



Department of Justice Ministère de la Justice

Canada

Canada

**WORKING DOCUMENT**

**STRATEGIES FOR SOCIAL  
REGULATION: THE CASE OF  
OCCUPATIONAL HEALTH  
AND SAFETY REGULATION**

**R. Brown**

**March 1991**

**WD1991-15e**

**Research and Development Directorate /  
Sous-direction de la recherche et du développement**

**Corporate Policy and Programs Sector /  
Secteur des politiques et programmes ministériels**

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*The present study was funded by the Research Section  
Department of Justice Canada. The views expressed  
herein are solely those of the author and do not  
necessarily represent the views of the Department.*

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## 1.0 INTRODUCTION

The typical regulatory approach to social problems is to promulgate legal standards that are enforced by inspectors who detect violations and attempt to bring employers into compliance. However, conventional regulation is unable to fully achieve all goals, not just because people's goals conflict; the conventional approach, like any public policy instrument, has inherent limitations.

This report explores the limitations of conventional regulation and reviews alternative regulatory strategies, such as economic incentives and standards for organizational structure, that might be used to supplement it. Although the present discussion is set in the context of occupational health and safety, many aspects of the analysis apply to other types of social regulation.

Chapter 2 discusses two goals that occupational health and safety regulation seek to accomplish. The first is to maximize the welfare of society as a whole by minimizing both the cost of preventing injury and disease and that of injury and disease that actually occur. Achieving an acceptable degree of equality in the distribution of occupational risks is the second goal. The chapter concludes by demonstrating that the labour market falls short of accomplishing either of these goals.

The next two chapters assess the uses and limitations of conventional regulation. Chapter 3 considers whether the incidence of injury and disease that would result if all employers fully complied with legal standards would meet the twin goals of efficiency and equality, while Chapter 4 addresses the questions that arise when compliance cannot be taken for granted: How wide-spread is non-compliance? Can the existing compliance deficit be substantially reduced?

The remaining chapters focus on alternative regulatory strategies. Chapter 5 reviews the uses and limits of two types of incentives that could be utilized in the occupational health and safety arena, namely experience rating of workers' compensation assessments and exposure fees. Unlike conventional regulation, which tells employers what hazards must be controlled and to what extent, economic incentives are designed to force employers to internalize the social cost of injury and disease. To the extent this is accomplished, employers are offered a financial inducement to take precautions, and their customers invited to take the social cost of occupational hazards into account when deciding what products to purchase.

Chapters 6 and 7 take up the topic of organizational structure. Most employers are organizations, corporate or otherwise, comprised of numerous individuals. Both conventional regulation and economic incentives largely ignore this reality, treating an employer with thousands of employees the same as one that employs a handful. Accordingly, the possibility is overlooked to control work hazards by requiring employers to adopt structural safeguards that increase information about work place hazards and influence the way decisions are made.

The role of labour management health and safety committees is examined in Chapter 6, while Chapter 7 addresses the role of two key members of management, namely the health and safety director and the senior manager responsible for safeguarding employees from injury and disease.

## **2.0 PUBLIC POLICY GOALS**

A comparative assessment of conventional regulation and other public policy strategies intended to control workplace hazards must begin by identifying criteria for evaluating these approaches.

In the occupational health and safety arena, the two most important objectives are "efficiency" and "equality". The most efficient strategy, or mix of strategies, is the one that maximizes the aggregate welfare of all members of society by minimizing the total cost of injury and disease and of prevention. Efficiency, however, is blind to who bears the risk of hazardous employment. An important but often overlooked question is therefore how equal the distribution of occupational risk is. As discussed below, however, neither efficiency nor equality is free of controversy as a yardstick for evaluating occupational health and safety regulation.

The criteria of efficiency and equality can be applied not only to the levels of risk to which employees are exposed, but also to the number of workers facing them. While most discussions of occupational health and safety regulation focus upon safeguards utilized in the production process, the incidence of injury and disease is as much a function of the number of employees in jobs entailing different degrees of hazard as of the precautions taken to protect them. Injury and disease can be prevented not only by taking greater precautions, but also by simultaneously reducing the number of employees in hazardous employment and increasing that in safer jobs.

### **2.1 Efficiency: Minimizing the Costs of Injury and Disease, and their Prevention**

The very use of the efficiency criterion is a matter of debate. Within an efficiency framework, injury and disease are prevented to the extent that the benefits of doing so exceed the costs, but only to that extent. In the occupational and safety arena, the efficiency of any regulatory strategy can be assessed only by putting a monetary value on the well-being of employees, so that the benefit of controlling hazards can be compared with the cost. The reduction of personal security to a dollar figure and tolerance of injury and disease whenever the cost of prevention is greater than the resulting benefit attract considerable opposition.

#### **2.1.1 Efficiency and the level of risk**

However, the major objection to cost-benefit analysis is that efficient preventative measures leave some employees exposed to much higher risks than others, because certain jobs are more dangerous or entail higher costs of hazard control than others. If all workers faced the same risk level, any qualms about accepting some degree of risk because the cost of eliminating it is too great could be overcome. An egalitarian society, in which each productive task is shared equally by all members, exposing everyone to exactly the same degree of risk at work, is more likely to consent to embracing efficiency as a goal in deciding what precautions to take against occupational perils.

Health and safety, like all other goods, have a cost. One way to reduce the incidence of injury and disease is to take precautionary measures to reduce the level of risk to which workers are exposed. Precautions can be taken, however, only at the cost of diverting the resources necessary to produce these safeguards from the production of other goods or services.

Moreover, the marginal cost of hazard reduction -- the cost of each successive incremental reduction in risk -- increases as the level of risk falls. The rise in marginal cost is partly attributable to an increase in the quantity of resources required to attain each successive, incremental reduction in risk. Reducing the probability of injury or disease from 1.0 to 0.99999 requires fewer resources than a reduction of precisely equivalent size from 0.00001 to zero, if for no other reason than that the first reduction can be achieved by attacking the part of the problem that is easiest to solve.

There is a second reason why the marginal cost of hazard control rises as risk falls: fewer resources are available to produce other goods and services, as more are devoted to health and safety. As the quantity of those goods and services falls, their marginal value to consumers rises. This value is the opportunity cost -- i.e., the true social cost -- of shifting ever more resources into preventative measures. In other words, as the level of risk falls, the unit cost of resources devoted to prevention rises.

The marginal benefit of hazard reduction is the value attached to the prevention of harm to employees that arises from an incremental reduction in risk. The social benefit of hazard control is a reduction in the number of workers who suffer actual harm, but note that a reduction in risk to each individual from 0.00001 to zero saves the same number of workers from harm as a reduction from 1.0 to 0.99999. In other words, the marginal benefit does not fall with the level of risk.

A cost-benefit analysis favours the taking of precautions whose marginal benefit exceeds their marginal cost. As the level of risk is reduced by adopting these safeguards, the marginal cost of further precautions eventually outstrips the marginal benefit; any further reduction in risk represents a loss of social welfare and would be rejected under a cost-benefit analysis. The greater the value attached to personal security, relative to consumer goods and services, the lower will be the efficient level of risk. Yet even if the relative value of personal security is very high, at some level of risk the marginal cost of a further reduction is almost certain to exceed the marginal benefit, making it not worth the cost.

### 2.1.2 Efficiency and the level of employment

The efficiency criterion can be applied to levels of employment as well as to levels of risk. Just as precautions are not costless, there is a cost to reducing the level of hazardous employment. As employment decreases, so do output and consumer satisfaction. Efficiency requires the same balancing of costs and benefits in setting output and employment levels as in determining what safeguards are appropriate. Each marginal unit of output should be produced only if the benefit it yields is at least equal to its full

social cost -- including not only the cost of taking efficient precautions, but also injury and disease that occur with these safeguards in place.

In a market economy, the best available measure of the social benefit of a unit of production is what customers are willing to pay for it. If the price charged for products that are hazardous to produce equals their full social cost, then only those customers whose valuation of a product exceeds its cost to society will purchase it. Conversely, if the price is below full social cost, because the cost of injury and disease is not taken into account, customers who value these products more than the going price, but less than their true social cost, make purchases which represent a net loss in social welfare.

In an imaginary world where the burden of hazardous employment is shared equally, maximizing social welfare by minimizing the aggregate cost of injury and disease and of prevention is a worthwhile goal. To accomplish this goal, employers must make efficient use of hazard control technology and operate at efficient levels of output and employment.

### 2.1.3 Questioning the efficiency criterion

While conceding that absolute safety is too costly, some people argue that the appropriate level of risk should be determined without explicitly balancing costs and benefits. They contend that the very act of putting a price tag on the well-being of workers demeans the value of their personal security. Yet any decision about acceptable levels of risk attaches an implicit value to safeguarding workers, even if costs and benefits are not consciously considered. That value is the marginal cost of saving the last employee from injury or disease. By not establishing a slightly lower level of risk, achievable only at a slightly higher cost, decision-makers implicitly reject a higher valuation, and vice versa. Refusing to address the question of value merely precludes public debate about whether the implicit valuation is correct and, therefore, about whether the allocation of resources to health and safety is efficient.

What is all too often overlooked by those opposed to cost-benefit analysis is that efficiency puts an upper limit, as well as a lower limit, on the incidence of injury and disease. A major thesis of this report is that conventional regulation allows both levels of risk and of hazardous employment to rise above efficiency. A regulatory strategy that is efficient in every way would substantially reduce the suffering of Canadian workers.

