. A new government could

destroy the effectiveness of the program without altering its basic structure. The committees gain legitimacy in large measure because program administrators want them to be the instrument through which decisions are made. Management and labour know that labour department administrators want problems solved in committees. They also gain stature as a result of their role in arbitrating work refusals. A change in attitude by administrators toward the problem resolution role of committees, or an alteration of the arbitration role, might significantly undermine the stature of the committees. Of course, many other changes are possible which could reduce the influence of committees to that experienced in British Columbia. In that latter case, we concluded that the committees are influential only where unions are present.

While a future government can change the program itself, the program will--by then--have evolved in such a fashion as to involve a minimum of government direct regulation. More importantly, labour force members in industries with hazardous work processes will have come to expect to participate actively through committees in resolving safety and health programs related to the work process and insist on the continuance of that participation. It seems unlikely that once a program like Saskatchewan's has been in force for an extended period that it would be possible to return to a more traditional system without bitter resistance and long-term labour relations effects which management would find objectionable.

The Saskatchewan approach, its adherents acknowledge, may not work as effectively in the health area as in the safety area. It is interesting that critics (Nichols and Zeckhauser, 1977) of OSHA have suggested that its administrative approach is weakest in the safety area. It is possible the two types of programs may complement each other.

An interesting aspect of the Saskatchewan program is that even if the theory of accident causation which has been adopted is invalid, the program may be effective in preventing or reducing accidents. The increased sensitivity at workplaces by employees and their representatives on the committees may lead to reduced accidents through reduction in apathy or carelessness. The interest which labour members on the committees have in

the success of the program may make them more sensitive to hazards. This sensitivity may also provide worker pressure on co-workers to use personal protective equipment. The failure of labour to use personal protective equipment was pointed to frequently in our interviews as supporting evidence for the man at the centre theory of accident causation.

Thus, it is possible that the Saskatchewan program can work as the most effective approach even if the accident causation theory upon which it is predicated is incorrect. We suspect that this, in large measure, explains the willingness of other provinces such as Quebec, Manitoba, New Brunswick and Ontario, as well as the federal government, to adopt modified committee programs. Except for Quebec, these governments have not been willing to adopt the information, work refusal and committee procedural provisions which are essential parts of the Saskatchewan model.

Three aspects of the operation of the Saskatchewan program to date provide its critics some apprehension about its efficacy in the long run. These aspects are costs, effectiveness to date, and committee life-cycles.

No effort has been made to measure the cost of the program. Critiques have suggested that the time required for committee activities and worker training may exceed benefits. We question the validity of this argument. Most major corporate and government employers outside Saskatchewan have some type of safety committee system. While Saskatchewan formalizes the arrangements, the increased administrative costs do not seem consequential. The size of the training staff in the labour department is small. The committee members assume many of the functions which professional educators must otherwise assume.

There is little chance that the committees can substitute for industrial hygienists in performing all the technical functions of industrial disease prevention. But, the committees' role in monitoring, and the good sense of workers who are increasingly sensitive to health hazards--in part due to the educational roles of committees--should not be underestimated.

The evidence to date on the effectiveness of the committee approach to industrial accident prevention is inconclusive. Canadian provincial accident statistics are widely recognized as unreliable and comparable only at great risk of error. Given those risks, one recent study (Reschenthaler, 1979, Ch. 8) suggests that there is no evidence that the Saskatchewan program has proven itself superior in preventing industrial injuries to some other Canadian programs which are different in their approaches. This is not to say that the program may not be more efficient than the others. We have not explored that question empirically.

Data in Table 10.15 permit a limited evaluation of the program. Table 10.15 provides information on nonagricultural employment, major disability claims, reported accidents, and fatalities in Saskatchewan for the years 1968 to 1978. Interpretation of the statistics is complicated by changes in the composition of the work force over time, changes in claims policies, and allegations by current program administrators that prior to 1973 many injuries were not reported.

Most nonagricultural employees in Saskatchewan are covered by workmen's compensation. Therefore, the nonagricultural employment statistics for the province should be a reasonable base upon which to build incidence measures. Reported accident statistics are probably accurate for 1974 and later years. The years 1970 and 1971 should be viewed as exceptional given the very depressed state of the Saskatchewan economy.

The trend of statistics on injury incidence--accidents per one hundred nonagricultural employees--has been downward over the past three years, but over the 1973-1978 period in which the program has been in place, injury incidence has not declined. We note that the frequencies are less than in British Columbia, but comparisons are hazardous since the industrial structures of the provinces are so very different. In general, there is no apparent trend toward reduced accident incidence. To the extent that employees in the last three or four years have begun to report all injuries, the frequency rates during the very recent period is biased upward in comparison to earlier periods. The shift in employment toward higher hazard resource industries will also cause frequency rates to rise.

Table 10.15 Statistical Summary for Occupational Injuries and Fatalities for Saskatchewan, 1967 to 1978

Year	Total Non Agricultural Employment (000's)	Reported Accidents		Major Permanent Disability Claims Settled		Fatalities	
		Number	Incidence ^a	Number ^b	Percent ^c	Number	Incidence ^d
1967	193.3	29,759	15.4	--	--	66	3.4
1968	201.7	28,596	14.2	--	--	62	3.1
1969	200.0	27,399	13.7	--	--	47	2.4
1970	191.9	24,946	13.0	--	--	36	1.9
1971	195.8	26,034	13.3	--	--	37	1.9
1972	204.5	26,775	13.1	142	35.3	54	2.6
1973	210.1	29,054	13.8	137	49.3	49	2.3
1974	219.1	31,513	14.4	65	37.4	65	3.0
1975	239.3	33,039	13.8	89	24.1	57	2.4
1976	245.2	37,062	15.1	109	20.6	66	2.7
1977	251.5	35,997	14.3	113	17.2	66	2.6
1978	256.0	36,481	14.2	158	22.1	61	2.1

- a. The incidence measure for reported accidents is the number of accidents per one hundred non agricultural employees.
- b. Major disability claims settled are those involving 20 percent more permanent disability.
- c. Major disability claims as a percentage of all permanent disability claims settled.
- d. The incidence measure for fatalities is the number of fatalities per ten thousand non agricultural employees.

Source: Data from Statistics Canada, "Estimates of Employees by Province and Industry", Catalogue No. 72-008; and from various issues of the Annual Report of the Workers' Compensation Board of Saskatchewan.

Both of these factors have had mitigating effects on the injury incidence measure.

The statistics on major disability claims are confusing. We have defined major disability claims as those involving more than 20 percent permanent disability. In comparison to 1972 and 1973, which reflect the results of the earlier program, the statistics for 1975 through 1978 show a marked reduction in the incidence of serious injuries. However, particular care should be exercised in interpreting these statistics for at least two reasons. During 1973, the Workers' Compensation Board Act was changed to eliminate a pre-existing condition test. Prior to 1973, many injured or sick workers were denied benefits because their conditions were partly attributed to pre-existing conditions. After the 1973 legislative revisions, the Board was relieved of the need to narrowly distinguish between the effects of pre-existing conditions and of work injuries. Moreover, board policy was changed to permit permanent disability compensation for many industrial diseases not previously compensated. Allowance for disability related to the respiratory effects of grain dust exposure, cancer caused by uranium industry exposures, and heart attacks attributed to work-related stress were the most important of these policy changes.

The effect of the legislative and policy changes was to cause the severe permanent claims ratios to rise significantly in 1973 as the Board worked its way through a back-log of cases. These program changes render difficult meaningful comparisons of statistics on serious injuries before and after the introduction of the current program. To the extent that a trend is discernable,, it is a trend toward a lower incidence of serious injuries.

Finally, the incidence of fatalities--number of fatalities per ten thousand employees--has fallen since 1974. The statistics reported in Table 10-15 provide grounds for guarded optimism about the program. The trends for all three incidence measures are all favourable. However, the absence of marked improvement in injury and fatality frequencies justifies concern about the long-run effectiveness of the program.

There are other grounds for concern in the long-term. Will the committees become passive with time? In the long-run, even with powers different from those possessed by committees in British Columbia, will the distinctions in practice blur? Some committees will be effective, but will they be effective only because the employer wants them to be, or because a strong union is present?

It is also clear that the Saskatchewan government has some concern about whether the committee is adequate to the task. A process of program review was underway in the province throughout 1979.

Chapter 11: THE ONTARIO PROGRAM

The Ontario program was selected for discussion in this study for several reasons. First, the recent passage of the Occupational Health and Safety Act of 1978 (Bill 70) represents a unique opportunity to evaluate the process by which health and safety legislation is enacted in Ontario. Among the more important aspects of this Act are provisions which

- 1) require the establishment of Joint Health and Safety Committees;
- 2) provide the legislative basis for the creation of the Advisory Council on Occupational Health and Occupational Safety;
- 3) specify the general duties of the employer, supervisors and employees;
- 4) extend the right to refuse hazardous work to employees;
- 5) pertain to the use of toxic substances in the work place;
- 6) enable the Lieutenant Governor in Council to promulgate regulations regarding Occupational Health and Safety;
- 7) enumerate the powers of the inspectorate; and
- 8) specify penalties which might be imposed on those who contravene or fail to comply with the Act.

As will be described in more detail later, the Act represents an attempt to promulgate comprehensive health and safety legislation that addresses all aspects of the regulatory and enforcement process. The second major reason for examining the Ontario program involves the recent consolidation of the responsibility for administering the occupational health and safety program in the Ministry of Labour. As will be seen later, the primary objective of the consolidation was to coordinate the efforts of the inspectorate and to improve the use of limited supply of technically qualified manpower. The final reason for including Ontario as a case study involves the role played by the Workmen's Compensation Board in the areas of prevention, rehabilitation and compensation.

11.1 The Passage of the Occupational Health and Safety Act

In recent years the regulatory framework in Ontario has been the subject of increased scrutiny and revision. As mentioned in Chapter 7,

the crisis in the mining industry as well as inadequacies in the regulatory and enforcement process resulted in the formation of the Ham Commission in 1974. Many of the recommendations advanced by the Commission provided the conceptual basis for a significant portion of the provisions contained in the Occupational Health and Safety Act that was enacted in October 1979. In describing the enactment of this Act, the following discussion relies on "An Assessment of Government Decision-Making Processes in the Field of Occupational Health and Safety" which is a forthcoming study prepared by Hushion, Ogilvie Associates of Toronto.

The process by which Bill 70 and regulations concerning occupational health and safety were enacted was characterized by

- 1) The formal provision for both the notice of intent to change regulations pertaining to designated substances as well as a sixty-day period during which interested parties were permitted to comment on proposed regulations concerning designated substances;
- 2) The use of the Standing Committee on Resources Development of the Legislature to conduct public hearings concerning revisions to the Act and its regulations;
- 3) The tabling of draft regulations subordinate to Bill 70 at the time Bill 70 was reviewed by the Standing Committee;
- 4) The use of public hearings throughout the province to review the basic philosophy concerning the statutory framework of controlling exposure to occupational health and safety hazards;
- 5) Consultation with a full range of groups and associations that are formally concerned with occupational health and safety; and
- 6) A continuous dialogue between government and interested parties concerning the increased participation of labour in controlling health and safety hazards present in the workplace.

These characteristics imply that a concerted effort was devoted to expanding the extent to which interested parties participated in developing the legislative and regulatory frame of reference.

Presented in Figure 11.1 is a summary of the sequence of events that occurred between the publication of the report of the Ham Commission in 1976 and the enactment of Bill 70. As seen in this figure, an interim Act (Bill 139) was promulgated prior to the passage of Bill 70. More specifically the more important provisions of the interim bill:

- 1) consolidated the responsibility for administering occupational health and safety legislation in the Ministry of Labour;
- 2) granted labour the right to refuse hazardous work; and
- 3) empowered the Ministry to order the creation of mandatory health and safety committees.

As might have been anticipated, the business community expressed opposition to those provisions that pertained to the right to refuse hazardous work and the mandatory creation of health and safety committees.

As seen in the figure, the public hearings that were conducted in the spring of 1977 represent the initial attempts to involve public participation in the development of Bill 70. The primary purpose of the public hearings was to provide a forum for the expression of views concerning the philosophy and approaches that were subsequently embodied in the legislation.

After the Bill was introduced in the Legislature, the Standing Committee conducted public hearings in January and February of 1978. The primary purpose of the second set hearings was to obtain the comments, criticisms and concerns of interested parties as well as to review the results of each submission as recorded in the formal Hansard transcriptions.