## 2.2 Equality: Sharing the Burden

Efficiency is not the only goal of occupational health and safety regulation in a world where huge disparities exist among employees regarding the risks they face at work. As the degree of hazard varies widely across jobs, occupational risks are distributed very unevenly, with some workers facing much greater dangers than others.<sup>1</sup>

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<sup>1</sup> For a breakdown of injury rates by occupation and industry see Haggard-Gunette (1988).



Is this inequality unjust? The answer to this question may depend upon whether employees incur risk voluntarily. Inequality in exposure to risk might not be troubling if those who face relatively high hazards are aware of the risks they incur, rational in dealing with low probability events and able to choose among jobs that include some that are very safe. A substantial number of employees do not satisfy these conditions.<sup>2</sup>

Even if all workers were well-informed, rational and mobile, disparities in risk distribution might be unjust because the poor are over-represented in the most dangerous jobs. Empirical evidence demonstrates that exposure to occupational risk is inversely related to wealth. (Viscusi, 1983): The poor often feel the greatest economic pressure to trade personal security for risk premiums offered to those willing to take hazardous jobs, even if they are inadequate.<sup>3</sup>

The risks of dangerous employment are borne by a few, but the product of their labour is enjoyed by many. The very hazardous jobs performed by a small minority produce goods and services that are widely utilized. Indeed, per capita consumption of these goods and services is likely to increase with wealth, all other things being equal. In short, the wealthy reap a disproportionate share of the benefit of dangerous jobs, while bearing a lesser share of the burden.

Attaining an acceptable degree of equality in the distribution of occupational risk is an important regulatory goal. While the most obvious way to achieve greater equality is to narrow the risk gap between high- and low-hazard jobs, it is not the only one way. Like efficiency, equality is a function not just of varying risk levels, but also of the number of workers exposed to them. Any reduction in the number of employees exposed to greater perils than the rest of the workforce promotes equality.

### **2.3 Balancing Efficiency and Equality**

The relationship between efficiency and equality is complex. Some changes in levels of risk or levels of employment serve both goals, while other changes promote one at the expense of the other. In the absence of precautions, there would be huge disparities among jobs in the level of occupational risk. The introduction of efficient precautions would narrow the gap by reducing the risks of at least some hazardous employment, while having little effect on certain jobs that are already very safe. To this extent, efficiency and equality are complementary.

However, the adoption of efficient precautions would not eliminate disparities in risk, even if the well-being of all employees is valued equally. Consider two employers whose jobs have the same level of risk in the absence of precautions, but for whom the marginal cost of hazard reduction differs. When efficient preventative measures are adopted, the employer with the lower cost of hazard control will offer employment with lower risks than the other. Of course, if two employers have the same marginal cost of hazard reduction, but differ as to the degree of danger in the absence of precautions, the

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<sup>2</sup> The question of how well informed and rational employees are about occupational risks is taken up below.

<sup>3</sup> As discussed below, empirical studies have confirmed the existence of risk premiums, although whether they reflect the expected cost to workers of occupational risk is a matter of debate.

one starting from the lower hazard level can efficiently offer employees a lower level of risk than the other. Efficient precautions would thus not eliminate disparities among workers in the hazards they face. Greater equality can be achieved only by taking more than efficient precautions to protect high-risk employees (or less than efficient precautions to protect low-risk employees).

Efficiency and equality display a similar relationship when applied to employment levels. Increasing the extent to which the cost of injury and disease is reflected in market prices causes the price of goods that are hazardous to produce to increase more steeply than that of goods that are safer to produce, all other things being equal. As more of the cost of injury and disease is incorporated into market prices, the number of employees engaged in relatively hazardous employment falls relative to those engaged in safer employment, again all other things being equal. Risk is distributed more equally when employment levels are efficient, with the cost of injury and disease built into the price of goods, than when prices do not reflect this cost. However, efficient employment levels still leave some employees facing greater danger than others. The only way to achieve greater equality is to hold the level of employment in relatively hazardous occupations below efficiency (or to raise the levels in safer jobs above efficiency).

Some economists contend that the incidence of occupational injury and disease should be determined solely by reference to efficiency, without concern for equality. Accordingly, the desired degree of equality would be achieved by redistributing whatever losses individuals incur when resources are allocated efficiently. However, the contention that efficient losses can be redistributed in the pursuit of equality makes little sense in the context of occupational injury and disease. The approach is only sound when applied to property damage, where losses typically can be shifted by paying compensation to the property owner once an efficient level of property loss is achieved.

But the same approach cannot work for employees who suffer serious injury and disease; monetary compensation is inadequate. Money offers no consolation to the victim of a fatal accident, although it may assist his dependents. Money may assist a severely disabled person to lead a fuller life, but it can never replace the abilities and freedom from pain that have been lost. In the realm of injury and disease, equality must be addressed at the stage of deciding what losses should be prevented, as the degree to which losses can be redistributed after they occur is severely constrained.

As later chapters will demonstrate in both the levels of risk and the levels of hazardous employment generated by conventional regulation are above efficiency. A reduction would serve both efficiency and equality.

## **2.4 The Deficiencies of the Labour Market**

The following chapters consider which regulatory strategy, or combination of strategies, is best able to achieve an acceptable mix of efficiency and equality. To determine which public policies will best carry us to our desired destination, we must begin with an analysis of our point of departure, the labour market which determines workplace conditions in the absence of regulation. As noted earlier, market forces

generate levels of risk and employment which are unacceptable according to both criteria for evaluation.

#### 2.4.1 The failure to internalize social costs

As employers and employees have a contractual relationship, they might be expected to strike an efficient bargain about the level of occupational risk, namely one in which employees are able to force their employers to internalize the full social cost of injury and disease.

In a perfect world, profit-maximizing employers who internalize this cost would make efficient use of hazard control technology. In addition, the price charged for the goods they produce would capture their full social cost, including the cost of harm to workers, so that the number of employees engaged in hazardous production of goods would not exceed the efficient level. As employees are fully mobile in a perfectly competitive market, not only would levels of employment be efficient, but also the matching of employees and jobs. Employees would choose from among the available jobs the one that suited them best -- risk, remuneration and other factors considered. This is how labour markets would work if perfect competition prevailed.

There is good reason to doubt that labour markets in the real world can ever achieve efficient results. The market's most serious deficiency is entirely ignored by most economists, even though it was pointed out by a leading commentator almost two decades ago (Calebresi, 1970 at 91). The most a perfectly competitive market can force employers to internalize is the cost of risk to employees, who each face a low probability of injury or disease. Yet the true social cost of occupational hazards is the cost of injuries and disease actually suffered by employees, not that of risk of exposure to danger. The important point is that the cost of risk is almost certainly much less than the cost of injury and disease.

Consider, for example, a hazard posing a 0.001 probability of a fatal injury each year for each employee in a work force of a thousand. Although this hazard claims one life per year, no one can determine in advance who will die. Accordingly, the cost to each individual is the disutility arising from a 0.001 chance of death, and the most the market can do is make the employer bear the sum of this disutility for each of a thousand workers, which is almost certainly less than the value the employee who dies places upon his/her life. While employees might accept a thousand dollars for facing a one-in-a-thousand chance of death, most would almost certainly decline an offer of substantially more than a million dollars in exchange for certain death. The same point holds true for serious nonfatal injuries and disease; in short, the cost of harm is greater than the cost of risk. The labour market cannot make an employer bear the cost of harm, because each employee bargains only for the cost of risk. Even if perfect competition prevailed, employers would bear much less than the full cost of injury and disease. As a result, both levels of risk and the number of employees in hazardous jobs are higher than is efficient.

#### 2.4.2 The lack of knowledge among workers

In a perfectly competitive labour market, employers would internalize the cost of risk to employees, although not the cost of harm. But is even the cost of risk actually borne by employers in "real-world" labour markets? The answer depends in part upon how well informed employees are about the hazards they face. Employees who underestimate the cost imposed upon them by occupational risks will not drive a bargain which brings this cost home to employers. While there is a general consensus that workers are poorly informed about the risks associated with many toxic chemicals, there is disagreement over how much they know about the risk of injury.

Several empirical studies have attempted to measure the association between wages on the one hand, and risk of injury on the other, while controlling for other variables that affect compensation levels. The consensus is that remuneration increases with the risk of injury and death, all other things being equal. According to a leading commentator, the best estimate of the risk premium paid to workers who face a 0.0001 probability of death each year is in the range of \$200 per annum. For employees facing a 0.001 probability of death, the premium is estimated to be about \$ 500. (Viscusi, 1983 at 106). The fact that wages increase with risk suggests that employees are able to detect risk, but leaves open the question whether they are able to ascertain the cost of risk with any degree of precision.

To do so an employee must know not just the risk of injury in an occupation, but the risk for employees performing that job for a particular employer. As injury rates vary widely across employers in the same industry, some commentators contend that employees are unlikely to have adequate information about their own employer, even if they have some idea of the general hazard level for their industry (Ashford, 1976). Those who disagree concede that while an employee knows little about the risk of working for a particular employer at the time of hire, reasonably accurate information is acquired through on-the-job experience (Viscusi, 1983).

In order to determine the cost of running a risk of injury or disease, workers need to know not just the probability of suffering a particular type of harm but also the size of the resulting loss. A worker's forecast of the magnitude of the loss caused by a serious disability is likely to underestimate the losses actually suffered when it occurs and all of the financial, physical, psychological and social ramifications become apparent.

Information about the probability and severity of losses provides the raw material for workers to determine their cost of facing occupational risks. Many workers run the risk of a range of injuries that vary widely as to both probability and severity; computing the total cost of all these risks demands a huge amount of information. Even if employees are fully informed about risks, they are not likely to take all of this information into account in making decisions especially when dealing with low probability events.

In summary, even a perfectly competitive labour market cannot force employers to internalize the full social cost of harm to employees. Given the limited information available to workers and the bounds of human rationality, there also is reason to doubt whether employers operating in "real-world" labour markets bear even the cost of risk to

employees, which is less than the cost of harm. To the extent that the cost of harm is not brought home to employers, they have an inadequate incentive to take precautions that yield a social benefit greater than their social cost. And to the extent that employers do not bear the cost of harm to employees, it is not reflected in the price of their products, so that goods are purchased by customers whose valuation is below the cost to society.

Large disparities in risk would remain even in the presence of efficient precautions since the benefit of risk reduction is determined by individual workers according to the value they place on their personal security. This value varies with such characteristics as attitude towards risk, and wealth. As a result, poor employees are exposed to greater risk than rich ones. This method of valuing reductions in risk is almost certain to result in greater disparities in exposure to risk than a regulatory scheme which treats all employees as equally valuable.

## 3.0 THE LIMITED REACH OF LEGAL STANDARDS

This chapter explores what conventional regulation would accomplish if employers always complied with legal standards; the extent and implications of non-compliance are taken up in the next chapter. No attempt is made here to address all of the strengths and drawbacks of legal standards. As the primary purpose is to provide the groundwork for a comparison of standards with economic incentives and structural safeguards, the focus is on the shortcomings of legal standards that other regulatory strategies can overcome, and on the virtues of standards that are wanting in other approaches.

### 3.1 Failure to Affect All Hazards

#### 3.1.1 The impact of noncompliance

A major deficiency of legal standards is their failure to address the hazards that are a contributing cause in the vast majority of current occupational injuries. While legal standards may fare no better in combatting occupational illness, no other regulatory instrument is likely, on the other hand, to accomplish more on the disease front. The important point about injuries is that economic incentives and structural safeguards are able to address a much broader range of injury-causing hazards than legal standards.

A substantial body of empirical evidence demonstrates that compliance with legal standards would yield only a small reduction in the current toll of occupational injuries.<sup>4</sup> At a macro-level, support for this conclusion is found in a study of the impact of standards promulgated under the Occupational Safety and Health Act (OSHA) in the United States. Two researchers who examined the relationship between the rate of compliance with these standards by employers in a given industry and the corresponding injury rate found a weak and marginally significant association. Based upon this finding, the researchers estimated that if all firms moved into complete compliance with OSHA standards, the injury rate would fall by just less than 10 per cent (Bartel and Thomas, 1985).

A similar conclusion emerges from micro-level studies of the circumstances in which injuries actually occur. In these studies, safety professionals were asked to estimate how many injuries would have been prevented by compliance with legal standards. Studies of accident investigation reports in California and Wisconsin found that regulatory violations were a contributing factor in only 10 to 15 per cent of all fatalities.<sup>5</sup> Two studies based upon the much less complete information contained in reports filed by employers under the California and New York workers' compensation

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<sup>4</sup> The conclusion that many of the injuries that presently occur would not be prevented by compliance with regulatory standards does not mean that precautions required by law do not avoid injuries that would otherwise occur. All of the studies of standards cited in this chapter demonstrate that standards do prevent many injuries. Further support for this conclusion is provided by studies of OSHA's recent enforcement activities, which are mentioned in Chapter 4. These studies conclude that injury rates are inversely related to inspection frequency and the number and magnitude of penalties. As the linkage between enforcement activities and compliance is not tight, the association between injuries and compliance with standards is almost certain to be stronger than the association between injuries and enforcement activities.

<sup>5</sup> These two studies are cited by Mendeloff, (1979 at 86) who conducted the California study.

programs estimated that approximately one quarter of all injuries were caused by violations.<sup>6</sup>

### 3.1.2 The need to recognize differing types of hazards

The two California studies also shed some light on what types of hazards current legal standards are best able to control. In that state, three categories of hazards account for approximately three quarters of all injuries: "strain or over exertion," "struck by or striking against" and "falling or slipping." For these categories, the study of accident investigation reports estimated that the percentage of fatalities caused by infractions ranges from a low of 16 per cent to a high of 24 per cent. Although most fatal injuries caused by these perils could not be prevented by complying with regulatory standards, the same is not true of "caught in or between" injuries, most of which involve workers being caught in moving machinery. Over 60 per cent of the fatalities in this category were caused by a violation, but it accounts for only a small percentage of all injuries (6 per cent). An analysis of California workers compensation reports produced analogous results (Mendeloff, 1979 at 95-98).

Similar conclusions also emerge from three studies that have attempted to measure the impact of occupational health and safety regulation on the incidence of injuries caused by various types of hazards. One study found that the introduction of OSHA was associated with a 20 per cent decrease in the incidence of "caught in and between" injuries in California. OSHA did not have the same effect on the two largest categories of injuries. The number of "strain and over exertion" injuries actually increased, while the number of "struck by and striking against" injuries remained constant (Mendeloff, 1979). Another study, using data from New York, found that the introduction of OSHA was associated with a reduction in the severity of "caught in machine" injuries by one third and with a 15 per cent reduction in the frequency of "struck by machine" injuries, two relatively small categories of injuries. These reductions were again partly offset by an increase in the frequency and severity of "over-exertion" injuries (Curington, 1986).

A third study distinguished between acute injuries, such as lacerations and fractures, and nonacute injuries, involving strain and pain, and found that OSHA inspections at three plants were associated with a reduction in the former but not the latter (Robertson and Keeve, 1983).

Standing alone, these three impact studies do not indicate whether the failure of conventional regulation to control certain hazards is the result of inadequate standards, because they fail to address these hazards, or of widespread noncompliance with standards that are adequate. When these research findings are viewed against the backdrop of safety professionals' estimates of how many injuries arising from various hazards would be prevented by compliance with regulatory standards, there can be little doubt that the "inadequate standards" explanation goes a long way to explaining the results of the impact studies. The hazards which, as the impact studies show,

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<sup>6</sup> Ibid.

conventional regulation is least able to control are the same as those that cause the largest proportion of those injuries which safety professionals believe could not be prevented by compliance with standards.

### 3.1.3 Ignorance of the working environment

The limited reach of current legal standards is partly attributable to their neglect of some of the physical characteristics of the work place. While many such aspects of the work environment are regulated in immense detail, others are ignored almost entirely. For example, the machine guarding regulations first adopted under OSHA provided detailed guidance for only an estimated 15 per cent of all types of machines then in use; the rest were governed by a vague requirement to provide protective guarding. As this requirement offered very little guidance as to what type of guarding was acceptable, officials were reluctant to enforce it (MacAvoy, 1977). In addition, little use is made of ergonomic standards to reduce the strain placed upon the human body by the performance of various tasks.

In part, the limited reach of current legal standards can also be attributed to their neglect of the role that worker behaviour plays in causing injuries. While estimates of the proportion of injuries caused at least in part by unsafe acts vary widely, there can be little doubt that worker conduct plays a role in a substantial number of injuries.<sup>7</sup> The only standards applicable to job performance methods are those requiring workers to wear personal protective equipment, and certain very amorphous requirements that they be properly trained and supervised. A notable exception is made for employees engaged in ultra-hazardous employment, such as loggers, whose work is regulated by very specific standards.

Another limitation of legal standards is that they do not address the broader industrial relations setting in which employees encounter hazards. A large body of empirical evidence demonstrates that injury rates are directly related to the length of the work day and the rate at which new employees are hired.<sup>8</sup> A smaller, but still substantial, body of evidence shows that production bonuses and piece rates increase injury rates.<sup>9</sup> No doubt other industrial relations factors influence the level of occupational risk.

While it is doubtlessly possible to formulate more comprehensive standards that would prevent some presently occurring injuries. Yet there is reason to doubt that conventional regulation can ever solve a large part of the occupational injury problem. Legal standards are typically promulgated to control only hazards common to a large number of workplaces, because regulators lack the information and resources to address dangers which are less commonplace. A related problem is that a standard often is not introduced until months or years after the appearance of a new hazard or the discovery of an existing one. The standard-setting process requires time, to gather data on both the

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<sup>7</sup> Bacow (1980) reviews the studies examining the circumstances in which injuries have occurred in an attempt to determine what proportion are caused by unsafe acts, unsafe conditions or some combination of the two.

<sup>8</sup> See Mendeloff (1980); Cooke and Gautachi (1981); Viscusi (1979 and 1986); Robertson and Keeve (1983); and Curington (1986).

<sup>9</sup> The empirical evidence is reviewed by the Joint Federal-Provincial Commission of Inquiry (1981) at 173-195.



harm workers are likely to suffer and the cost of hazard control, and to determine what level of risk is to be tolerated.

Those standards which are issued apply to every employer in an industry or in some cases the whole economy. Writing uniform standards to regulate such matters as training and methods of remuneration is a daunting task. The more employers governed by a rule, the greater the diversity among the regulated population (Bardach and Kagan, 1982). The fundamental mismatch between uniform rules and diverse work places is a brake on the use of legal standards.

For all of the above reasons, legal standards fail to address a range of hazards that are a contributing cause in the vast majority of presently occurring injuries. In addition, conventional regulation does not rectify the market failure that leads employers to take inadequate precautions against these perils. The result is not only inefficient but also inequitable for workers in high-risk occupations.

### **3.2 The Level of Risk Allowed by Legal Standards**

For the hazards addressed by legal standards, the important question is whether the latter produce an acceptable level of risk.