Presented in Figure 11.2 is a summary of the process by which regulations enacted under the auspices of Bill 70 were enacted. In general, the process of revising regulations began prior to 1976 when interested parties were invited to comment on possible changes to existing regulations. In this regard, the briefs submitted by interested parties and the inspectorate provided the basis for the revision of existing regulations

Figure 11.1 Flow Chart of the Amendments to OH&S Omnibus Act (Bill 70) -- Ontario

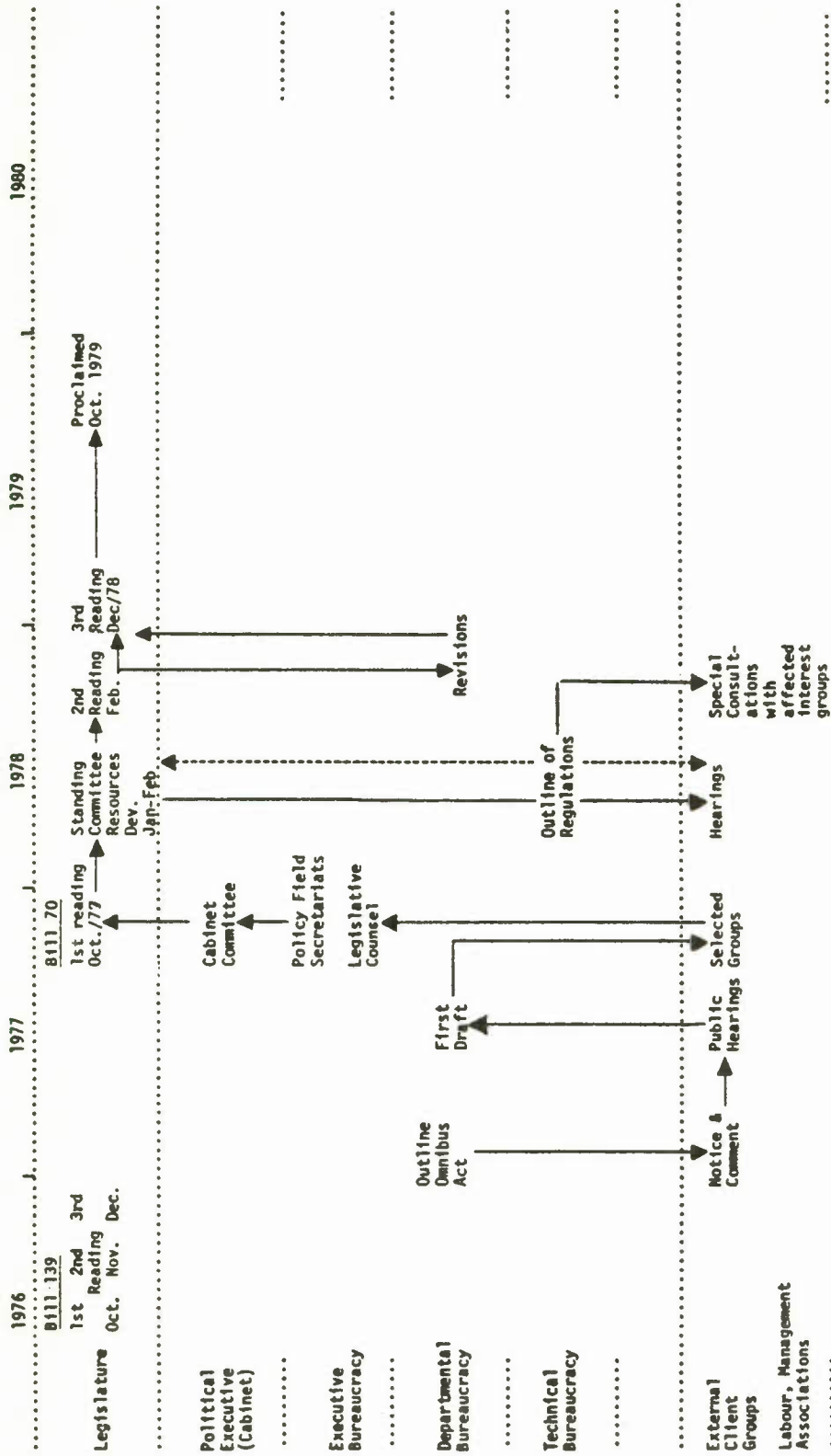
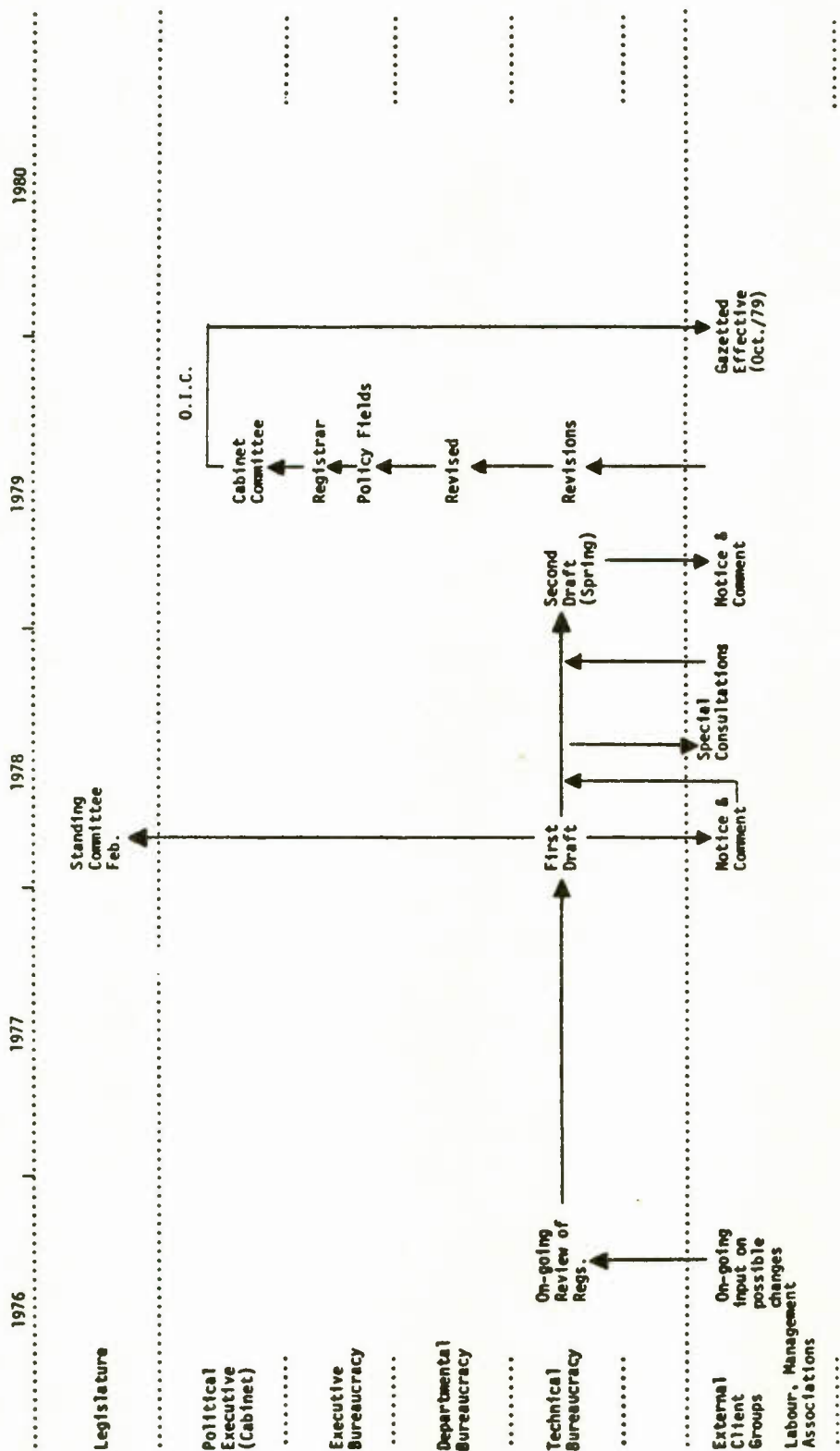


Figure 11.2 Flow Chart of the Revisions to General OH&S Regulations Under Bill 70 -- Ontario



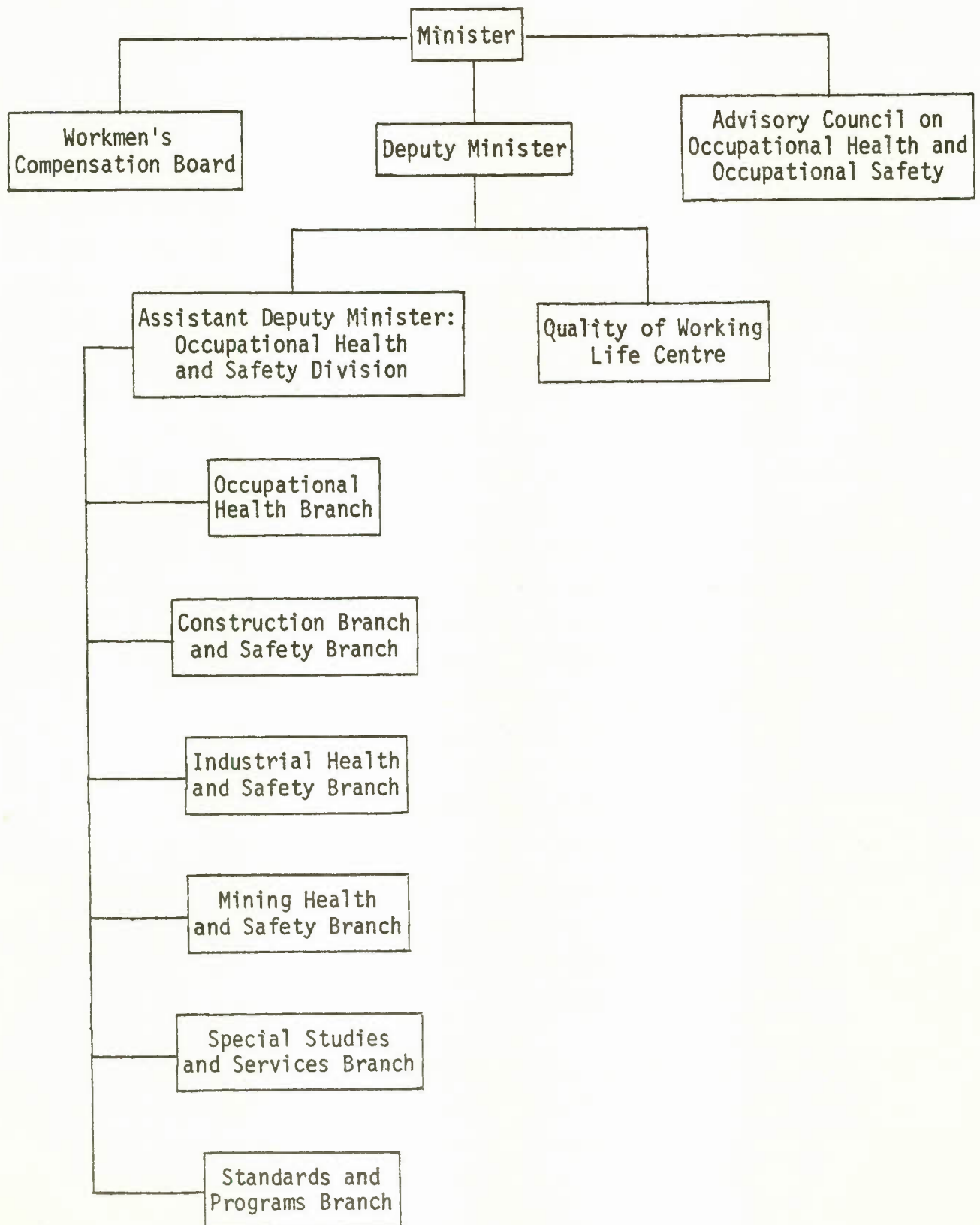
by a series of task forces within the new Occupational Health and Safety Division of the Ministry of Labour. The internal task force based revisions on the submissions to which we referred above as well as on the results of a series of meetings with various interest groups. At the conclusion of the hearings conducted by Standing Committee on Resources Development, an additional 75 meetings were held during which key organizations and associations in the area of occupational health and safety were given an opportunity to comment on the practicability, acceptability and desirability of the draft regulations. In turn, these responses were incorporated in a second draft of the regulations that was published in the spring of 1979. The second draft was again circulated for review and comment to a wide range of interest groups. On the basis of these comments, a final draft of the regulations was developed and proclaimed in effect as a part of Bill 70 in October 1979.

11.2 Consolidation: An Overview of the Ministry of Labour

With the passage of Bill 139 and Bill 70, the responsibility for administering occupational health and safety legislation was consolidated within the Ministry of Labour. In addition, the recent legislation also reduced the role played by governmental authorities in the inspection and enforcement process and increased the role of government in developing the "internal responsibility system" recommended by the Ham Commission. As specified by the Minister of Labour (COHSN, 1979, pp. 4-6), the primary role of government is now one of "auditing, monitoring and acting as a resource". Accordingly, the Ministry will rely less on inspectors and more on joint health and safety committees to enforce regulations. Thus, the problem of identifying and controlling hazards in the workplace is the responsibility of management, labour and, to a lesser extent, governmental authorities.

Presented in Figure 11.3 is a summary of the organizational units in the Ministry of Labour that play a major role in the area of occupational health and safety. As seen in this figure, the major organizational units that are directly concerned with matters pertaining directly to occupational health and safety are the Workmen's Compensation Board, the Occu-

Figure 11.3 The Ministry of Labour: An Overview of the Organizational Structure Pertaining to Occupational Health and Safety



pational Health and Safety Division, the Quality of Working Life Centre and the Advisory Council of Occupational Health and Occupational Safety. When viewed from the perspective of inspection, enforcement and incentive schemes designed to prevent accidents, the Workmen's Compensation Board and the Occupational Health and Safety Division are the most important elements of the organizational structure.

11.3 The Occupational Health and Safety Division

The primary objective of the Occupational Health and Safety Division is to promote the health and safety of workers throughout the province. The division assumes the primary responsibility for administering the provisions of the Occupational Health and Safety Act as well as the regulations pertaining to the manufacturing, mining and construction industries which are promulgated under the Act.

As seen in Figure 11.3, the division is comprised of:

- 1) the Construction Health and Safety Branch;
- 2) the Industrial Health and Safety Branch;
- 3) the Mining Health and Safety Branch;
- 4) the Occupational Health Branch;
- 5) the Special Studies and Service Branch; and
- 6) the Standards and Programs Branch.

The first three of these branches assume the primary responsibility for promoting the health and safety of workers while the remaining branches provide general support and consultant services to the line branches.

11.3.1 The Construction Health and Safety Branch

As implied by its name, the Construction Health and Safety Branch is concerned with the health and safety of workers engaged in all aspects of the construction industry. Prior to the passage of the Occupational Health and Safety Act, the Branch was responsible for administering the Construction Safety Act, 1973 and the Employees' Health and Safety Act, 1976 as it applied to the Construction Industry.

11.3.1.1 Branch Activity: 1978-1979 Fiscal Year

During the fiscal year 1978-1979, the Branch consisted of one director, 111 inspectors and nine support staff. As seen in Table 11.1, the inspectorate attached to the Branch was responsible for 73,330 inspections during the 1978-1979 fiscal year. As indicated in this table, the number of inspections increased by 10 percent during this period while the number of accidents investigated, the number of fatal injuries, the number of directions issued and the number of convictions declined by 7.8, 11.9, 8.9 and 10.4 percent respectively. These data seem to imply that either working conditions in the construction industry improved during the period or construction projects were subjected to less rigorous inspections.

In addition to investigating all fatalities, most serious accidents and any unusual circumstances that might represent a hazardous situation, the Branch also provides consultant services which are designed to encourage the cooperation of management and labour in developing a healthier and safer workplace. This dimension of branch activity will no doubt assume an ever increasing importance as the reliance on the "internal responsibility system" recommended by the Report of the Royal Commission in the Health and Safety of Workers in Mines is expanded.

11.3.1.2 The Format of Current Regulations

With the passage of Bill 70, the Branch assumed the responsibility of administering the provisions of Ontario Regulation 659. As seen in Table 11.2, these provisions are divided into essentially five major parts and address a wide variety of factors which influence the health and safety of workers employed in the construction industry. In general, Parts I and II summarized in the Table apply to all construction projects while Parts III, IV and V apply to specific aspects of the construction industry.

The regulations for which the Branch assumes responsibility are based on general performance criteria as well as on specific details and procedures. As an example of the former, section 28 in Ontario Regulations 659 specifies that

Table 11.1 Summary of the Activity of the Construction Health and Safety Branch for the 1977-1978 and 1978-1979 Fiscal Years

Dimension of Activity	Fiscal Year		Percentage
	1977-1978	1978-1979	Change
Number of inspections	66,663	73,330	10.0
Number of directions	42,932	39,088	(8.9)
Number of inspections where no directions specified	46,923	54,400	15.9
Number of convictions	536	480	(10.4)
Total fines	\$178,855	\$158,210	(11.5)
Number of fatalities	42	37	(11.9)
Number of complaints investigated	1,047	1,183	13.0
Number of Accidents investigated	624	575	(7.8)

Source: Annual Report, 1978-1979, Ontario Ministry of Labour, March 31, 1979.

Table 11.2 Summary of Ontario Regulation 659: The Construction Industry

Part	Dimensions
I Administration	Notice of projects; notice of accidents; notice of occurrences; alternative methods and materials.
II General Construction	General construction; traffic control; personal protective clothing, equipment and devices; access to egress from work areas; housekeeping; storage of material; excavation; guardrails; forms and false work; platforms, runways and ramps; stairs and landings; ladders; scaffolds and working platforms; hygiene; fire protection; cutting and welding; electrical hazards; explosives; confined spaces; general equipment; explosive activated tools; roofing; damaged structure; demolition.
III Trenching	Support systems.
IV Tunnels and Shafts	Land requirement; fire protection, first aid; rescue of workers; communications; lighting and electricity supply; shafts; hoisting; tunnels; tunnel equipment explosives; ventilation.
V Work in Compressed Air	Communication; fire prevention; lighting sanitation; medical requirements; compressors for air supply; air locks and working chambers; working periods and rest periods; duties of lock tenders; decompression procedures.

"an employer shall require every worker to wear or use such personal protective clothing, equipment or device as is necessary for the worker's protection for the particular hazard to which the worker may be exposed."

while section 54 states that

"Every excavation in which a worker may be required to enter shall be kept reasonably free of water at all times."

In a similar vein, sections 41 and 42 specify that

"an object shall not be placed or left where it is likely to endanger a worker."

and

"reusable and waste material and debris on a project shall be removed to a disposal or storage area as often as is necessary to prevent a hazardous condition,"

respectively. When viewed from the perspective of traditional systems of evaluating and controlling the work environment, the terms "necessary", "likely to endanger", "reasonably", "as often as it necessary", and "hazardous condition" are ambiguous and, as a result, the enforcement of the general performance criteria would depend on the discretionary judgment of the inspectorate. On the other hand, when viewed from the perspective of the internal control system (see section 11.4) the legislative format of the general performance criteria provide a considerable latitude within which management and labour might cooperate in resolving health and safety problems present in the workplace.

As mentioned previously, regulations for which the branch is responsible are also based on specific procedures and details. For example, subsection 3 of section 59 states that

"A wooden guardrail shall be free of splinters, and protruding nails and shall consist of:

- (a) a top rail not less than 38 millimetres by 89 millimetres securely supported on posts which are not less than 38 millimetres by 89 millimetres and spaced at intervals of not more than 2.4 metres.
- (b) an intermediate rail not less than 19 millimetres by 89 millimetres in size securely fastened to the inner side

of the posts midway between the top rail and the toe-board; and

- (c) a toe-board securely fastened to the posts or other vertical supports and extending from the surface, floor, scaffold or roof to a height of not less than 10.2 centimetres."

Similarly, subsection 2 of section 204 states that

"Where a service shaft is over 6 metres in depth or is serving a tunnel over 15 metres in length, the minimum inside dimension for clear passage, measured between the walls or other wall supports, shall not be less than

- (a) 2.4 metres in the case of a cylindrical shaft; and
- (b) 1.5 metres in the case of a shaft that is not cylindrical, the traverse cross-sectional area for clear passage shall not be less than 5.7 square metres."

Even though detailed standards are specified by several regulations promulgated under the Act, the majority of the provisions are based on general performance. As will be discussed later, the extensive use of general performance criteria is consistent with the Ministry's desire to rely more on the internal responsibility system than the provincial inspectorate to evaluate and control the environment of the workplace.

11.3.2 Industrial Health and Safety Branch

Similar to the Construction Health and Safety Branch, the objective of the Industrial Health and Safety Branch is to promote the health and safety of workers engaged in the industrial sector of the Ontario economy. Prior to the passage of the Occupational Health and Safety Act on October 1, 1979, the Branch was responsible for administering the Industrial Safety Act, 1971 and the relevant provisions of the Employees' Health and Safety Act.

11.3.2.1 Branch Activity: 1978-1979 Fiscal Year

Recently the Industrial Health and Safety Branch has focused its efforts on developing the internal responsibility system in which employers and employees assume primary responsibility for occupational health and

safety programs in the workplace. Accordingly, the inspections performed by the branch are, to a significant extent, intended to provide employees and employers with the information required to monitor, evaluate and control hazardous conditions in the work place.

As a practical matter, the branch attempts to vary the frequency and intensity of inspections or audits in accordance with the potential hazards present in a given workplace. Initially, branch officials, employers, employees and union representatives, if any, meet to discuss concerns and possible solutions. Following the inspection, the officer again meets with employer and employee representatives to discuss the report, the presence of potential hazards and required preventive action. Further, when a contravention of the legislation is discovered, a direction, which specifies required corrective action, is issued. Although the powers of the inspectorate are extensive, a matter which will be considered in detail later, one of the primary objectives of the officer is to encourage the development of programs designed to ensure self-inspection and self-compliance.

Presented in Table 11.3 is a summary of the activities of the branch, during the 1978-1979 fiscal year. As seen in this table, fatal and non-fatal accidents increased by 16.7 and 10.9 percent respectively while the number of inspections and convictions declined by 2.1 and 67.2 percent respectively. The latter results probably emanate from an increased reliance on self-compliance, regulation and inspection. Also notice that, even though the number of directions increased slightly, the number of convictions resulting from a contravention of the legislation declined dramatically during the period. Although a number of factors may have contributed to the increase in the number of fatal and nonfatal accidents, the data summarized in the table suggest a need to evaluate the effectiveness of the joint efforts of labour and management in controlling hazardous conditions on a periodic basis.

Table 11.3 Summary of the Activity of the Industrial Health and Safety Branch during the 1978-1979 Fiscal Years

Dimension	Fiscal Year		Percentage Change
	1977-1978	1978-1979	
Nonfatal accidents	74,362	81,220	10.9
Fatal Accidents:			
Industrial Safety	37	41	10.8
Logging Safety	7	13	85.7
Canada Labour Code	4	2	(50)
Inspections	42,582	41,700	(2.1)
Directions issues	38,181	42,866	12.3
Direction Completed	24,647	27,376	11.1
Convictions	67	22	(67.2)
Fines	\$34,934	\$29,900	(14.4)
Right to Refuse Work Cases	79	74	(6.3)

Source: Annual Report, 1978-1979, Ontario Ministry of Labour, March 31, 1979.

11.3.2.2 The Format of Current Regulations

With the passage of the Occupational Health and Safety Act, the Industrial Health and Safety Branch assumed the responsibility for administering the provisions of Ontario Regulation 658. In general, the regulation applies to all industrial establishments and consists of the three major parts summarized in Table 11.4.

As before, the regulations for which the Industrial Health and Safety Branch is responsible are based on general performance criteria and, to a lesser extent, on specific details or procedures. As an example of the latter approach, section 15 of Ontario regulation 658 states that

- "A guard rail shall,
- (a) have a height of not less than 107 centimetres above the surface, floor, ground or platform on which it is installed;
 - (b) be capable of withstanding any load likely to be applied to it;
 - (c) when constructed of wood, be not less than 38 millimetres x 89 millimetres in cross section, the parts being spaced at intervals of not more than 2.4 metres;
 - (d) have an intermediate rail which, when constructed of wood, is not less than 75 millimetres wide, securely fastened to the inner side of the parts mid-way between the toprail and the surface floor, ground or platform on which it is installed;
 - (e) where tools or other objects may fall on any worker, have a toe board extending from the floor platform or other surface to a height of not less than 125 millimetres; and
 - (f) be free of splinters and protruding nails."

Similarly, section 18 of the regulations requires that

"A fixed walkway, service stair or stile shall be at least 55 centimetres in width."

Of far greater importance are those provisions that establish general performance criteria. An example of this approach is section 28 which states that

"Where a machine or prime mover or transmission equipment has an exposed moving part that may endanger the safety of any worker, the machine or prime mover, or transmission equipment

Table 11.4 Summary of Ontario Regulation 658: Industrial Establishments

Part	Dimensions Addressed
I	Safety regulations; notice of accidents; machine guarding; material handling; confined spaces; maintenance and repairs; protective equipment; molten metal; logging
II	Buildings
III	Industrial Hygiene

shall be equipped with and guarded by a guard or other device which prevents access to the moving part."

while section 131 requires that

"An industrial establishment shall be ventilated by either natural or mechanical means such that the atmosphere does not endanger the health and safety of workers."

In a similar vein, section 38 specifies that

"Guards shall be provided beneath conveyors,
(a) which pass over workers; or
(b) from which falling material, including broken conveyor parts, may be a hazard to any worker."

As before, the extensive use of general performance criteria is predicated on the premise that the identification and control of hazardous conditions in the work environment is the responsibility of management and labour rather than the provincial inspectorate.

11.3.3 Mining Health and Safety Branch

The primary function of the Mining Health and Safety Branch is to provide healthy and safe conditions in the mining environment. The program of the branch consist of a complex framework of inspections, audits and consultation with employers and employees. Pursuant to the achievement of stated goals, the branch

- 1) provides advice and guidance to employees and employers concerning practices required to comply with legislation;
- 2) audits work practices and procedures for compliance with legislation;
- 3) encourages and audits the "internal responsibility system" in mining and mine-related enterprises;
- 4) reviews the minutes of management-labour committees; and
- 5) audits the effectiveness of training programs in the workplace.

Consequently, the branch relies on an internal inspection process and self-compliance to control health and safety hazards in the mining environment.

With the passage of the Occupational Health and Safety Act, the branch assumed the responsibility of administering the provisions of Ontario Regulations 660, the eleven parts of which are summarized below.

<u>PART</u>	<u>Dimension</u>
I	General
II	Fire Protection
III	Access to Workplaces
IV	Protection of Workers
V	Haulage
VI	Explosives
VII	Electrical
VIII	Mechanical
IX	Railroads
X	Mine Hoisting Plant
XI	Working Environment

For reasons cited earlier, the regulations promulgated under the Occupational Health and Safety Act are based more on general performance criteria than on specific details or procedures.

11.3.4 Powers of the Inspectorate

As implied above, the line branches not only promote the development of the "internal responsibility system" recommended in the Report of the Royal Commission on the Health and Safety of Workers in Mines, but these three branches are also actively involved in the inspection and enforcement process. Concerning the latter point, section 28 of the Occupational Health and Safety Act empowers the inspectorate to:

- 1) obtain all information required to assess the extent to which the employer has complied with regulations promulgated under the Act;
- 2) conduct tests on any mechanical device or biological, chemical and physical agent as necessary;
- 3) order the employer to comply with any regulation which has been contravened;
- 4) stop the use of any place, mechanical device or material until the employer has complied with the order; and

- 5) stop work and clear all employees from the workplace until the employer has complied with the order.

It should also be noted that the Act requires the employer to allow an employee representative to participate in physical inspections of the workplace and to compensate the representative for the time required to accompany the inspector.

11.3.5 Penalties

Although the basic philosophy of the Ontario program is to encourage employers and employees to engage in self-compliance and self-regulation, the Act provides for the assessment of penalties when regulations are contravened. More specifically, section 37 of the Occupational Health and Safety Act states that any person who fails to comply with:

- 1) a provision or regulation of the Act;
- 2) an order or direction issued by an inspector; or
- 3) an order of the minister;

is guilty of an offence and, on summary conviction, is subject to a fine of not more than \$25,000 or to imprisonment for a period of not more than twelve months or both. Although the sanctions that might be imposed under the Act are substantial, the general nature of the regulations coupled with an unwillingness to prosecute would appear to reduce the effectiveness of potential penalties.

11.3.6 Support Branches

As mentioned previously, the Occupational Health Branch, the Special Studies and Services Branch and the Standards and Program Branch of the Occupational Health and Safety Division provide support and consultant services to the three line branches. In addition, support or advisory services are also provided by the Research Branch, the Ontario Quality of Working Life Centre and the Advisory Council on Occupational Health and Occupational Safety.