#### **3.2.1 Standards and the balance between efficiency and equality**

In the United States, critics of OSHA have argued that its occupational hygiene standards mandate levels of risk below efficiency. The efficient level of risk as discussed in Chapter 2, is a function of both the value attached to the well-being of workers and the cost of hazard control. Although regulators seldom attach an explicit value to life, an implicit value lies behind every standard, namely the estimated cost of saving a life by complying with the standard.

Critics contend that for many standards the implicit value is much too high. This critique rests upon the questionable premise that the value that public policy attaches to saving a life should be based upon the risk premiums paid to workers. As the premiums paid to workers exposed to a very poorly understood risk of disease are notoriously inadequate, the critics instead rely upon the premiums received by employees who incur a risk of injury. Their argument is that the value of a life can be determined by extrapolation from the premium paid to those who run a risk of fatal injury: If workers who face a 1 in 10,000 chance of death are paid a certain premium, the value of a life is assumed to be 10,000 times that amount.

This line of argument is open to at least two very potent attacks, derived from the analysis in Chapter 2:

1. The premium paid to workers who face a risk of death does not fully reflect the cost to them of running that risk, because they are neither well informed nor fully rational in dealing with uncertainty;

## 2. The cost of risk to employees understates the social cost of fatal hazards.

A better measure of the social cost of these perils is the cost of the lives actually lost, which is almost certain to be much higher than the cost of risk. As the market offers no way to put a price on lives, the only way to do so is through the political process.

### 3.2.2 The question of cost control

Once the value to be attached to the well-being of workers is determined, the only question remaining for efficiency analysis is whether the risk level permitted by legal standard entails a cost of hazard control commensurate with the benefit.<sup>10</sup> Even if regulators do not consciously balance costs and benefits when setting standards, they do so implicitly by refusing to promulgate a standard which would put a substantial number of firms out of business. (Pierce, 1980) Accordingly, their estimates of the cost of hazard control often determine standards. However, these estimates frequently overstate the cost of hazard reduction, resulting in maximum permissible risk levels being set too high to produce the intended mix of efficiency and equality.

The major reason why many standards are based upon inflated cost estimates is that they fail to take full advantage of technological advances that reduce the cost of hazard control. Improved prevention technology is incorporated into regulatory standards only after a significant delay, just as there is a time lag in establishing standards for new or recently discovered hazards.

### 3.2.3 Risk levels and technological advances

A related but much more serious deficiency of legal standards is that they do little to induce employers and their suppliers to invest in the development of new hazard control technology. Such advances are a very important means of reducing occupational risk levels, and one of the greatest contributions public policy can make to injury and disease prevention is to promote investment in technological change. The social cost of a new prevention technology includes both the cost of development and that of utilizing it. To the extent that the sum of these costs is equal to or less than the resulting benefit in risk reduction, efficiency requires that new technologies be developed and applied. Equality may require an even greater investment in technological change to reduce risk in high hazard industries.

Yet legal standards do little to promote the efficient development and utilization of new technology. The problem is greatest for specification standards, which sometimes called design standards, prescribe in detail the precautions to be taken in order to achieve the desired level of risk. When the law requires the use of one technology, there is little point in regulated firms searching for a better one. A specification standard may even preclude the use of already developed new technology.

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<sup>10</sup> Of course, a standard that sets a level of risk lower than is efficient might be justified on grounds of equality.

Unlike specification standards, performance standards prescribe only the desired outcome, allowing employers to decide how to accomplish this result. Performance standards typically set the maximum permissible risk at a level which current technology is able to attain. Unlike specification standards, performance standards do not preclude the adoption of new technologies and offer a limited incentive to invest in their development, in particular, to finding new, less expensive methods to accomplish the mandated result. However, even performance standards typically provide no impetus to achieve a degree of risk lower than the law requires.

Regulators occasionally do seek to force innovation by establishing a level of performance beyond the reach of current technology (Ashford, Ayers and Stone, 1985). Technology forcing is rare, perhaps because of the difficulties regulators encounter in predicting the costs and benefits of developing and applying new technology.

The devotion of too few resources to new technology leaves workers unnecessarily exposed to higher levels of risk, which it might be possible with new technology. To the extent that the cost of hazard control is a constraint on risk reduction, new technology which reduces this cost thus also leads to a lower level of risk.

As well as not taking full advantage of technological change, some legal standards are based upon an overestimation of the costs of applying the technology in existence at the time they are set. Regulators are largely dependent upon industry sources for data on the cost of hazard control. Industry has every reason to inflate cost estimates, and the uncertainty surrounding the cost of achieving a level of risk lower than that generally prevailing provides ample opportunity for this sort of inflation. For this reason, regulators are more likely to overestimate compliance costs than to underestimate them, as demonstrated by recent American experience with occupational hygiene standards.<sup>11</sup> Legal standards are likely to systematically permit higher levels of risk than would be tolerated if costs were estimated with greater precision.

In short, the level of risk tolerated by many legal standards is too high, because standards fail to promote technological change and are slow to incorporate it, and because the cost of utilizing extant technology is often overestimated. These problems would exist even if the cost and benefits of hazard control did not vary among employers.

Diversity adds its own inefficiencies. A uniform legal standard, even a performance standard, is inefficient when applied to employers who differ as to their cost of risk reduction, for certain hazards the cost of control is much higher for some employers than for others. A performance standard mandates the same level of risk for all, likely based upon the average cost of control. More injuries or disease would be prevented, at the same social cost, if the uniform standard were jettisoned in favour of requiring employers with lower control costs to take greater precautions than those with higher costs.

While some commentators deplore the inefficiency of uniform standards in this setting, greater efficiency can be achieved only when levels of risk are allowed to vary

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<sup>11</sup> Examples of this are cited by Viscusi (1985) and Mendeloff (1988).

across work places, with a resulting inequality in exposure to hazard. To the extent that equality is cherished, however, the ability of legal standards to produce uniform levels of risk among workers exposed to a common hazard is a virtue, not a vice. Legal standards can also be formulated to achieve whatever degree of equality is desired among workers exposed to different hazards.

### **3.3 Legal Standards and Employment Levels**

One of the most significant limitations of legal standards is often overlooked in the debate about regulatory strategies. Legal standards are designed to regulate the degree of risk to which employees are exposed by requiring employers to take precautions. Standards have nothing to say, however, about the number of employees exposed to various levels of risk. Although they address levels of risk rather than levels of employment, they do slightly reduce the number of workers performing dangerous jobs by increasing the cost of production. Yet employees continue to suffer injury and disease without their losses being reflected in the price of the goods they produce. The unfortunate result is that goods are purchased by customers below their full social cost. In other words, legal standards do not correct the market failure which results in more relatively dangerous and less safe employment than is efficient.

The inability of legal standards to hold the number of employees performing hazardous jobs to an efficient level is also inequitable. At present a relatively small number of employees face much higher risks than the rest of the working population. The inequity of legal standards lies in their failure to reduce this number.

Could regulators promulgate standards which fix efficient levels of output and employment, either directly or by regulating production levels? To do so, they would have to determine the marginal social costs and benefits of every product, and then fix output and employment at the level where costs just equal benefits, a task that is tantamount to administering a planned economy.

The point of noting the above shortcomings of conventional regulation is not to suggest that regulators should promulgate standards which dictate levels of employment, force technology advancement and address every last source of injury in the workplace. Rather, it is to highlight the importance of finding regulatory mechanisms that can overcome the inherent limitations of legal standards.

## 4.0 ENFORCEMENT AND THE COMPLIANCE DEFICIT

The enactment of legal standards is only the first step in reducing risk levels in the work place. Employers must actually adopt the required precautions before they can have any impact on the incidence of injury and disease. To promote compliance with legal requirements, regulators conduct inspections and sometimes resort to penalties for non-compliance. The current enforcement activities of regulatory agencies however fail to prevent a large number of violations. Although greater stringency would likely produce a higher compliance rate, any realistically achievable level of enforcement would probably leave a substantial compliance deficit.

The analysis in this chapter draws upon a detailed study of the enforcement practices of the Workers' Compensation Board (WCB) of British Columbia. Summary data were also gathered in all other provinces except Nova Scotia and Prince Edward Island; data for the federal jurisdiction were also unavailable.

### 4.1 The Extent of Noncompliance

While the exact dimensions of the compliance deficit cannot be determined, there is no doubt that a large shortfall exists between the law in the books and the law in action. The only readily accessible data on the extent of compliance with legal standards are contained in inspection, reports which provide a "snapshot" of the state of compliance by inspected firms at the time inspections are conducted. The number of written orders issued by inspectors directing employers to comply with regulatory requirements is the best available measure of the extent of detected violations. Tens of thousands of orders are issued each year in the three largest provinces, as recorded in Table 1.

**Table 1** Number of Orders Issued (1983-1988)\*

	<b>1983-84</b>	<b>1984-85</b>	<b>1985-86</b>	<b>1986-87</b>	<b>1987-88</b>
British Columbia	29,323	31,169	34,051	39,406	37,946
Ontario	103,077	100,515	93,333	81,382	70,504
Quebec	50,359	37,720	35,407	34,464	38,489

\* The data for Quebec and British Columbia refer to calendar years; the data for Ontario refer to the fiscal year.

Table 2 reports the average number of orders per inspection between 1983 and 1987. The number ranges from 0.71 to 0.86 in Ontario, 1.16 to 1.4 in British Columbia and 0.94 to 1.55 in Quebec; it is much lower in Alberta and Saskatchewan. In part, this difference may reflect a lower incidence of detected violations, but probably results from the approach that enforcement officials take to writing orders. The figures suggest that a much smaller proportion of detected violations are recorded in a written order in Alberta and Saskatchewan than in other provinces. Field work in British Columbia revealed that

even in that province many violations observed by officers are not recorded in writing. In addition, of course, not all violations existing at the time of an inspection are detected.