11.3.6.1 Occupational Health Branch

The primary function of the Occupational Health Branch is to provide consultant services to the three line branches, the Ministries of Environment and Health and to the Workmen's Compensation Board. In support of the three line branches, the Occupational Health Branch cooperates primarily with the Industrial Health and Safety Branch in the investigation and identification of existing or potential health hazards. The services of the branch are also available to the other two line branches.

In discharging its responsibilities, the Occupational Health Branch consists of: the Occupational Health Medical Service, the Occupational Health Engineering Service, the Occupational Health Laboratory and the Industrial Chest Disease Service.

In general, the consultants associated with the Occupational Health Medical Service cooperate with other members of the branch in the investigation of potential health hazards, recommend and monitor medical surveillance programs and participate in the development of regulations and guidelines. The Occupational Health Engineering Service represents the major advisory and investigative arm of the branch. In general, the service not only provides advice to industry, labour, community organizations and the Workmen's Compensation Board, but it also conducts field investigations of chemical and physical health hazards, monitors the exposure of workers to hazardous substances, submits samples for analyses and recommends corrective action.

11.3.6.2 Special Studies and Service Branch

Perhaps the most important among the support branches is the Special Studies and Service Branch. The primary responsibilities of the branch are to:

- 1) conduct long- and short-term studies of the health problems associated with occupational exposures to chemical, physical or biological agents;

- 2) act as a consultant on all matters related to ionizing and non-ionizing radiation;
- 3) evaluate the health of specific groups of workers (e.g., uranium miners, asbestos miners);
- 4) conduct studies related to problems associated with hazardous agents and the health status of exposed workers; and
- 5) perform or sponsor research in the area of occupational safety and act as a consultant in matters concerning safe work procedures.

In addition the branch provides technical support to the Ministries of Health and Environment on matters which influence occupational and environmental health.

When viewed from the perspective of controlling toxic substances, sections 20 and 21 of the Occupational Health and Safety Act represent the frame of reference within which the Occupational Health Branch operates. Subsection 1 of section 10 empowers the Director to issue an order that prohibits, restricts or controls the use of biological, chemical or physical agents that are "likely to endanger the health of a worker". In reaching decisions concerning the issuance of restraining orders or disposing of any appeals, factors such as

- 1) the relation of the agent or combination of agents to a biological or chemical agent that is known to represent a danger to health;
- 2) the quantity of the agent or combination of agents in use or intended for use;
- 3) the extent of exposure;
- 4) the availability of alternate processes agents or equipment; and
- 5) data regarding the effect of the agent or process on health;

must be considered by the Director.

In addition, the Act also contains provisions concerning the introduction of new agents in the workplace. More specifically, section 21

prohibits the supply, manufacture or distribution of any new substance prior to providing the Director with information concerning the ingredients, generic names, composition and properties of a new agent or combination of agents. When a new substance is likely to endanger the health of workers, the director may require the manufacturer, distributor or supplier to provide a report or assessment of the substance or agent. In turn, the Minister may prohibit, regulate, restrict, limit or control the exposure of workers after publishing the intent to identify the agent as a designated substance as well as any proposed regulations in the Ontario Gazette.

In discharging its legislative responsibilities, the branch is divided into essentially four separate but interrelated services: the Radiation Protection Service, the Health Studies Service, the Safety Studies Service and the Radiation Protection Laboratory. Each of these services is described briefly below.

The primary objective of the Radiation Protection Service is to protect residents of Ontario from "unnecessary" exposure to radiation. Pursuant to the achievement of this goal, the service operates programs designed to inspect x-ray installations in industry, commercial microwave ovens, radioisotopic installations as well as to measure radon daughter concentrations occurring in newly constructed homes in the Elliot Lake and Bancroft areas. In addition, the service has devoted a significant effort to the development of new methods of measurement, the evaluation of new instruments and the construction of special instruments that provide a more timely and accurate assessment of radiation hazards.

Of particular importance to the functioning of the Branch is the Health Studies Service which provides information and consultation on the health effects of agents employed in industrial processes. In turn, the accumulated information frequently provides the basis for recommending standards and guidelines as well as providing consultant services. As a result, the service provides much of the technical information that is required in discharging the legislative responsibility to which we referred earlier.

As its name implies, the Safety Studies Service performs studies of factors that contribute to occupational accidents and diseases. The multidisciplinary approach employed by the service is designed to examine the long- and short-term effects of actions, procedures, and environmental factors in the workplace.

The Radiation Protection Laboratory assumes the responsibilities of analyzing a wide range of radioactive substances. As such the laboratory is responsible for programs designed to monitor uranium mining, nuclear reactors as well as industries and facilities that use radioactive isotopes. The surveillance of radiation has been increased recently which reflects an intensified effort with respect to the uranium mining and milling industry.

11.3.6.3 Standards and Programs Branch

The primary responsibilities of this branch are twofold. The first of these responsibilities is to coordinate the development and evaluation of division policies or programs on behalf of the assistant deputy minister. The second is to assemble data concerning occupational hazards and to coordinate the development of programs designed to control the exposure of workers to hazards present in the workplace.

11.3.7 Quality of Working Life Centre

Established in December, 1978, the primary objective of the Centre is to encourage efforts devoted to improving the quality of working life in Ontario. Pursuant to achieving this objective, the centre engages in a set of interrelated activities designed to encourage practices that improve the quality of working life.

The mandate of the centre includes:

- 1) the provision of assistance in designing, implementing, monitoring and evaluating projects that address the quality of working life;

- 2) the education and training of individuals and organizations in approaches that enhance the quality of working life; and
- 3) the collection and dissemination of information.

As a result, the activities of the Centre have been focused on consulting with individuals and organizations, developing, implementing and maintaining programs designed to improve the quality of working life, developing and presenting educational programs as well as collecting and disseminating information concerning quality of working life concepts.

11.3.8 Advisory Council on Occupational Health and Occupational Safety

Formed in October 1977, the Advisory Council consists of 19 members representing labour, management and the general public. As specified by section 10(7) of the Occupational Health and Safety Act, the functions and powers of the advisory council are:

- "(a) to make recommendations to the Minister relating to programs of the Ministry in Occupational Health and Safety; and
- (b) to advise the minister on matters relating to Occupational Health and Occupational Safety which may be brought to its attention or referred to it."

Thus, the primary objective of the council is to provide advise to the Minister of Labour concerning all matters that are related to occupational health and safety in Ontario. Pursuant to achieving this objective, the council ensures, as far as possible, that: (1) programs and policies minimize the risks to health and safety in the workplace; (2) knowledge and information concerning health and safety is available to management, labour and the general public and (3) the training and development of occupational health and safety manpower is adequate. In addition, the council also assists in establishing mechanisms by which management and labour might cooperate in resolving health and safety problems.

More specifically, the Advisory Council provides advice to the Minister concerning

- 1) programs in the field of occupational health and safety;

- 2) policies, principles and procedures employed in establishing standards and guidelines;
- 3) the introduction of new substances in the workplace;
- 4) the detection, measurement and control of hazards in the workplace;
- 5) priorities for research and development in occupational health and safety; and
- 6) priorities for manpower training and development in the area of occupational health and safety.

In addition, the Council reviews and assesses all matters that are referred to it by the Minister, submitted to it by interested parties or pursued by the Council on its own initiative.

The accountability of the Council is established by section 10(8) of the Occupational Health and Safety Act which states that

"The Advisory Council shall submit to the Minister not later than the 1st day of June in each year an annual report upon the affairs of the Advisory Council."

As summarized in the annual report for the 1978-1979 fiscal year, the Council submitted five Advisory memoranda to the Minister of Labour. These memoranda contained 27 recommendations that included advice concerning the coordination of federal provincial activity in the area of occupational health and safety, the policies and processes by which standards, guidelines and codes of practice are established, the process of identification of designated substances and policies regarding the process of monitoring and maintaining standards in the workplace.

In summary, the Mining Health and Safety Branch, the Construction Health and Safety Branch and the Industrial Health and Safety Branch are responsible for administering regulations that pertain to the presence of hazardous conditions in the workplace. In the next section we consider in more detail the basic elements of the internal responsibility system as well as the responsibility of employers and employees in controlling occupational health and safety risks.

11.4 The Internal Responsibility System

As implemented in Ontario, the internal responsibility system is characterized by

- 1) joint health and safety committees;
- 2) specific duties and responsibilities of the employer;
- 3) specific duties and responsibilities of employees;
- 4) the right of workers to refuse hazardous work; and
- 5) prohibitions concerning reprisals that might otherwise have been imposed by employers.

Each of these elements is considered in this section.

11.4.1 Joint Health and Safety Committees

As mentioned previously, federal and provincial authorities have increasingly relied on the cooperative efforts of labour and management to control not only the presence of health and safety hazards in the workplace but also the incidence of occupational disease and the frequency of accidental injuries. In Ontario, Joint Health and Safety Committees represent the organizational vehicle by which employers and employees might cooperate in resolving health and safety problems. As specified by section 8(2) of the Ontario Health and Safety Act, employers are required to establish a Joint Health and Safety Committee in firms that employ 20 or more workers or when a designated substance applies to the workplace. Further, in accordance with section 8(5), Health and Safety committees consist of no fewer than two members and at least one half of the membership must be comprised of workers who do not perform managerial functions. Employee representatives are selected by workers or trade unions while the representatives of management are appointed by employers. In terms of representation, then, the health and safety committee constitutes a forum for the expression of the views of both employees and employers.

Similar to other jurisdictional legislation, section 8(6) of the Act states that

- "It is a function of a Committee and it has the power to
- (a) identify situations that may be a source of danger or hazard to workers;
 - (b) make recommendations to the constructor or employer and the workers for the improvement of the health and safety of workers;
 - (c) recommend to the constructor or employer and the workers, the establishment, maintenance and monitoring of programs, measures and procedures respecting the health or safety of workers."

As specified by these provisions, however, the recommendations of the Committee are not binding on the employer and the employer is not required to consult or cooperate with the Committee in resolving concerns regarding health and safety matters.

In addition to the powers enumerated above, the employee representatives must designate a member who was selected by workers to inspect the physical condition of the workplace. Moreover, the employer is required to provide the designated member with any information or assistance that may be required to perform the inspection. In addition to inspecting the physical condition of the workplace, employee representatives of the committee are also empowered to investigate all accidents resulting in death or serious injury. The results of the investigation must be submitted to an appropriate director in the Occupational Health and Safety division and to the Health and Safety Committee.

Although data concerning the impact of Health and Safety Committee are fragmentary at best, available evidence seems to suggest that committees are most effective when the roles of management and labour are well specified (Schwartz, 1978, pp. 25-28). In addition, the extent to which management is cooperative and supportive also enhances the effectiveness of Health and Safety Committees (Moodie, 1978, pp. 4-5).

Of particular importance to the effectiveness of Health and Safety Committees as well as the other inspectorates is the extent to which information concerning hazardous conditions is available and accessible. In this regard, section 8(6)(d) empowers the committee to:

"obtain information from the constructor or employer re-
specting

- (i) the identification of potential or existing hazards of materials, processes or equipment, and
- (ii) health and safety experience and work practices and standards in similar or other industries of which the constructor or employer has knowledge."

Moreover, section 9(1) requires the Workmen's Compensation Board to provide workers, employers, health and safety representatives as well as trade unions with annual information concerning the number of fatal accidents, the number of lost work day cases, the number of nonfatal cases that required medical care, the incidence of occupational illness and the number of occupational injuries associated with a given workplace. In addition, section 9(3) requires the Director of the Occupational Health and Safety Division to ensure that persons and organizations, to include occupational health and safety committees, are provided with information and advice that pertains to the administration of legislative provisions as well as to the protection of the occupational health and safety of workers generally. As such these provisions are intended to improve the ability of workers to obtain and interpret information concerning existing or potential hazards in the workplace as well as the procedures or practices that might minimize such risks.

In discharging the functions described above, committees are required to meet at least once every three months. In addition committees are required to maintain records concerning its proceedings and to provide inspectors with minutes of its meetings for review and examination.

Finally, it should be noted that employers must provide members with the time to attend meetings of the committee or to perform committee-related functions. Moreover, the employee must be compensated for the time devoted to these activities at a regular or premium rate as may be appropriate.

11.4.2 Employer Responsibilities

In addition to the responsibilities outlined above, employers must also comply with a set of general duty requirements. More specifically, section 14(1) of the Act requires the employer to

- 1) provide and maintain prescribed equipment, material and protective devices;
- 2) ensure that prescribed practices and procedures are performed in the workplace; and
- 3) ensure that equipment, material and protective devices are used as prescribed.

Further, section 14(2) requires the employer to provide the worker with adequate supervision and instruction as well as information concerning the presence of hazardous conditions in the workplace. In particular, the employer is required to acquaint the worker with the risks associated with handling, storing, using, and disposing of "any article, devices, equipment, or a biological, chemical or physical agent".

With regard to hazardous or toxic substances, section 15(1) of the Act requires the employer to:

- 1) maintain accurate records concerning the handling, storage, use and disposal of biological, chemical or physical agents;
- 2) maintain and make available to workers records concerning the exposure of the employee to toxic substances;
- 3) notify an appropriate director in the Occupational Health and Safety Division of the use or introduction of toxic substances;
- 4) monitor the levels of toxic substances in the workplace and post accurate records as prescribed by the regulations;
- 5) comply with standards that limit the exposure of workers to toxic substances as prescribed; and
- 6) where prescribed, permit only medically qualified employees to work in the workplace.

In addition, section 15(1) also specifies that the employer is responsible for establishing an occupational health service for employees and maintaining the service in accordance with prescribed standards.

11.4.3 Employee Responsibilities

In addition to the responsibilities assigned to the employer, the Act also recognizes the role and responsibility of the worker in preventing or controlling occupational injury and disease. The provisions that pertain to the employee are related to the use of protective equipment as well as the behaviour of the employee in the workplace.

In terms of the provisions which are germane to the use of protective equipment, section 17(1) requires the employee not only to comply with the regulations and provisions of the Act but also to report any defects in protective equipment, devices or equipment as well as any contraventions to the Act or the existence of hazardous conditions to the employer.

Concerning the behaviour of the employee in the workplace, section 17(2) of the Act prohibits the worker from: 1) operating any machine, equipment or device in a manner that will endanger himself or any other worker and 3) engaging in any "prank, contest, feat of strength, unnecessary running or rough and boisterous conduct". In addition, the employee is required to use protective equipment or device as prescribed by the employer or by the regulations. These provisions are intended to reduce the incidence of disease or injury that is attributable to the "unsafe acts" of workers.

11.4.4 Right to Refuse Dangerous Work

The Occupational Health and Safety Act implicitly recognizes that employees who are intimately familiar with a given workplace or process are perhaps the most qualified to recognize a situation which might represent a health or safety hazard. Of critical importance to the right of workers to protect their health and safety is section 23(3) of the Act which states that

"A worker may refuse to work or do particular work where he has reason to believe that,

- (a) any equipment, machine, device or thing he is to use or operate is likely to endanger himself or another worker;
- (b) the physical condition of the workplace or part there of in which he works or is to work is likely to endanger himself; or
- (c) any equipment, machine, device or thing he is to use or operate or the physical condition of the workplace or the part there of in which he works or is to work is in contravention of the Act or the regulations and such contravention is likely to endanger himself or another worker."

As such, the right to refuse work may be invoked by the employee when there is reason to believe that the work situation is likely to endanger himself or another employee. It should be noted that the right to refuse dangerous work is not extended to identified groups such as the police force, fire fighters or employees of correctional institutions or facilities.

When viewed from the perspective of the employer, the refusal to work represents a potential device that might be employed indiscriminately by workers. Pursuant to the problem of resolving conflicts of opinion which emanate from the right to refuse dangerous work, the Act requires the worker to report the circumstances surrounding his refusal to the employer or supervisor who must investigate the situation in the presence of the worker and either a committee member, a health and safety representative or another worker selected by the employee.

Following the investigation and the implementation of any corrective action, the employee may continue to refuse to work if there are "reasonable grounds" for believing that a hazard to health and safety remains in the workplace. In this case, an inspector, who has been appointed for the purposes of the Act, must investigate the refusal to work in the presence of the worker and the employer or a representative of the employer. Following this investigation, the inspector determines the extent to which a hazardous condition is present. It should also be noted that, pending the investigation and decision of the inspector, the employer may not assign the work that has been refused to another employee.

11.4.5 Prohibition of Reprisals

To ensure that employers do not intimidate and prevent workers from exercising their rights as well as discharging their duties as prescribed by the regulations, section 24(1) of the Act states that

"No employer or person acting on behalf of an employer shall,

- (a) dismiss or threaten to dismiss a worker;
- (b) discipline or suspend or threaten to discipline or suspend a worker;
- (c) impose any penalty upon a worker; or
- (d) intimidate or coerce a worker, because the worker has acted in compliance with this Act or the regulations or an order made thereunder or has sought the enforcement of this Act or the regulations."

Obviously, this provision is intended to protect workers from real or threatened reprisals and to encourage employees to initiate action designed to avoid, reduce or eliminate occupational hazards.

The employee may also report contraventions to section 24(1) to Ontario Labour Relations Board which, in turn, must investigate the complaint in accordance with the Labour Relations Act. In response to such a complaint, the employer or a person acting on behalf of the employer must prove that real or threatened reprisal was not invoked to intimidate the worker. When the Board concludes that a worker has been discharged or disciplined in contravention to the Act, penalties specified in existing collective agreements or a reasonable sanction is imposed on the employer. Consequently, the Act provides the worker with protection that is external to the workplace.

11.4.6 Summary

As seen in the foregoing discussion, employers and employees, with the assistance of the various line and support branches in the division of Occupational Health and Safety, are responsible for monitoring, evaluating and controlling the work environment. In addition, management and labour are expected to cooperate in a program of self-regulation and self-

compliance in which the line and support branches of the Division will increasingly play an advisory role.

Thus far, our discussion has focused on the regulatory framework as it pertains to general performance criteria, the standards and the roles played by management, labour and the various branches of the Ministry. In the discussion that follows the focus of analysis is on the role of the Workmen's Compensation Board and, more specifically, on the incentive schemes employed by the board to control occupational disease and injury.

11.5 Workmen's Compensation Board

In general, the priorities of the Workmen's Compensation Board are to:

- 1) provide compensation to employees who have been disabled by occupational disease or injury;
- 2) rehabilitate employees who have been disabled by occupational disease or injury; and
- 3) prevent occupational disease and injury.

The role of the Workmen's Compensation Board in each of these three areas is discussed in this section.

11.5.1 Compensation

Section 1(1)(a) of the Workmen's Compensation Act defines an "accident" to mean "a willful and intentional act, not being the act of the employee", "a chance event occasioned by a physical or natural cause" or a "disablement arising out of and in the course of employment". On the other hand, section 1(1)(e) states that industrial disease means "any of the diseases mentioned in schedule 3 and any other disease peculiar to or characteristic of a particular industrial process, trade or occupation". Specifically, Schedule 3 lists 15 disease groupings as well as the associated industrial processes that are recognized by the Act. Subject to Order-in-Council, section 118(14) enables the board to amend Schedule 3

from time to time by expanding the number of diseases or processes that are compensable under the Act.

The definition of an accident enables the board to award compensation for diseases that are peculiar to a given occupation, trade or process which are not listed in Schedule 3. The conditions under which a disease is regarded as compensable are as follows. Section 118(1) of the Act states that "where an employee suffers from an industrial disease and is thereby disabled or his death is caused by an industrial disease and the disease is due to the nature of any employment in which he was engaged, whether under one or more employments, the employee is or his dependents are entitled to compensation as if the disease was a personal injury by accident and the disablement was the happening of the accident". As mentioned previously, however, the administration of the provisions is complicated by the difficulties associated with establishing a causal relationship between the exposure of an individual to an occupational hazard and the onset of disease.

As in the case of an accidental injury, the amount of compensation is based on the extent of the resulting disability as well as the average earnings of the individual. It should be noted, however, that no compensation is awarded for diseases listed in Schedule 3 unless the worker has been a resident of Ontario for a period of three years or the Board is satisfied that the disease emanated from the employment of the worker in Ontario (section 118(8)). In the event the worker is employed in an occupation other than the one in which the disease was contracted, the board may base the amount of compensation on the average earnings in the previous employment (section 118(6)).

11.5.1.1 Scale of Compensation: Disability

As mentioned above, the benefits awarded to a disabled worker are based on the extent of the disability as well as the average earnings of the individual. In this regard, disability is classified as being temporary or permanent and as being total or partial. The act defines the earnings of the worker as "any remuneration capable of being estimated in

terms of money" (section 1(1)) while section 44(1) requires that the average earnings of the individual must be calculated in a manner that reflects "the rate per week or month at which the employee was remunerated but not so as in any case to exceed the rate of \$18,500 per annum".

In the event that disease or injury results in total temporary disability, the worker is entitled to a weekly payment equal to 75 percent of the average weekly earnings of the individual and is payable for the duration of the disability (section 39). Further, when a disabled employee returns to work and becomes entitled to payment for a temporary disability that emanated from the original accident, the compensation awarded is based on the greater of the earnings of the individual at the time of the original accident or on the date of recurrence (section 40).

Concerning a disease or injury that results in temporary partial disability, section 41(1) provides essentially two bases for calculating the scale of compensation. First, when the employee returns to work, section 41(1) states that the amount of compensation shall equal

"a weekly payment of 75 percent of the difference between the average weekly earnings of the employee before the accident and an average amount that he is able to earn in some suitable employment or business after the accident."

The second basis pertains to the situation in which the individual suffers a temporary partial disability and does not return to work. In this case, if the individual cooperates in a rehabilitation program, as requested by the board, and does not return to work because no suitable position is available, the scale of compensation is an amount that would have been paid had the worker suffered a temporary and total disability. On the other hand, if the worker refuses rehabilitation or refuses available employment, the compensation awarded is an amount that the Board considers "equitable" (section 41(1)(b)).

Awards that pertain to total or partial permanent disabilities are based on the average earnings of the individual during the twelve month period prior to the injury and the estimated degree of impairment. For example, the payment to an individual who is totally (i.e., 100 percent)

and permanently disabled is 75 percent of covered earnings while proportionate amounts are paid for lesser degrees of impairment (section 42(1)). Compensation for permanent disabilities is paid for the lifetime of the worker or for a shorter period that is determined by the Board.

In addition, the Act specifies a set of benefits that are payable when death results from injury. In such a situation, a maximum of \$800 is awarded for the purposes of defraying the costs of burying or cremating the deceased (section 36(1)(a)). Moreover, in 1978 the widow (or widower) was entitled to a monthly payment of \$365 plus an additional \$113 for each dependent child under the age of sixteen years (section 36(1)(d)(iii)). In this case, the payments continue

"only so long as in the opinion of the Board it might reasonably have been expected had the employee lived he would have continued to contribute to the support of the dependents..." (Section 36(3)).

On the other hand, payments automatically cease when the widow or widower remarries or a dependant child attains the age of sixteen. In this case the widow, widower or common law spouse is entitled to a lump sum payment that is equal to the monthly payments for a period of two years (section 36(8) and (11)).

11.5.1.2 Financing Disability Benefits

As in other provinces, the cost associated with occupational disease and injury represents the responsibility of the employer since neither the government nor the employee contribute to the Accident Fund from which compensation awards and medical aid to the disabled employee are financed (section 18, 51(9)). Essentially two mechanisms of financing compensation claims are employed in Ontario and, accordingly, employers are included in one of two basic schedules.

Employers who are included in schedule 1 are collectively liable for the costs of medical care required to treat the disabled as well as the compensation paid to their employees. As mentioned previously, the employer finances these costs by contributing to the Accident Fund and the

amount of the assessment depends on the class or subclass as well as the covered payroll of the employer. In general, the assessment levied against the employer is given by the product of an assessment rate, which, in the absence of experience rating, is the same for all employers in a given group, and the covered payroll of the employer. The assessment may be paid annually or in installments as specified by the Board (sections 100(1) and 100(2)). In addition, section 86(4) states that when

"in the opinion of the Board sufficient precautions have not been taken for the prevention of accidents to employees in the employment of an employer or where working conditions are not safe for employees",

the Board may add to the contribution of any employer a percentage that is considered just and equitable.

In deriving the assessments for which the employer is liable, the board must ensure that sufficient funds are available for

- 1) the payment of compensation during the year;
- 2) the payment of the expenses of the Board for the year; and
- 3) the maintenance of a reserve fund to finance future benefits that emanate from accidents occurring during the current year (section 100(1)).

In the event that funds are insufficient, the board may revise the assessment levied against a given employer (section 102(3)) or impose supplementary assessments to reduce or eliminate the deficit (section 103).

In addition to the supplementary or additional assessments, the Board is also empowered to levy a special assessment on employers in a given class or on employers in all classes. The power to levy a special assessment to redress deficits that result from a disaster which influences one or more classes of industries. If a disaster creates a deficit in a given class which represents an unfair burden to employers in the class, the Board may impose a special assessment on all employers. Alternatively, the Board may impose a special assessment on employers contained in sche-

dule 1 and create a special fund from which the costs resulting from a disaster or other circumstance might be financed.

Employers contained in Schedule 2 are individually liable to pay compensation and finance the costs of medical care provided to their disabled employees. Compensation and other related payments made by the Board to workers of employers contained in Schedule 2 are repaid to the Board by the employer. Employers contained in Schedule 2 maintain a special deposit with the board that must be replenished as required. Moreover, these employers may purchase commercial insurance policies that cover compensation costs and, under the Act, the board may require such coverage. In addition, employers contained in Schedule 2 must contribute to the recurring expenses of the Board.

11.5.2 Claims Adjudication, Medical Services and Rehabilitation

Administratively, the Workmen's Compensation Board consists of three operating divisions which are responsible to the Vice Chairman of Administration. The three operating divisions are the Claims Service Division, the Medical Services Division and the Vocational Rehabilitation Division.

11.5.2.1 The Claims Service Division

The Claims Service Division is responsible for the adjudication, investigation and processing of all claims submitted to the Board. Accordingly, the claims Adjudication Branch of the division not only adjudicates and examines all claims but also determines and authorizes claim payments. In addition, the Branch establishes awards for permanent disability, approves medical aid claims and coordinates the adjudication function with related medical and rehabilitative activities of the Board.

In addition to the Claims Adjudicating Branch, the Division also consists of a Claims Information and Counselling Service Branch and a Claims Review Branch. The first of these branches provides information and counselling services to claimants and employers. The branch also performs investigations for the adjudicators. The Claims Review Branch automat-

ically investigates all adverse decisions concerning claims before the worker or the employer is notified. Further, the Branch is empowered to reverse any decision or to require further study. Moreover, the branch also participates in the establishment of claims policy as well as the process of monitoring approved claims in an effort to control quality.

11.5.2.2 Medical Service Division

The primary function of this division is to supervise and provide medical care to the disabled worker. In conjunction with these activities, the division is also responsible for the physical rehabilitation of the worker as well as the operations of the Board's Hospital and Rehabilitation Centre that is located in Downsview, Ontario.

The medical branch of the division not only establishes policy regarding the treatment of injured workers but also monitors the effectiveness of treatment programs as well as the medical facilities that are operated for injured workers in Ontario. In addition, the medical branch supervises the funding of research regarding the treatment of compensable conditions and provides advice to the Claims Service Division regarding the adjudication of claims.

The Hospital and Rehabilitation Centre, which is also attached to the Medical Services Division, accommodates approximately 580 patients and provides medical, physical and neurological assessments or reassessments for disabled patients. The primary focus of the centre is on the use of specific therapeutic exercises, equipment and techniques to improve functional use, strength and joint mobility.