**Table 2 Average Number of Orders per Inspection (1983-1988)\***

	1983-84	1984-85	1985-86	1986-87	1987-88
British Columbia	1.16	1.13	1.22	1.23	1.40
Alberta	0.39	n/a	0.31	0.24	n/a
Saskatchewan	0.36	0.45	0.39	0.46	n/a
Manitoba	n/a	0.57	0.60	0.68	0.67
Ontario	0.71	0.74	0.80	0.75	0.86
Quebec	1.55	0.94	0.97	1.03	0.93
New Brunswick	0.52	0.66	0.70	0.68	n/a
Newfoundland	n/a	n/a	2.20	2.10	2.50

\* The data for British Columbia, Newfoundland and Quebec refer to calendar years, the remainder to fiscal years.

Although many of the violations recorded do not pose a serious hazard, others do. For example, in 1986 officers of the British Columbia WCB cited 1,612 violations concerning guard rails and 409 concerning floor openings. Both of these infractions put workers at risk of falling from a height, the hazard that accounts for more serious injuries and deaths than any other in the construction industry. Board officers also issued 2,540 orders concerning machine guarding, 339 concerning the sloping and shoring of trenches, 238 concerning asbestos, 174 concerning isocyanates, 109 concerning controlling the fall of a tree and 74 concerning explosives. Many or most of these violations entailed a significant risk of injury or disease.

Many orders are issued to firms that previously have been cited for the same infraction. Computer records of all inspection reports issued in British Columbia over the three-year period from 1984 to 1986 were reviewed to identify instances of employers receiving repeat orders. A "repeat order" is defined as one issued under the same subsection of the regulations as one or more previous orders issued to the same employer. Approximately 60,000 orders were issued to employers inspected 10 or more times during this period. Almost one half of these orders (28,500) were for repeat violations, 10 per cent (5,950) were for violators with 5 or more previous citations or three per cent (1,936) addressed violations cited 10 or more times previously. All of these figures substantially understate the true number of repeat orders issued during this three-year period, because orders written before 1984 are not taken into account.

## 4.2 Current Enforcement Practices

The huge number of violations that continue to occur across Canada exposes a large number of workers to the very hazards legal standards were designed to eliminate.

A partial explanation for this compliance deficit is that many employers are inspected only at long intervals, if ever, relatively few offenders are penalized, and the penalties imposed are not large.

Inspecting tens of thousands of work places is a major challenge for enforcement officials. Less than one-third of the approximately 85,000 employers under the regulatory jurisdiction of the WCB of British Columbia were inspected between 1984 and 1986. No doubt many of the employers who were not inspected are in low hazard industries. Yet over one half of the employers inspected by safety officers were visited only once over this three year period; just over ten per cent were visited five or more times. These numbers overstate the frequency of visits to worksites as many employers carry on operations at more than one location.

While many violations escape detection because employers are inspected infrequently at best, only a tiny fraction of the violations that are detected result in any type of sanction. Studies of the enforcement of occupational health and safety regulation in Canada,<sup>12</sup> the United Kingdom,<sup>13</sup> Australia<sup>14</sup> and several European countries<sup>15</sup> over the last decade have found that only fraction of all offences are subject to punishment. This observation accurately describes the recent Canadian experience.

Table 3 reports the ratio of orders to employer sanctions, while indicating in parenthesis the ratio of orders to all sanctions, including those against employees and supervisors. The number of sanctions is based upon the number of formal enforcement proceedings initiated, not the number of such proceedings that ultimately resulted in a sanction being imposed. With the exception of Alberta and Quebec, the number of orders per sanction is more than 100, much more in most provinces: In New Brunswick and Newfoundland, there are thousands of orders for every sanction.<sup>16</sup>

The reluctance of regulators to resort to sanctions is dramatically illustrated by their frequent failure to punish employers with a history of repeat offences. Consider, for example, the treatment of employers who were cited for guard rail infractions in British Columbia between 1984 and 1986. Forty employers received between five and nine orders and 21 received 10 or more. Fifty-seven per cent of the employers with between five and nine guard rail orders were not penalized for any offence in this three-year period. The corresponding percentage for employers with 10 or more orders is 48. It is not known whether the penalties that were levied against employers with repeat guard rail offences were prompted by these or other violations. As some of the penalties were probably attributable, at least in part, to other offences, these figures overstate the Board's willingness to penalize repeat guard rail violations.

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<sup>12</sup> Reschenthaler (1979) and Royal Commission (1985).

<sup>13</sup> Carson (1970a and 1982).

<sup>14</sup> Grabosky and Braithwaite (1986); Braithwaite and Grabosky (1985).

<sup>15</sup> Morgenstern (1982).

<sup>16</sup> The only data available for Labour Canada are the number of prosecutions initiated in three of its six regions, namely the Atlantic, St. Lawrence and Central regions; there were four in fiscal 1986-1987 and two in 1987-1988. The best estimate of the number of violations recorded in these regions in each of these years is in the thousands.

Across Canada, the relatively few offenders who are punished do not incur large fines. Table 4 reports the average employer penalty in the provinces for which data is available. The average penalty has exceeded \$4,000.00 in only two provinces, Ontario and British Columbia, and only in a single year in each. Elsewhere, average penalties have ranged as low as \$550.00 and have rarely exceeded \$2,000.00.

**Table 3 Ratio of Orders to Employer Sanctions (1983-1988) \***

	1983-1984	1984-1985	1985-1986	1986-1987	1987-1988
British Columbia	484	346	181	131	175
Alberta	187		83 (49)	46 (29)	
Saskatchewan	341	543	205	206	
Manitoba		2,002 (1,334)	474 (252)	248 (237)	266 (178)
Ontario			(166)	212 (129)	127 (110)
	(185)	(226)			
Quebec	(109)	(55)	(31)	(26)	(29)
New Brunswick	1,156	2,870	3,641	3,480**	
Newfoundland			1,163 (1,163)	2,192 (731)	

Notes:

The numbers in brackets are the ratio of orders to all sanctions including those against employees and supervisors.

\* There were no prosecutions and 3,480 orders in this year.

\*\* The data for Alberta (1985 and 1986), British Columbia, Newfoundland and Quebec are for calendar years, all others for fiscal years.

**Table 4 Average Employer Penalties (1983-1988)\***

	1983-84	1984-85	1985-86	1986-87	1987-88
British Columbia	3,122	2,368	1,911	3,298	4,914
Alberta	1,840	1,608	1,912	1,093	1,060
Saskatchewan	1,300	1,400	1,800	1,360	n/a
Manitoba	n/a	n/a	n/a	n/a	2,969
Ontario**	3,194	2,285	2,656	4,420	3,484
Newfoundland	550	1,167	550	1,000	n/a

\* The data for Alberta (1985 and 1986), Newfoundland and Quebec for calendar years, not fiscal years.

\*\* The data presented is for the Industrial Health and Safety Branch only, not the Construction Health and Safety Branch.

### 4.3 The Prospects of Stricter Enforcement

Violations would almost certainly would decrease if regulators conducted more inspections or levied more, or larger, penalties. According to standard deterrence theory, an increase in either the number or size of penalties is expected to reduce the incidence of infractions by raising the expected cost of noncompliance with legal standards.



Employers who deliberately disregard legal requirements whenever this course is more profitable than compliance can be expected to change their practices when the projected cost of noncompliance, or rather the cost as perceived by them goes up.

There also is reason to expect that an increase in the number of inspections would yield a higher rate of compliance, even in the absence of any change in the size or frequency of penalties. Not all violations are committed in the conscious pursuit of profit. Some employers simply do not know what the law requires and will comply when shown how by an inspector. Others who know what they should do, but have been preoccupied with other concerns, will remedy deficiencies which an inspection draws to their attention. Some of these employers may be motivated to comply by the prospect of a penalty, others because they believe it is the proper thing to do.

Empirical studies confirm that both inspections and penalties lead to enhanced compliance. Since the advent of the Occupational Health and Safety Act (OSHA) in the United States in 1969, several researchers have attempted to measure the impact of this brand of regulatory enforcement. As no similar research has been conducted in Canada or elsewhere, these American studies offer the only available insights about the actual results of enforcement activities.

The only two studies to examine the impact of OSHA inspections on compliance rates both found that an increase in their number had a beneficial effect. One study tracked the performance of individual employers on successive inspections and found that the number of citations decreased with the frequency of inspections (Gray and Jones, 1987). The number of citations from the first inspection of a firm to the second decreased, on the average, by three, much larger than the average decrease precipitated by fifth and subsequent inspections (0.028). Similar results were obtained when this methodology was applied to hygiene violations, excluding safety infractions. The second study found an inverse relationship between inspection frequency for an industry and the number of citations issued to employers in that industry (Bartel and Thomas, 1985). The researchers estimated that doubling the inspection rate would increase the compliance rate by just over 25 per cent.

This second study also examined the impact of OSHA penalties on compliance rates, again finding an inverse relationship. The association between mean penalties and violations was found to be even stronger than the relationship between inspections and violations. This finding suggests that penalties play a crucial role in regulatory enforcement.<sup>17</sup>

This empirical evidence suggests that more inspections and larger penalties would lead to greater compliance. Indirect support for that conclusion comes from a group of studies, summarized in Appendix I, which examine the impact of OSHA inspections and penalties on injury rates. Overall, for every study that finds a beneficial effect on injuries, another reaches the opposite conclusion. However, the picture portrayed by this research becomes much clearer when the focus is narrowed to recent OSHA enforcement activities, ignoring the agency's early years.