11.5.2.3 Vocational Rehabilitation Division

The primary objective of this division is to restore the physical, social and psychological functioning of the injured worker. More specifically, the Division attempts to restore the physical functioning of the individual by

- 1) ensuring initial treatment is designed to speed the healing process;
- 2) preventing further functional loss;
- 3) retraining so as to compensate for functional loss; and
- 4) providing prosthetic devices, as needed.

In terms of restoring the social functions assumed by the disabled worker, the primary goal of the division is to return the individual to the performance of normal roles and responsibilities through occupational rehabilitation and training. Further, the division attempts to improve the psychological functioning of the individual by providing psychiatric and other support services as required. In short, this division adopts a "whole man" approach to the problem of rehabilitating the disabled worker.

11.5.3 Incentive Schemes and Prevention

In addition to the rehabilitation of disabled workers, the Board also engages in activities designed to prevent occupational disease and injury. The Board not only funds educational programs that are sponsored by accident prevention associations, but it also relies on financial incentives to reduce occupational injury and disease. Concerning the latter dimensions of activity, penalty assessments and experience rating are intended to provide economic incentives to reduce hazards in the workplace.

11.5.3.1 Experience-Rating in Ontario

Experience-rating may be defined as a technique by which the assessment rate associated with a given employer is determined by the accident record of that employer. As such, experience-rating induces the employer to prevent accidents and abuses such as malingering or fraudulent behaviour.

One of the fundamental difficulties associated with experience-rating is that historical data do not provide an accurate indicator of future performance unless the firm is of substantial size. For example, it seems intuitively plausible that, other things remaining constant, the accident

rate of a firm employing 2,000 workers is likely to remain more or less constant from one year to the next. On the other hand, accidents in a small firm are similar to rare events and, as a result, the accident rate in such a firm is likely to exhibit considerable volatility during an extended time period. Consequently, it is difficult, if not impossible, to predict with precision the number of accidents that will occur in small firms. A strict adherence to the definition advanced earlier implies that only larger firms are eligible for experience-rating and it is to this group of employers that reductions in the assessment rate represents an incentive to reduce accidents.

One approach to resolving the difficulty outlined above is to base the assessment rate on the previous experience of a group of identical or similar firms. In Ontario, the experience-rating system is limited to employers contained in Schedule 1. Further, experience-rating is implemented at the request of employers in a given rating group and after employers who are eligible have been surveyed. As a practical matter a response rate of 51 percent with at least two-thirds of the respondents in a given group favouring the approach is required before implementing the system. In this regard, only 40 of the 108 subgroups have adopted the experience-rating system (The Wyatt Company, 1978, pp. 401).

An employer will be experience-rated if the covered payroll and assessments have exceeded specified limits during the past three years. In addition, the employer is eliminated from the program when stated criteria are not satisfied in three consecutive years.

As implemented in Ontario, the experience-rating system consists of two plans. The first is referred to as the 25 percent plan while the second is called the 50 percent plan. Under the 25 percent plan, the actual rate imposed on the employer is given by

$$\begin{array}{rcccl} \text{Experience} & & \text{Class} & & \text{Cost Rate} & & \text{Cost Rate} \\ \text{Assessment} & = & \text{Assessment} & + & \text{of Firm} & - & \text{of Group} \\ \text{Rate} & & \text{Rate} & & & & \\ & & & & & \frac{-}{4} & \end{array}$$

where the class assessment rate pertains to the industrial class of which the rating group is a member. On the other hand, under the 50 percent plan, the actual rate imposed on a given employer is obtained by

$$\begin{array}{rcccc} \text{Experience} & & \text{Class} & & \text{Cost Rate} & & \text{Cost Rate} \\ \text{Assessment} & + & \text{Assessment} & + & \text{of Firm} & - & \text{of Group} \\ \text{Rate} & & \text{Rate} & & \hline & & & & & & \hline & & & & & 2 & \end{array}$$

In both cases, the actual rate depends not only on the assessment rate of the class to which the employer belongs but also on the extent to which the cost rate of the employer deviates from the experience of the rating group. Notice that the inequality

$$\text{Cost Rate of Firm} - \text{Cost Rate of Group} < 0$$

represents a financial reward for improving or maintaining a "good" accident record. On the other hand, the inequality

$$\text{Cost Rate of Firm} - \text{Cost Rate of Group} > 0$$

constitutes a financial penalty imposed on a firm that has an unfavourable accident record relative to the rating group. Obviously, when the cost rate of the firm is equal to the cost rate of the group, the actual rate imposed on the firm is the assessment rate that is imposed on the industrial class of which the employer is a member.

The effectiveness of the incentives in preventing accidents is mitigated by several factors. The first involves the calculation of the cost rates that are employed in the determination of the actual rate imposed on the employer.

The cost rate of the firm is based on the total accident costs of the employer which are given by the sum of

- 1) cash payments pertaining to temporary disability compensation and the related provision of medical care; and
- 2) the capitalized values of permanent disability awards and widows' pensions.

In turn, the accident costs for each year are divided by the covered payroll for the corresponding period. The cost rates are then averaged so as to obtain a cost rate for the three-year period. Consequently, the cost rate of the firm is based on a performance which, in part, is at least three years old. During the interim many changes might have occurred which may or may not be adequately reflected in the assessment levied on a given employer. In addition, the "time lag" problem may be compounded by the impact of inflation. More specifically, any reduction in the assessment rate that emanates from an improved accident experience may be more than offset by increases in cost that result from general inflationary pressures. To the extent that inflationary pressures more than offset the effects of an improved accident performance, the incentives associated with experience-rating systems are mitigated.

Consider next, the calculation of the cost rate that pertains to the group. The three-year cost rate for each firm in the group is multiplied by the covered payroll of the employer during the most recent year. This procedure is intended to weight individual cost rates so as to reflect differences in the sizes of firms contained in the group. The weighted data are then summed and the total is divided by the total payroll for all such firms so as to obtain a three-year cost rate for the group. Notice, however, that the penalties imposed and the rewards bestowed on the employer are based, in part, on the group cost rate which, in turn, is influenced by the performance of the individual employer. Thus, an improvement in the accident experience of a single employer reduces the value of the cost rate of the group which, in turn reduces the rewards that are bestowed on the employer. As a result, to the extent that a single employer is able to influence the cost rate of the group, the incentive scheme seems to militate against serious efforts to prevent accidents.

The potential effectiveness of experience-rating in preventing accidents is predicated on the assumption that employers are able to predict with precision the costs, benefits and changes in the actual assessment rate that emanates from the implementation of safety programs. Unfortunately, a number of studies (Atiyah, 1975, p. 93; Sands, 1968, pp. 165, 174; Barber, 1974;, pp. 32-33; Robens Report, 1972, para. 10) suggest that

experience-rating is poorly understood by employers and that the benefits as well as the costs are difficult, if not impossible, to calculate on an a priori basis. These considerations obviously reduce the effectiveness of the incentives designed to induce the employer to improve the accident record of the firm.

The situation in Ontario is compounded further by the basic structure of the experience-rating system. Recall that rewards or penalties are based not only on the performance of the individual firm but also on the performance of other employers in the rating group. As a result, the estimation of potential changes in the actual assessment rate requires the employer to predict not only the impact of safety programs on the accident record of his firm but also the performance of other employers in the rating group. As a result, the uncertainties concerning potential rewards or penalties also militate against the effectiveness of the experience-rating system implemented in Ontario.

11.5.3.2 Penalty Assessment

In general, a penalty assessment is simply an additional levy that is imposed on an employer with a "bad" record. A major feature of the penalty assessment is that the additional levy is in excess of the monetary value of the additional risk.

In Ontario, penalty assessments may be imposed on employers in response to the presence of hazardous conditions in the workplace. More specifically, section 86(7) of the Act states that

"Where the work injury frequency and the accident cost of the employer are consistently higher than that of the average in the industry in which he is engaged, the Board, as provided by the regulations, may increase the assessment for that employer by such a percentage thereof as the Board considers just, and may assess and levy the same upon the employer to establish one or more safety committees at plant level."

As specified by section 7 of Ontario Regulations 834, the employer must satisfy three criteria before a penalty assessment is imposed. First, the employer must have incurred "a lifetime deficit accident cost experience,

including his proper share of administration, safety and other expenses". Second, the employer must have incurred in two of the last three complete years of operation a deficit accident cost experience. Finally, the employer must have incurred in two of the past three years, a frequency rate of compensable accidents at least 25 percent higher than the average rate in the industry in which he is classified".

Once an employer has qualified for a penalty, he is automatically subject to an increased assessment of 100 percent. Further, if the employer continues to satisfy the three criteria specified above, the assessment is increased by 125 percent, 150 percent, 175 percent and so on in subsequent years. A penalty assessment under section 86(7) may be imposed on a firm that is experience-rated or it may be applied to an employer in a group that is not experience-rated.

When a penalty assessment is levied, the employer receives a special notice in which the basis for the penalty is specified. Also included in the notice is a statement that advises the employer of his rights to appeal the decision of the Assessment Review Section and to offer reasons for the experience on which the assessment is based (Ison, 1979, p. 146). On appeal, the Board has been willing to waive part or all of the penalty if the employer offers a reasonable explanation for his record or indicates an intention to devote more effort to preventing accidents (Atiyah, 1975, p. 99).

In an attempt to evaluate the effectiveness of penalty assessments, Atiyah (1975, pp. 99-102) examined the accident experience of 15 firms three years before (1965-1967) and four years after (1968-1971) the imposition of a penalty assessment. Unfortunately, neither the size or the industrial grouping of the firms studied are specified. Moreover, the interpretation of the data is further limited by the sample size which, of course, prevents a statistical examination of the effectiveness of penalty assessments in reducing the number of accidents.

Recognizing the limitations of the data, Atiyah suggests that penalty assessments appear to have been imposed on several employers in years fol-

lowing an improvement in the accident record. The anomaly appears to be related to the costs that accrued during the year prior to the penalty assessment but were related to accidents which occurred in the more distant past. Moreover, penalty assessments were imposed on several firms that experienced only one or two accidents during the period 1965-1967. In this regard, Atiyah contends that

"... many small firms are penalty rated as the result of three, two or even one accident, a result which offends common sense. Doubtless employers can be stimulated to prevent many of the accidents that occur in industry, but there is certainly an irreducible minimum number of accidents and the distribution of these among small firms cannot be shown to be due to anything other than random chance."

In a confidential communication, the Board recognized the latter point by observing that many firms qualifying for penalty assessments "are very small and thus their poor experience is due in no small part to random chance". Consequently, one must seriously question the statistical basis on which penalty assessments are imposed.

Concerning the effectiveness of penalty assessment in preventing accidents, Phillips (1976, pp. 157-159) used information obtained by Atiyah to examine five of the 15 firms that were regarded as "truly comparable". The summarized data suggested that the average costs and the average number of accidents decreased after the imposition of the penalty assessment and Phillips considered the decline to be "substantial" in four of the five cases. On the basis of this finding we are led to believe that "there seems little doubt that the Ontario system has a substantial effect on accident rates". However, one must seriously question the basis for assuming that the firms selected for study were "truly comparable" or that the other firms might not respond to the imposition of a penalty assessment. Moreover, it is also important to note that it is impossible to determine the accident experience of these firms during 1969-1971 if no penalty had been imposed. In any case, it seems somewhat pretentious to base the conclusion that the system has a substantial effect on accident rates in Ontario on the experience of five firms.

The effectiveness of the system depends, in part, on the number of workers affected as well as on the willingness of the board to impose the penalty assessment. Concerning these issues, a confidential communication with the Board revealed that "out of some 100,000 firms (in 1976) eligible for an 86(7) penalty; (i.e., those who have been in their rate group for at least 3 years) only 500 of them receive a 'threat' of an 86(7) penalty". Moreover, the communication concluded that "the present programmes in place in Ontario either require such poor performance that very few firms--whose size is statistically significant--fail the test or the fiscal repercussions are trivial". These observations, though unsubstantiated statistically, seem to cast serious doubt on the conclusions advanced by Phillips.

In summary, neither experience-rating nor penalty assessment as implemented in Ontario appear to represent effective devices for inducing employers to prevent accidents. As seen above, the value of experience-rating is limited by not only scale considerations but also by the time lag problem, general inflationary pressures and the inability of employers to predict with precision the costs, benefits and changes in the assessment rate that emanate from the introduction of safety programs. On the other hand, the fragmentary evidence suggests that the imposition of penalty assessments is frequently unrelated to the most recent accident rate of the employer. Moreover, the effectiveness of the assessment system is further reduced by the cancellation of penalties, the number of workers affected and the trivial nature of financial repercussions that are imposed on employers who have a "poor" accident record.

Chapter 12: REDUCING OCCUPATIONAL INJURIES AND DISEASE: POLICY OPTIONS AND STRATEGIES

12.1 Introduction

In chapter 5 we analyzed the economic justification for government intervention in matters of occupational health and safety. We discussed in considerable detail the nature of several market failures that collectively appear to us to warrant an important role for government in reducing the extent of occupational injuries and disease. It is not our contention that the existence of market failures is either necessary or sufficient to legitimize government involvement in occupational health and safety. Indeed, social, scientific, legal and political factors could and have been cited to support the existing, and perhaps even a higher level of, government intervention. However, the importance of the discussion and focus on market failures is that it points to the appropriate forms of policies or instruments that the government ought to consider in its efforts to reduce occupational injuries and disease.