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<sup>17</sup> This conclusion was also reached by Gray and Scholz (1988), who found that penalties had a much larger impact on injuries than inspections.

The only two studies use inspection data for a period beyond 1978 both concluded that OSHA inspections lead to fewer injuries (Robertson and Keeve, 1983; Viscusi, 1986). One researcher estimated that the effect of OSHA inspections was to reduce the number of injuries leading to lost time by between 1.5 and 3.6 per cent (Viscusi, 1986).

Only two studies use penalty data for a period ending later than 1978. One of these studies, using data from 1973 to 1983, found no association between either the mean penalty in an industry or the number of penalties per employee in an industry, on one hand, and the industry injury rate on the other (Viscusi, 1986). But another study, this one using data from 1979 to 1985 for individual employers, found that injury rates were inversely related to both the probability of the employer being penalized and the mean penalty for the industry (Scholz and Gray, 1988). Not only did this study use more recent data than the other, it avoided the problems that arise from collecting data on injuries and penalties at the industry level. In particular, the researchers developed a model to estimate the probability of each employer being penalized based upon its size and injury record, as well as the average number of penalties per employer in that industry, rather than assuming that all employers in an industry faced the same probability of a penalty. The greater precision of this employer level study lends credence to its conclusion that penalties do prevent injuries.

These researchers found that the general deterrence to which all employers are subject affects injury rates much more strongly than the specific deterrence experienced by employers who actually receive a penalty. They also estimated that a 10 per cent increase in the number of penalties would reduce the number of injuries by 1.16 per cent and that a similar increase in the average size of penalties would reduce injuries by 0.93 per cent. In other words, an increase in the probability of a penalty has a larger effect on injuries than a similar increase in the size of penalties.

While studies of OSHA's early years produced mixed results, studies using more recent data suggest that OSHA's enforcement activities do prevent injuries. The most recent evidence probably offers the best measure of the agency's potential. Although enforcement activities may lead employers to take precautions that are not legally required, increased compliance with legal standards is probably the mechanism by which most of the impact of inspections and penalties on injuries is registered. In other words, the studies finding an association between enforcement and injuries suggest that enforcement promotes compliance.

#### **4.4 Limits on the Stringency of Enforcement**

Inspections and penalties probably do enhance compliance, but current enforcement practices leave a large compliance deficit. While the stringency of enforcement can be increased, there are limits on what is possible in the current political setting. Any attempt to increase the stringency of enforcement by the large measure required to substantially eliminate this deficit is unlikely to succeed.

The resources devoted to inspection activity have not been sufficient to ensure that even all employers in high-hazard industries are inspected regularly. Massive resources would be required to increase inspection frequencies enough to reduce violations to a negligible level. Even very frequent inspections, however, would probably fail to detect a significant number of transient violations, such as employees working too near a power line or not wearing personal protective equipment which may account for a large proportion of injuries. A study of the reports filed by California officials investigating injuries caused by infractions estimated that approximately one half of these violations were transient in character (Mendeloff, 1979 at 87).

Compared to an increase in inspections, the deterrent threat of more and larger penalties appears to offer a much less expensive way to reduce injuries. Deviant employers might be expected to comply with regulatory requirements only if enough offenders are penalized and fines are sufficiently high. But there are strong constraints on the extent to which penalties can be used to enforce occupational health and safety regulations, constraints imposed as much by attitudes about punishment as by resource limitations.

One such constraint is found within the regulatory process itself. Canadian regulators have traditionally been very reluctant to punish employers, even for repeated health and safety violations. The number of offences that continue to occur, many posing a serious hazard, demonstrates that the limited deterrent provided by regulatory enforcement has failed in the past to provide an acceptable degree of compliance. Yet still only a tiny fraction of all offenders are penalized, even in Ontario and British Columbia where the number of enforcement proceedings has increased dramatically in recent years. There is no certainty that current enforcement levels in these provinces can be sustained, and even less reason to expect that other jurisdictions will achieve such levels in the foreseeable future.

The reluctance of many regulatory officials to invoke punitive sanctions can be traced to several sources, the first being a strong preference for persuasion over punishment relayed from one generation of officials to the next. How did that preference arise and why has it survived?

The vast majority of infractions -- especially contravention of safety standards as opposed to hygiene standards -- create a risk of harm, but do not result in actual harm being suffered. In at least some jurisdictions, the majority of prosecutions are for violations that resulted in actual death or serious injury. By comparison, offenders who expose workers to the same degree of risk, but by chance cause no harm, are viewed as less deserving of punishment.

Moreover, field officers, the officials who must recommend a prosecution if there is to be one, have an ongoing relationship with the firms they inspect. Officers work hard at building a rapport with regulated firms, in part because a good relationship makes it easier to achieve compliance through education and persuasion. When these tactics fail, built-up personal bonds may inhibit an officer from resorting to harsher measures.

Senior officials may also shun time-consuming prosecutions because they believe that inspectors' time is better spent in the field. Some regulators may be reluctant to penalize corporations (and individual managers) for offences which are perceived as an inevitable by-product of productive economic activity. Whatever the reason for the recalcitrance of many regulators to resort to punishment, these attitudes are not easily changed.

The second constraint on the use of penalties comes not from regulators but from the regulated firms. To a point, increasing the frequency or magnitude of penalties above current levels is likely to yield a reduction in violations that more than justifies the associated enforcement costs. But as enforcement becomes more and more stringent, employers at some point can be expected to fight back, driving up enforcement costs. Punishment by its very nature invites resistance. Not only may employers contest sanctions and compliance orders, employer associations can be expected to lobby to weaken the enforcement agency by reducing its budget or by other means. The political turmoil over OSHA's very frequent use of penalties, most of which are relatively small in amount, illustrates what can happen (Bardach and Kagan, 1982). This external political constraint would limit the number and magnitude of penalties even if regulators were to shed their own aversion to punishment.

The dislike of punishment shared by regulators and employers limits not just the number of penalties, but also their size. In addition, political and social constraints affect the magnitude of penalties. An employer who obeys the law only when compliance is more profitable than non-compliance will not comply unless faced with a penalty much larger than the cost of compliance. The reason why the fine must be substantially larger is that the employer will discount it by the perceived probability of capture and penalty, the size of the discount depending upon his attitude towards risk. The probability of a violation being detected is low, especially for transient violations, and the probability of an employer being penalized is even lower. If the probability of detection is 1 in 100, and 1 in 100 detected violations result in a penalty, (not unreasonable estimates for many types of infractions), then the probability that an infraction will be penalized is 1 in 10,000. Unless an employer grossly overestimates this probability or is extremely risk averse, the nominal penalty would have to be at least several thousand times as large as the cost of compliance in order to make the latter profitable. In this setting, huge penalties would be required to deter offences that entail more than trivial compliance costs.

Fines of this size give rise to two objections. Since many companies commit regulatory infractions, levying a huge penalty on the few that are caught, while all others escape unscathed, may be perceived as unjust. The objection is not that the offender does not deserve harsh punishment, but rather that one should not bear the burden for others. Whatever the merits of this claim to equal treatment, it is likely to preclude penalties capable of deterrence.

The second problem arises when a penalty sufficiently large to deter would drive the offender into bankruptcy or cause layoffs, with consequent losses to creditors, the local community and employees. Regulators and prosecutors are not likely to seek

adequate penalties in this context, and judges are no more willing to impose them (Coffee, 1981).

A reluctance either to make a few offenders bear the full cost of deterrence or to allow innocent parties to suffer may prevent large penalties from being imposed. But even if large penalties are levied, the threat they pose is an empty one in some cases. An offender's wealth sets an upper limit on the amount that can be extracted by way of a fine. When the penalty imposed exceeds an employer's resources, those resources will be discounted by the probability of a penalty in determining the expected cost of non-compliance, and the amount of the fine becomes irrelevant. If according to this calculation, breaking the law is the more profitable course, the legal system simply cannot mount an adequate monetary deterrent (Coffee, 1981).

## 5.0 ECONOMIC INCENTIVES

### 5.1 Introduction

Legal standards are not the only way to combat work place hazards; economic incentives can also be enlisted in this campaign. Although incentives are seen by some as an alternative to standards, there is no logical necessity to choose between these two regulatory strategies. Employers could be required to comply with legal standards in addition to paying a fee reflecting the social cost of the danger that remains after legal requirements are met. While the idea of charging a fee for putting employees at risk may seem immoral, the use of economic incentives along with conventional regulation is likely to achieve a lower incidence of injury and disease than the enforcement of legal standards alone. The two types of economic incentives discussed here are experience rating and exposure fees.

#### 5.1.1 Experience rating

Experience rating operates through the workers' compensation system. Under an experience rating scheme, the assessment that an employer pays is tied to the compensation benefits received by his work force. An alternative approach to funding workers' compensation programs is to calculate the levy charged an employer of any given size entirely by reference to the cost of claims for the industry in which he carries on business. This approach results in employers in a high-hazard industry paying a higher percentage of their payroll than those in a low-hazard industry. However, the same percentage of payroll is paid by all members of the same industry, equally by those with exemplary health and safety practices and by those with appalling ones.

In the past, many employers were assessed under this system, while most of the rest paid an assessment that was as much or more a function of industry claims costs as a function of their own experience. Only a handful of employers have been forced to pay the full cost of all claims made by their own work force.

#### 5.1.2 Exposure fees

While experience rating has been used to a limited extent in Canada for many years, exposure fees are a new arrival on the regulatory scene. Under a scheme of exposure fees, employers pay a charge based on the degree of hazard observed in the work place rather than on the harm actually suffered by employees, as is the case with experience rating. If exposure fees were used in conjunction with legal standards, a standard might prescribe a maximum permissible level of risk arising from a particular hazard and charges would be levied according to the extent that employers reduced risk below that level.