It is evident from the burgeoning literature on the scope and form of government intervention respecting occupational health and safety that it is folly for a government to rely exclusively or even predominantly on one policy instrument. It seems to us that the heavy emphasis in the literature on the debate between those who favour economic incentives or instruments as opposed to regulations or more specific standards is rather overblown and misplaced.¹ The debate is, in the first instance, too polarized--that is, the policy options are unnecessarily perceived in antithetical terms. Secondly, the obsession with the standard versus economic incentives argument has led many analysts to neglect other important policy instruments. Indeed, we will point out later on in this chapter that the extent to which governments rely on or emphasize these other instruments has a great bearing on the choice it makes between the economic incentive or standard approach in reducing occupational hazards. Finally, it is evident from the discussion in Chapters 1, 2 and 3 that the dynamic nature of occupational health and safety risks means that govern-

ment policies and programs must correspondingly be flexible to cope with new and emerging hazards. Any given policy package and the emphasis placed on the various instruments should not be regarded as immutable. This need for flexibility too is sadly underemphasized in the literature on public policies for occupational health and safety.

12.2 Alternative Policy Instruments to Reduce Occupational Injuries and Disease

The following categorization of policy instruments is only meant to be suggestive. The categories are certainly not mutually exclusive. On the contrary, there is some unavoidable overlap among them. They are also highly interrelated as the following will indicate. They are, nonetheless, useful in as much as they reflect groups of policies that are commonly thought of as a category in the literature and by policy-makers.

12.2.1 Standards and Guidelines

Standards are usually specific regulations concerning certain aspects of the environment and conditions at a workplace. For example, they cover such phenomena as exposure limits to toxic substances, ventilation, safety features of machinery, and so on. These are stipulated in legislation and, therefore, enforceable. Guidelines may be construed to be standards that do not have the force of law. Standards for well-recognized carcinogenic substances have strict exposure limits which a firm is not legally permitted to contravene. Guidelines are a little looser in that they allow a range of activity above and below some "recommended" level, though if a firm is above a level too often a government inspector can issue compliance orders. This is rarely done, of course, because guidelines are voluntary codes which adopt such vague criteria that successful prosecution under them is very remote. It is not an exaggeration to say that guidelines are essentially unenforceable in law (Franson et al., 1977).

Standards can be further broken down into two types--specific or performance, the latter being a less rigid version of the former (Nichols and Zeckhauser, 1977; Stellman, 1977).

It is regrettable that the expression, "regulatory approach" is often used interchangeably with the "standards" approach. In reality, the latter is only a subset of the former. Also, standards to be at all meaningful must be enforced, which, as has been mentioned above, requires an inspectorate and penalties for violations. The latter aspect of the standards approach has elements of economic disincentives, an approach that will be discussed next.

12.2.2 Economic Incentives/Disincentives

As mentioned above, penalties for violating standards is one form of economic disincentive. Counter examples of economic incentives or subsidies to assist firms in meeting regulatory standards also exist, but they are few in number and are usually meant for small and/or marginal firms to lighten the cost burden of government policies. Such subsidies are also of recent vintage, unlike penalties which have been around for a much longer period (Ashford, 1977).

Recently Smith (1974) has proposed an "injury tax" approach to occupational health and safety, under which the government would levy a monetary penalty on firms for each work injury. The economic advantage claimed for this approach is that the tax would penalize injuries directly, permitting the employer to seek the minimum cost method of achieving the reduction in injuries.

Workmen's compensation is traditionally thought to be a type of "injury tax" and indeed some programs have features such as penalties, experience-rating assessment and surcharges, all of which attempt to impose a higher assessment to particularly high-risk workplaces or industries. The nature of the workmen's compensation system was discussed in greater detail in Chapters 4, 9 and 11.

12.2.3 Information and Education

We have argued that the efficiency of the market mechanism is usually predicated on the assumption of knowledge and information on the part of

key participants. We provided reasons why workers in particular and management to a lesser extent are not well informed about occupational hazards in Chapters 1 to 5. The upshot of the problem of this lack of information, unequal access to the available information, and uncertainty about the validity of what information exists for some issues (carcinogenicity of certain chemicals, for example) means that reliance on market solutions to occupational health and safety problems is unacceptable (Cornell et al., 1976; Trebilcock et al., 1978).

The only corrective solution to the problem from the point of view of public policy is to generate more information either by subsidizing private research or through public agencies (the Department of Health and Welfare, the Canadian Centre for Occupational Health and Safety, etc.). The task of generating and disseminating information is formidable, as was explained in Chapters 2 and 3. However, it must be done not only because workers demand that they be informed about occupational hazards as a matter of political right, but because information is instrumental; indeed, it is the sine-qua-non in making other instruments to reduce hazards and risks to health work better.

Education in the sense of informing workers and management about safety practices, technology and procedures, safety campaigns sponsored by the industrial accident prevention associations, and the workmen's compensation boards, etc., should be mainly construed as a means of disseminating relevant information to workers. All too often readily available information has not been implemented by management as was argued in Chapters 1, 5 and 6 (Ashford, 1977).

The need for improved data and work profiles for workers in certain occupations and industries are required so as to: 1) obtain a much needed set of reliable human data in epidemiological studies as well as provide vital information for medical practitioners treating the worker-patient; 2) assess the compensability of disability claims; 3) identify workers who may have been exposed to substances deleterious to their health but who are currently in other occupations and or workplaces, or may have died

from an occupationally-induced disability; and 4) evaluate the effectiveness of current preventive or regulatory measures and standards.

Apparently the barriers to medical and work profiles are neither technological nor economic (Newcombe, 1978).² It is by no means easy considering such factors as the frequent mobility of employees,³ regular rotation of assignments of shop supervisors, and the change or modification of chemical and physical processes that are continually occurring in the workplace. The availability and use of computer technology and the experience with surveillance and worker health records existing today makes the task much more feasible (Kerr, 1978; Barret, 1977). Less than comprehensive (both in terms of informational content and the coverage of workers) records exist already, such as the Ontario Workmens' Compensation Board "nominal roll"⁴ of uranium miners and Health and Welfare Canada's "national dose register" for radiation workers. While there are some organizational and jurisdictional problems, they are not judged to be insoluble. The main obstacle has to do with confidentiality.⁵ Workers want guarantees that such data will not be misused, for example, by employers to lay-off workers suspected of contracting a disease. Employers are concerned that alerting workers to possible hazards in some chemical industries may reveal propriety information.⁶ Others simply insist that employment records are confidential to the firm.

Health records have been recommended by a number of commissions of inquiry but the strongest pressure for legislation comes from labour unions. There is no current legislation, to our knowledge, that compels such medical and work records in Canada.⁷

12.2.4 Changing the Power Relationships in the Workplace

In general it is the employer who is held legally responsible for safety in the workplace. This principle is often thought of by management as conferring to them the sole, if not principal, right and prerogative in matters affecting their workers' health. However, throughout the western world occupational safety and health is becoming a matter of joint respon-

sibility for employers and employees. In many countries the legislation provides for a more or less structured system of participation by workers in health and safety matters. This is achieved in basically two ways: 1) by the establishment of joint labour-management health and safety committees, which may or may not be mandated by legislation (in Canada, it is now mandated in six provinces (Ackroyd, 1978)); and 2) by legislating meaningful right-to-refuse hazardous work. The advantages of joint union-management health and safety committees were cited earlier and will not be repeated at this point. A notable shortcoming of this instrument, as the government response to occupational health and safety problems, is that for many workplaces there are no unions to implement such committees. It is this problem that can partially be overcome by the right to refuse hazardous work legislation, since the power to influence safety and health policies in the workplace is conferred to the individual worker and not to the union per se.

12.3 An Optimal Mix of Policy Instruments

Probably more than any other, the standards approach evokes more controversy and arguments from affected interests. Unions call for more standards backed up by larger and more forceful inspectorates and stiffer citations and fines for violations (Bargmann, 1977). Corporate interests complain about capricious and ineffective enforcement, zealous policing of requirements that bear no relation to genuine job hazards, conflicts among standards, innumerable unnecessary standards, and the growing and burdensome costs of compliance.

There are many lessons to be learned from the United States with respect to the heavy reliance on standards to reduce occupational injuries and disease. The bureaucratic, legal and administrative costs that the standards approach entails is widely recognized and considerable efforts have been made in the past few years to reduce these costs and inefficiencies (Levin, 1979). More than a 1,000 unnecessary standards, mainly related to occupational injury, have been deleted. The Occupational Health and Safety Administration has made on-site compliance advice more available to employers. There has been a significant effort to concen-

trate inspections to larger worksites (and hence affect more workers) in high-hazard industries and to focus on serious dangers rather than trivial ones. It has also funded university-based centres to educate workers and managers in hazard recognition and safe work practices.

Most importantly, the standards approach lacks credibility when examined in light of the results it has achieved. Smith (1979) among others shows that the standards approach has had no measurable impact on the injuries and illnesses in the workplace. Levin (1979) advances the view that the approach may even be perverse. He (1979, p. 35) claims that "during OSHA's 1972-75 Target Industries Program, for example, the severity of serious injuries in all five intensively inspected industries actually increased. From 1972 through 1977, the country's overall serious injury rate went up 15% and the severity of those injuries rose nearly 30%".

Unions complain that this is due to lack of enforcement of the standards. There is, of course, an element of truth in this protestation, but the fact remains that for standards to be rigorously enforced would require an army of inspectors--an expensive proposition. Even then, the standards are often so complex that inspectors often do not know when to, or won't, enforce them because the appeals and litigations are not worth the bother. There is no way of getting around the fact that for standards to be effective, a large element of voluntary compliance by industry is necessary. And if this is so, and if compliance costs are larger than investing in prevention or paying workmen's compensation costs, voluntary compliance to standards should not be expected (Gleason and Barnum, 1977).

It is our view that the government should rely much less on the standards approach to reduce injury than it has hitherto, if and only if other instruments are implemented. Indeed, the standards approach to injury reduction is less effective and probably more costly than a number of alternatives that we propose. The alternatives include: a) greater reliance on economic incentives (a modified and reformed workmen's compensation system)⁸; b) the generation and dissemination of information about occupational injuries (so as to make labour markets generate more

meaningful hazard pay differentials as just one of the positive side-effects); c) the implementation of worksite joint management and labour health and safety committees, so that workers and managers can work out specific hazards situations between them; and d) a legislated right-to-refuse hazardous work measure. The latter three instruments all have the effect of strengthening the influence and impact of workers to correct hazardous situations themselves. It is this precondition that makes it feasible for the "privatization" of decision-making with respect to occupational injuries, together with a system of incentives that penalizes riskier or negligent employers with a workmen's compensation system that must adopt the experience-rating principle to a greater degree in estimating employers assessments or premiums. In the absence of these changes, any government's attempt to reduce its reliance on standards will, of course, be bitterly fought against by the workers. The desire by many analysts to reduce the quantity of regulation by government cannot be met in the absence of such compensating changes in the workplace. Indeed, these changes are necessary to promote what the Ham Commission (1976) referred to as the "joint or internal responsibility system", or what the Robens Report (1974) in the United Kingdom rather felicitously called "industrial self-help" or "self-regulation".

It is encouraging to see that in Ontario the standards approach is justly down-played in Bill 70 (1979) and that the compensating legislative and institutional change we referred to is being seriously considered. Bill 70 will promote joint labour and management health and safety committees; it features a fairly rigorous right to refuse hazardous work (legislation); it does authorize the establishment of a Centre to collect, generate and disseminate information on occupational health and safety matters; and it does command employers to share illness and injury data, as well as medical records with workers. Robert Elgie, the Minister of Labour, who sheperded Bill 70 through the legislature is convinced of the wisdom of the internal responsibility concept recommended by the Ham Commission, "whereby management and labour are by far the best people to work together to decide what are the identifiable hazards in an industry and to try to deal with them on their own with us (the government) acting as a resouce, an advisor and, where needed, getting involved to make sure

workers get the protection they require. We'd like our role to be primarily one of auditing, monitoring and acting as a resource" (Elgie, 1979, 4).

Joint labour-management health and safety committees are increasing in number in Canada. Their advantages are considerable. One benefit to the government is that they can substitute for inspectors in monitoring and improving working conditions on a continuous basis. From the perspective of labour, these committees can assure that management complies with standards. These committees can also be very instrumental in the collection and dissemination of information and in educating the workers at worksite (Brown, 1978). While there is no formal evaluation of the effectiveness of these committees in Canada, there is some anecdotal evidence that makes us believe that these committees will prove to be successful. In a recent newspaper account (Globe and Mail, January 22, 1980) the joint committee was considered by both labour and management spokesmen as contributing to a dramatic drop in accident and death rates at INCO Ltd. in Sudbury Ontario.

There are a number of issues concerning these joint committees that need to be resolved in the Canadian context, such as: should they be voluntary or mandatory, should the committees be advisory or should they have decision-making authority, what constitutes the legitimate areas of concern for these committees (for example, are issues such as technological change a matter for these committees or is this only a management issue), among others.

The role of information in promoting the self-regulation concept should not be underestimated. As suggested earlier, the importance of information is that it will allow other instruments to work more effectively. That is labour-management joint health and safety committees can only be effective to the extent that both parties possess reliable and timely information about hazards. Until now, lack of such information has meant that occupational disease and methods of reducing exposure have been disregarded. Workers are at a loss as to what they can demand from employers to protect themselves from hazards.

Information about occupational hazards and injuries should also permit labour markets to work more efficiently. Workers can select among different industries exchanging risks for wages. With information, workers, individually or through their unions, can better assess risks and correspondingly demand more nearly perfect compensating wage premiums (Ontario Economic Council, 1972, p. 2). In Chapter 5, a number of studies were reviewed that examined empirically whether the notion of risk premium or hazard pay was statistically valid. The evidence was mixed. It was argued that even if there was some evidence in support of the risk premium hypothesis, it could not be said that these premiums were as widespread and as large as the risks might warrant. In theory, improvement in the knowledge on the part of workers about the extent, nature and implication of occupational hazards should generate more realistic wage premiums.