For example, if the maximum permissible level of noise was 90 decibels, employers who just met that standard would pay a larger fee than those who exposed their

work force only to 85 decibels. The distinction between an exposure fee and a penalty levied for contravening a legal standard is that the fee is payable even though no mandatory standard has been violated.

This chapter first attempts to describe these two types of economic incentives in greater detail and to assess the extent to which they can force employers to bear the cost of occupational hazards. As we shall see, experience ratings are better able than exposure fees to accomplish this goal for occupational injuries, while exposure fees enjoy a comparative advantage in dealing with hearing loss and occupational illness. Against this backdrop, the next section argues that economic incentives, when used along with legal standards, can ameliorate the most serious deficiencies of conventional regulation. Attention then turns to the problems that experience rating poses for the compensation and rehabilitation of injured workers, while the final section addresses the pressing need for empirical research on the effects of economic incentives.

## **5.2 Economic Incentives: The Concept**

The purpose of economic incentives is to make each employer internalize the social cost of the hazards found in his work place. Any scheme that seeks to accomplish this objective must estimate hazard levels, put a value on the resulting harm to employees, and charge this cost to employers in a timely fashion.

### **5.2.1 The need for immediacy**

Economic incentives are meant not only to cause employers to consider potential harm to employees in deciding what precautions to take, but also to ensure that actual harm that caused, regardless of the precautions taken, is reflected in the price charged for an employer's product. To accomplish these objectives, the cost of hazards existing at any given time must be charged against employers without undue delay.

The prospect of paying in the distant future a charge for present hazards provides little incentive either to take precautions against them or to incorporate their cost into prices. One reason is that many managers base their decisions on short term consequences and ignore future charges. Even managers who operate on a longer time horizon are likely to discount a charge to be paid years hence and base their decisions on the its discounted present value. If the full charge equals the cost of harm to employees, the discounted charge grossly understates this cost.

Experience rating can promptly bring the cost of injury causing hazards home to employers because injuries typically do not have a significant latency period. On the other hand, experience rating is poorly suited to dealing with occupational disease since many remain latent for 10, 20 or even 30 years after the worker's exposure to harmful agents. Experience rating cannot charge an employer with the social cost of hazards until workers' compensation benefits are paid when harm becomes apparent. Accordingly, even if all workers with an industrial disease received workers' compensation -- which is

not the case, for reasons discussed below -- experience rating still would do little to safeguard against occupational hygiene hazards.

As exposure fees are based upon workplace conditions rather than upon actual harm, they can reflect conditions in the very recent past. Accordingly, the impact of exposure fees is not blunted by the long latency period of many occupational diseases.

### 5.2.2 Estimating hazard levels: the element of chance

The assessments levied under an experience rating scheme are based upon the claims workers file for compensation. If these assessments are to reflect the hazard level faced by employees, two conditions must be satisfied:

- Claims data must offer a reasonably precise record of the actual incidence of injury and disease in an employer's work force;
- The actual incidence of injury and disease in a workforce must reflect the degree of danger to which employees are exposed, rather than being a product of chance.

Claims data offer a very inaccurate record of industrial illness. Only a very small proportion of employees who suffer an occupational disease are awarded workers' compensation (Barth, 1980 and Weiler, 1983). This shortfall arises in part because modern science has not yet identified the causal link between illness and occupational exposure to certain substances. In addition, compensation awards have failed to keep pace with what modern science does know about the etiology of occupational diseases.

One reason for these shortcomings is that the condition of some workers suffering from an occupational illness is not accurately diagnosed. Unless or even if properly diagnosed, workers who were exposed to harmful agents years before the disease became manifest may be unaware of this exposure or unable to prove it. As most diseases caused by occupational hazards also arise outside the workplace, a worker who is able to prove occupational exposure to a substance known to cause disease often is denied compensation because her illness is attributed to other factors.<sup>18</sup> For all of these reasons, the number of workers who receive compensation for occupational illness grossly understates its true incidence.

Claims data provide a much more reliable record of occupational injury than of illness. The vast majority of employees who are injured on the job do receive compensation. This is not to suggest claims data perfectly reflect the frequency and severity of injuries. Some injured workers who are entitled to compensation do not receive it and vice versa; others receive more or less compensation than they should.

While claims data offer an imperfect record of injuries, even in the absence of experience rating, critics of experience rating argue it causes claims data to systematically

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<sup>18</sup> For example, even if one in three cases of a disease are known to be occupationally induced, the odds are still 2:1 that any particular person's illness arose from other causes. All claims would be denied if a balance of probabilities test is applied.



understate the harm suffered by employees. Experience rating gives employers an incentive to pressure employees not to file compensation claims, to fight the claims workers do make, and to press injured employees to return to work too soon (Ison, 1986). Proponents of experience rating counter that some employees who seek compensation are either not entitled to it or to less than they claim, and that experience rating may help to weed out these claims by encouraging employers to defend against them (Weiler, 1983).

Yet even if experience rating does cause claims data to systematically understate the frequency and severity of injuries, experience-rated assessments may still offer employers a significant incentive to reduce the incidence of injuries, albeit a smaller one than assessments that fully reflected the true incidence of injuries.

The usefulness of experience rating in injury prevention decreases as the size of an employer's workforce falls and as the degree of hazard drops. The objective of experience rating is to make each employer bear the cost of occupational hazards. Where chance has little or no influence on the harm suffered by employees, injuries are an accurate reflection of the level of hazard to which they are exposed; but where a chance element has a major bearing on the frequency and severity of injuries, only a weak association exists between the degree of danger faced by employees and the injuries which result. The role that chance plays in determining the actual incidence of injuries in a workforce is inversely related to the number of employees and the level of hazard.<sup>19</sup>

The objective of an experience rating scheme is to force employers to internalize the cost of occupational hazards. The cost of injuries must be brought to bear on an employer within a very few years of their occurrence in order to ensure that this cost is not ignored or substantially discounted. To the extent that the actual incidence of injuries in a work force is a product of chance rather than of the degree of danger, no preventative purpose is served by charging the employer with the cost of actual injuries. Indeed, to do so is to deny the employer insurance against a chance event.

Just as the effect of chance on the incidence of injuries varies with employer size and hazard level, so should the degree to which employers are experience rated. Experience rating can be done to various degrees. In its absence, an employer's assessment is based solely upon industry claims data. Under full experience rating, the assessment is based entirely upon an employer's own record of claims. Between these

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<sup>19</sup> Consider how chance influences the number of injuries in a small work force:

- In many industries, the probability of any particular employee suffering a disabling injury over the course of one or more years is low. There is low probability of injury striking a very small work force. Even if the degree of hazard were the same in for all small employers in an industry, only some would be struck by injury in any given year. The occurrence of an injury in one workplace and not another is no proof that the probability of injury is higher in the first than the second.
- Chance has little bearing on the number of disabling injuries in a very large workforce, however, even if the probability of any particular employee being injured is low. For example, the occurrence of twice as many injuries in one very large work force as in another is good evidence that the probability of an employee being injured is twice as high in the first as the second.
- The impact of chance on the number of disabling injuries in a workforce is a function not only of the number of employees but also of the probability of any particular employee being injured. If this probability is high enough, chance plays little part in determining the number of injuries over the course of a few years, even in a very small workforce.
- Chance also plays a role in determining the severity of injuries. For an individual employee, the probability of severe injury or death is lower than that of a minor injury. Accordingly, chance has a stronger influence on the severity of injuries suffered by a workforce than on the number of such injuries.

two poles lies a continuum of increasing experience rating in which both industry and employer claims are taken into account. Partial experience rating provides some incentive to prevent injuries as well as some insurance against chance events.

Large employers should pay assessments which are fully experience rated.<sup>20</sup> As the size of the workforce decreases, so should the degree of experience rating. The rate of decline should vary with the degree of hazard in an industry, with the most rapid decline in industries where the probability of any particular employee being injured is lowest. For low-hazard industries, the appropriate rate of decline is likely to be so steep that the smallest employers escape experience rating altogether. In order to give these employers some incentive to prevent injuries, their insurance coverage should be limited to require them to bear the first few hundred dollars of each claim (See Weiler, 1983).

The experience rating schemes currently in use do not follow this approach. These schemes typically exclude very small employers and rate the rest to the same limited degree, regardless of size and level of hazard. The degree of experience rating is set low enough to ensure that the smallest of the employers covered, in the lowest hazard industries, enjoy adequate insurance against chance events. As chance plays a large role in determining the injury costs of these employers, a small degree of experience rating does not compromise injury prevention. However, injury prevention is sacrificed by minimal experience rating of employers who are sufficiently large, or operate in industries with such high hazards, that chance plays little or no role in determining injury costs.

While experience rating uses claims data to estimate hazard levels, exposure fees are based upon the actual conditions under which employees work. Exposure fees would be calculated by reference to what is known about the general causal relationship between the conditions observed in the work place and the resulting incidence of injury or disease.

If exposure fees are to reflect the cost of occupational hazards, an accurate record must be kept of workplace conditions. This is feasible only for hazards that are constant over long periods, or at least generally subject to no more than minor variations.

Exposure fees also require a reasonably precise understanding of the causal relationship between workplace conditions and injury or disease. Such an understanding lies beyond the current knowledge about most safety hazards (Robertson, 1983). However, epidemiological studies do offer a crude estimate of this relationship for some hazards, for example, the relationship between noise levels and hearing loss and the disease rate among workers exposed to various amounts of certain air contaminants. Such estimates provide a basis for calculating charges based upon hazard levels. Although these charges provide only a rough approximation of the cost of occupational disease, deflecting some measure of this cost onto employers is better than doing nothing (Weiler, 1983).