With respect to the use of economic disincentives, specifically the idea of the injury tax, it would seem that its main drawbacks include: a) the injury tax would be particularly heavy on small firms that have high risks and hence threaten their economic viability and the jobs of their employees; and b) its full implementation would mean that the pooling-of-risk principle implicit in workers' compensation schemes would be lost or severely curtailed (i.e., every firm for itself). A compromise solution to a pure "injury tax" and the workers' compensation schemes seems to us to be both feasible and useful. That is, the essence of the injury tax is to penalize riskier firms. This can be implemented by modifying our workmen's compensation schemes by a greater use of experience-rating or merit-rating principles (Phillips, 1976). Another policy change should be to have workmen's compensation assessment reflect the full costs of an occupational injury and disease. Presently, much of the costs are not borne by the employer, as was pointed out in Chapters 2 and 3. Commenting on these proposals, Phillips (1976, 162) concluded that "the adoption of such a policy would not be costless; it would lead to unemployment in some industries and higher prices as accident costs were transferred from the exchequer to industry. In the long-run, however, the level of output would not be adversely affected, and accident rates would be lower".

The use of another form of economic disincentives, specifically penalties for violating standards, is not much discussed in the literature. Labour points to their relatively trivial to moderate level and urges the government to raise them dramatically. It is of course true that the higher the penalties, the higher the disincentives they generate. However one should not lose sight of the fact that, before fines/penalties can be levied, noncompliance must be established by the inspectorate and that this deficiency is not easily overcome. Secondly, the higher the fines the more likely are firms to appeal such fines, making the whole process more time-consuming and costly for the government. The net effect of raising fines is certainly not obvious. Unlike fines and penalties, the workmen's compensation route seems to be the preferred one in implementing a system of disincentives.

Finally, it should be recalled that our recommendation against the use of the standards approach in reducing injuries only must be emphasized. We argue that the use of other instruments are effective or worthwhile for purposes of controlling the injury situation in industry. However, this general recommendation does not hold for occupational diseases. On the contrary, to combat the disease-related problems in the workplace the government has very little choice but to promulgate more standards (Ashford, 1977). The reason for the difference is explained in Chapters 1, 2, 3, and 4. Among the more salient reasons are: 1) the information/knowledge problem is vastly more severe for disease-related problems than for injuries; disease information problems cannot be readily overcome and even if they could, such information is not easily transmitted or understood by workers; 2) decisions about disease-generating occupational hazards cannot be internalized to the workplace between workers and managers, because most such hazards (for example, lead mercury, VC, etc.) have significant externalities (i.e., third-party effects) and therefore require "public" input into the amount of hazard that may be tolerable; 3) workmen's compensation systems cannot readily be used to discourage such hazards since these schemes are fundamentally injury-oriented. In fact, given the long latency period of many occupational diseases and the inescapable problem of labour mobility, it would prove very difficult to institute anything like experience-rating of individual employers in

determining the assessment for financing workmen's compensation. That is, which firm is culpable for the "disease" will necessarily be a difficult problem and hence will limit experience-rating types of economic disincentives.

We are thus left with an apparently contradictory conclusion, i.e., reduce standards/regulations with respect to occupational injuries, but raise them with respect to occupational disease. As was suggested in Chapters 1 through 4, given the etiology of each of these problems and the private market solutions that do and do not exist to resolve them, the contradictory policy recommendation is warranted.

In Canada, as in other jurisdictions, there is a growing willingness on the part of the legislators, unions and business interests to entertain both greater devolution of decision-making and responsibility to the level of the workplace. As well, there is an increasing acceptance that there is an important and legitimate role for government to reduce occupational diseases. There is nevertheless considerable controversy over the instruments and the extent of their use by government in this endeavour.

FOOTNOTES

Chapter 1

1. Economic regulation typically focuses on: keeping markets competitive, prices, profit margins and the obligation to serve. Social regulation, by contrast, concentrates on the conditions under which goods and services are produced and the "desirable" characteristics of products as exemplified by certain consumer protection legislation. For a further discussion of the distinction between the two types of regulations, see Lilley and Miller III (1977).
2. In the United States this is the common element in all of the regulatory reform proposals before the Senate Governmental Affairs Committee. A noteworthy feature is that not only is the regulatory agency required to undertake such impact statements but to publish the analysis (Ribroff, 1979).
3. Regulatory reform used to focus on the substances of particular regulatory decisions or programs. The reform efforts these days is concentrated on changing basic procedures in the regulatory system as a whole.
4. There is increasing recognition in the United States that in the process of attacking occupational health and safety problems a plethora of regulations were developed that were duplicative, inconsistent and unnecessarily burdensome. The Regulatory Council established by President Carter in 1978 has as its mandate the identification and elimination of many of these regulations (Costle, 1979, p. 5). While the occupational health and safety scene in Canada is quite dissimilar to that of the United States, the American experience is nevertheless instructive.

Chapter 2

1. Pocock (et al., 1972) found that rapid shift changes or "continental rota" resulted in an increase of 35 percent of certified sickness absences versus the seven-day continuous or "traditional rota" shift change. Further, it was found that the shorter the afternoon or evening shift was, the better the attendance on these shifts (Taylor et al., 1972).
2. Pastor (1968), in a study of accidents during the workday, found a higher frequency of accidents occurring in the 4th working hour (before the lunch break) and during the last hour of work. By changing the start of early shift from 6 a.m. to 7 a.m. Wild (1967) observed a decrease in the day shifts' accident rate by about 15 percent.
3. The degree of personal involvement and the social structure of the work-group involved together in shift changes can have a beneficial effect on decreasing absenteeism (Taylor, 1968).
4. Back and spine injuries top the list of occupational injuries in several provinces in Canada (Winnipeg Free Press, July 4, 1978).

Chapter 3

1. In Montreal, conditions in grain elevators were said to be deplorable with excessive grain dust and pigeon excrement on the floors and railings. Mr. N. Beshway, Montreal Port Manager, said that the older elevators are more difficult to maintain (Winnipeg Free Press, April 14, 1977). Dr. Finn (U.B.C. Applied Science Dean who was the one-man committee investigating grain elevators in British Columbia) identified three dangerous conditions in grain elevators: 1) haphazard housekeeping because the companies did not assign enough importance to it; 2) poor handling of pesticides; and 3) inappropriate use of

electrical equipment in combustible atmospheres (Vancouver Sun, April 30, 1977.)

2. A recent study in the U.S. predicts that 15 to 20 percent of all cancers by the year 2,000 AD will be caused by exposure to asbestos (Globe & Mail, January 18, 1980). This will be the result of exposures in the 1960s and 1970s, before stricter safety controls were instituted and owing to the long latency period of the effects of asbestos. Over 80 percent of the workers in a major U.S. shipyard were found to have lung damage due to exposure to asbestos (Globe and Mail, July 10, 1979) and asbestos-linked deaths relating to the use of asbestos in manufacturing of gas masks during World War II have recently become apparent (Ottawa Citizen, December 13, 1979). Yet in many towns across Canada today, from Cassiar, B.C., to Thetford or Asbestos Quebec, workers and their families are continually being exposed to asbestos from the mountains of asbestos slag or tailings that blow asbestos dust over these towns with the prevailing winds so directed. The problem of the various diseases of asbestos is compounded by the fact that it is extremely difficult to find former asbestos workers and their families and assess the impact of asbestos on their health if the exposure occurred so many years ago.
3. It has been suggested that where industrial chemicals are identified as dangerous to U.S. or Canadian workers, they have apparently been shipped out of these countries. Their use has then appeared in industrial settings in other countries where regulations do not exist to prevent or hinder the use of these chemicals.
4. As an example, files going back to 1934 from Johns-Manville and Raybestos-Manhattan (two of the largest asbestos firms in the U.S.) noted the alleged efforts of senior executives to suppress information about potentially harmful effects on their employees from asbestos. This alleged industry cover-up implies that the companies made a conscious choice of profit over the health of their workers for the industry claims that it did not know about the dangers of asbestos until 1964. A 1949 report by a medical officer from Johns-

Manville Canada Limited, in Asbestos, Quebec, contained the following:

"We know that we are producing disease in the employees who manufacture these products and there is no question in my (our) mind that disease is being produced in non-employees who may use certain of these products."

and

"As long as a man is not disabled it is felt he should not be told of his condition so that he can live and work in peace and the company can benefit by his many years of experience."

Chapter 4

1. There are numerous examples of unions protesting WCB insistence on deliberately withholding reports from them. One rancorous example illustrating such behaviour concerns the rejection by the Ontario WCB of a cancer claim by an employee of Eldorado, as reported in the Globe and Mail on April 24 and 25, 1978.
2. There is evidence that the probability of high liability under common law was growing over time. Litigation was more common in the decades preceding the enactment of workmens' compensation laws and more plaintiffs were recovering damages. The increasing vulnerability of employers led them to lobby for workmens' compensation legislation in Canada and in the United States (Askford, 1976; Posner, 1972; Chisholm, 1977). In theory, workers gained a guaranteed (though relatively small) payment in place of an uncertain (though occasionally large) recovery through the legal system. Settlements under common law include payment for both loss of income and "pain and suffering". Workmens' Compensation Statutes generally cover the economic loss and rarely the latter.
3. The Environmental Health Directorate of National Health and Welfare was reported to have drafted a letter for the Canadian Medical Association advising its members to check for asbestos exposure while doing histories of their patients. The department feared for such

people as the estimated 10,000 Canadians who had worked in the ship-building industry during the Second World War (Globe & Mail, December 13, 1978).

4. The situation is much more complex in cases of multiple diseases and claims made by widows upon the husband's death using autopsy reports or death certificates as evidence. For a highly controversial and emotionally charged case see the exchange between Stephen Lewis, former leader of the New Democratic Party of Ontario, and Michael Starr, Chairman of the WCB of Ontario in the Toronto Star, January 3, 1979.
5. For example, the Ontario WCB has come under severe criticism from the Minister of Labour for its carelessness and tardiness in processing claims arising from the deaths of 22 Hamilton foundry workers (Globe & Mail, November 5, 1978).
6. There have been a few precedent-setting awards in the recent past. Examples include: a) passive, smoking-related (asthma) case in Ontario (Globe & Mail, February 7, 1979); b) the recognition that laryngeal cancer can be induced by exposure to asbestos fibers or nickel dust in the workplace resulting from the infamous case of Aime Bertrand that took 5 years to settle (Globe & Mail, May 20, 1978); c) British Columbia has added gastro-intestinal cancer to its schedule of industrial diseases for workers employed in any industry or process where there is exposure to asbestos fibers (The Labour Gazette, November/December 1978, p. 562).

Chapter 9

1. Workers' Compensation Act, R.S.B.C. 1968, c. 59; R.S.B.C. 1970, c. 44; R.S.B.C. 1972, c. 64; R.S.B.C. 1973, c. 92; R.S.B.C. 1974, c. 101; R.S.B.C. 1975, c. 81; R.S.B.C. 1976, c. 33.

2. Letter from Mr. J.D. Paton, Executive Director of Preventative Services, Workers' Compensation Board of British Columbia.
3. Section 61(1) provides that:

Where in the opinion of the Board,

- (a) sufficient precautions are not taken by an employer for the prevention of injuries and industrial disease; or
- (b) the place of employment or working conditions are unsafe; or
- (c) the employer has not complied with regulations or orders or directions made under section 60,

the Board may assess and levy upon the employer a percentage of the amount of the assessment for the preceding year or the projected assessment for the current year and may collect the amount so assessed and levied in the same way as an assessment is collected. The powers conferred by this subsection may be exercised from time to time and as often in the opinion of the board as is required. The Board, if satisfied that the default was excusable, may relieve the employer in whole or in part from liability.

- (2) Where an injury, death, or disablement from industrial disease in respect of which compensation is payable occurs to a worker, and where, in the opinion of the Board, this was due substantially to the gross negligence of an employer or to the failure of an employer to adopt reasonable means for the prevention of injuries or industrial diseases or to comply with the orders or directions of the Board, or with the regulations made under this Part, the Board may levy and collect from that employer as a contribution to the Accident Fund the amount of the compensation payable in respect of the injury, death, or industrial disease, not exceeding in any case \$11,160.08.

Chapter 10

1. Some of these papers have been published; most appear only in mimeograph form and are available from the Occupational Health and Safety Division of the Saskatchewan Department of Labour. Several are listed in the reference list.

2. The Occupational Health and Safety Act, R.S.S. 1976-1977, c. 53, s. 24(4).
3. "On a Matter Pertaining to a Stressful Condition at the Prince Albert Pulp Company Ltd., Prince Albert, Saskatchewan." Decision by Robert Sass, Director, Occupational Health and Safety Division, April 20, 1978 (mimeo).

Chapter 12

1. This is most evident in the American literature as exemplified by Smith (1976).
2. This was argued by H.B. Newcombe (1976) "Records, Confidentiality, and the Detection of Delayed Industrial Risks," in C. Fairclough (ed.) Hazards at Work: Proceedings (Toronto: Corpus Publishers), pp. 49-57.
3. To cite two of many examples: a) the United Steel Workers had a very difficult time searching out workers employed in the nickel sintering plant at INCO between the years 1948 and 1963 in Sudbury after it was learned that nickel sinter dust was carcinogenic; and b) similar difficulties were also experienced in the case of uranium miners at Elliot Lake after epidemiological studies showed conclusively a very high incidence of lung cancer and silicosis among the workers.
4. The Ham Commission (Royal Commission on the Health and Safety of Workers in Mines in Ontario) was able to establish an excess of lung cancer deaths among uranium miners with the use of the "Ontario Uranium Nominal Roll" which is maintained by the Workmens' Compensation Board. The Commission strongly recommended the continuation of this kind of statistical follow-up on all uranium miners.

5. Confidentiality of medical records for the general population is a highly controversial issue and a subject for commissions of inquiry.
6. In response to such concerns, the Environmental Protection Agency (1978) has proposed procedures that prescribe detailed minimum standards and establish responsibility and accountability for the control and security of documents and computer systems that contain confidential business information received under the Toxic Substance Control Act.
7. In the United States, OSHA is making a concerted effort to improve the information concerning occupational illness and injury. No similar effort is underway in Canada. In the U.K. a major effort is underway to implement a new system for reporting workplace accidents.

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