While posing challenges of their own in the calculation of hazard levels, exposure fees are better suited to dealing with occupational disease than experience rating. As long

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<sup>20</sup> An exception might be made for an extremely low probability catastrophe which kills or injures numerous employees.

as science can estimate the general causal relationship between occupational exposure and the incidence of a disease, the calculation of exposure fees is not impaired by the fact that many employees with this illness do not collect compensation.

Exposure fees also offer one advantage over experience rating in dealing with both injury and disease: Unlike the latter, they do not give employers an incentive to resist worker's compensation claims. The corresponding disadvantage of exposure fees is that they require constant monitoring of workplace conditions and a reasonably accurate understanding of the causal relationship between those conditions and injury or disease.

### 5.2.3 Putting a value on harm

Once hazard levels are estimated, a value must be placed upon the resulting harm to employees in order to calculate experience rated assessments or exposure fees.

An experience rating scheme charges an employer with the cost of benefits paid to employees who are afflicted by occupational injury or disease. In other words, the implicit "value" attached to the harm suffered by a worker is the amount he or she receives by way of workers' compensation benefits. This amount, as stated in Chapter 2, systematically understates the loss incurred. Disabled employees receive only partial compensation for lost wages, and no compensation for pain and loss of enjoyment of life. The assessments levied against employers should be increased to reflect the full social cost of injury. Where less than full compensation is awarded in order to give injured workers an incentive to return to gainful employment, the amount charged to employers should not be reduced.<sup>21</sup> It should be noted that experience rating does not value the well being of all workers equally. The assessments paid by employers are based upon the benefits received by employees, which in turn are based upon their earnings. In other words, the lives of high-wage employees are valued more highly than those of low-wage earners.

Exposure fees should also address the question of what value to attach to the well being of workers. As exposure fees are not triggered by the actual occurrence of injury or disease, they cannot be based upon compensation payments made to particular individuals. Nonetheless, a value must be attached to losses expected to arise from hazards observed in the workplace. This value should reflect the cost of actual harm to employees, which is greater than their cost of running the risk of harm.

As the identity of the employees at risk is neither known nor relevant under a system of economic incentives, all lives are valued equally, making the valuation exercise similar to that entailed in setting legal standards. Although regulators seldom put an explicit value on the well-being of workers when setting standards, every standard attaches an implicit value to personal security.

Yet from another perspective, there is an important difference between economic incentives and legal standards. Levying charges for harm makes the valuation exercise

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<sup>21</sup> The difference between the assessments employers pay and the compensation injured employees receive could be put towards the cost of administering the compensation system or towards the operation of programs designed to prevent injury and disease.

more explicit, if not fully transparent. Two environmental experts have argued that one advantage of economic incentives over legal standards in dealing with pollution is that incentives encourage legislators, and the public to whom they are accountable, to consider more carefully the value of clean air and water and how much should be spent to protect the environment. These commentators contend that incentives facilitate democratic decisionmaking about this important issue (Stewart and Ackerman, 1988).

If Stewart and Ackerman are correct, incentives would also promote democratic decisionmaking about the value of safeguarding workers. One can only speculate whether the more explicit valuation brought about by economic incentives would be higher or lower than the implicit valuation lying behind standards.

### **5.3 Harm Prevention: The Superiority of Incentives over Standards**

Experience rating can force employers, except small businesses in low-risk industries, to bear an approximate measure of the social cost of safety hazards, while exposure fees can make them shoulder a rough measure of the cost of noise and certain hygiene hazards. What remains to be seen is whether the internalization of these social costs would significantly address the problems encountered by conventional regulation described in Chapters 3 and 4. This section examines what would be accomplished by supplementing legal standards with economic incentives.

#### **5.3.1 The limits of precaution**

The inducement to take precautions that is provided by economic incentives is not affected by the limitations of legal standards, which see many injuries beyond their reach. As stated before, standards overlook many dangerous aspects of the work environment, have little to say about worker conduct and ignore entirely such features of the broader industrial relations setting as hours of work and methods of compensation.

A major advantage of experience rating, on the other hand, is that it prods employers to safeguard workers against all sources of injury, including those not addressed by legal standards. This is not to suggest that the inducement of economic incentives is sufficient to eliminate these hazards: Incentives prompt employers to take precautions only to the extent that their cost is less than the resulting payoff in assessment or exposure fee reductions.

#### **5.3.2 The degree of precautions**

For hazards subject to legal standards, the question is how the precautions arising from incentives compare to those required by standards? Whether the level of risk under incentives is higher or lower than that achieved by complying with standards obviously depends upon how strict the standards are. The strictness of standards in turn is determined by the value assigned to the well-being of workers and the estimated cost of compliance.

Even if the value assigned to the well being of workers is the same in fixing charges as in setting standards, two approaches may lead to different levels of protection, due to the role the cost of hazard reduction plays in determining acceptable levels of risk.

In particular, economic incentives may result in lower risk levels because they are better suited to take advantage of advances in control technology that reduce the cost of hazard abatement. Standards offer employers no incentive to achieve a level of risk lower than required by law, either by adopting a different technology already in existence or by investing in the development of a new one. Economic incentives do provide an inducement, not only for employers to use the best existing control technology, but also to search for even better technologies; to the extent that the cost of developing and applying new technologies is less than the resulting reduction in charges. If legal standards and economic incentives are used in tandem, any new technology precipitated by incentives can be incorporated into the standards in due course (Weiler, 1983).

As well as not taking full advantage of technological change, legal standards are sometimes based upon an overestimate of the costs of applying the technology in existence at the time they are set. As noted above, regulators' best estimate of the cost of hazard control frequently plays a role in determining the level of risk permitted by a standard. Under a system of economic incentives, however, official estimates play no role. Instead, employers determine their own marginal cost as best they can and reduce risks accordingly. If, as previously suggested, regulators systematically overestimate hazard control costs, economic incentives offer employers an inducement to reduce risks to a level lower than required by many legal standards, so long as both standards and incentives attach the same value to the well-being of workers.

While economic incentives are more efficient than legal standards, replacing standards with incentives entirely would increase the danger gap that separates high-risk from low-risk workers. If incentives were used without standards, the level of risk incurred by employees exposed to a common hazard would vary with their employer's cost of hazard control. Low-cost employers would reduce risk further than high-cost employers. Incentives alone would produce similar disparities among occupational groups exposed to different hazards, with different control costs. When economic incentives are used in combination with legal standards, disparities remain but standards limit their size by prescribing the maximum permissible risk.

Economic incentives offer employers an inducement to take precautions, but do not guarantee that they will be taken. Ideally, an employer responds to economic incentives by identifying hazards, selecting or developing the most cost-effective control techniques, and then reducing risk to the point where the marginal cost equals the marginal benefit in the form of reduced charges. This course would maximize profits by minimizing both the cost of precautions and charges reflecting the expected cost of injury and disease. While no employer is likely to perform this task perfectly, most can be expected to do as good a job of minimizing injury-related costs as they do with other production costs.

A competitive product market is not a necessary condition for incentives to yield efficient precautions. The only prerequisite is that employers minimize their production costs, including the charge levied under an incentive scheme. Even a monopolist strives for that goal (Shavell, 1988 at 62.) Competition is relevant only for employers who would fail to minimize their costs in its absence. In a competitive market, the prospect of losing customers to lower-cost suppliers offers an additional reason to take cost-reducing precautions. For a scheme of economic incentives to enjoy the full advantage of competitive pressures, employers should be told how their charges compare to those paid by their competitors.

Just as some businesses control production costs poorly, some can be expected not to take precautions which would reduce their injury-related costs. Yet even these employers are not immune from the beneficial effect of incentives on occupational hazards. To the extent that they fail to adopt precautions which are profitable under an incentive scheme, employers will have to charge higher prices than necessary and will find both output and workforce size curtailed accordingly.

### 5.3.3 Employment levels

Unlike legal standards, economic incentives exert a strong influence on levels of output and employment. Incentives incorporate the cost of injury and disease suffered in the production of goods into their price, so that customers take this cost into account. To the extent that incentives force employers to internalize this cost, the price of goods that are hazardous to produce reflects their full social cost and the number of employees engaged in hazardous employment cannot be allowed to rise above an efficient level.

When only some firms in a competitive industry minimize costs through appropriate precautions, incentives will steer production to the low-cost producers whose employees face less risk.<sup>22</sup> Economic incentives affect not only the distribution of workers across employers within an industry, but also their distribution among industries with varying degrees of occupational hazards.

Legal standards which fail to hold hazardous employment to an efficient level are also inequitable. By reducing the number of employees exposed to higher risks than the rest of the working population, incentives serve equality as well as efficiency.

Even if all employers complied fully with every legal standard, the case for supplementing standards with economic incentives is strong. Unlike standards, incentives address the full range of injury causing hazards, are a catalyst for technological advance and exert a powerful influence over the level of hazardous employment. Wide-spread non-compliance with legal standards makes the argument for combining standards with incentives even more compelling.

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<sup>22</sup> The impact of incentives on employment levels is different in a competitive market than in a monopoly situation. A monopolist always charges a price higher than unit costs with the result that customers buy less than they would in a competitive market where price equals unit costs. It follows that the output of a monopolist who does not internalize the cost or harm to employees does not exceed the efficient level by as much as the output of a producer in a competitive market. Indeed the output of the monopolist may fall below the efficient level even when this harm is externalized. In other words, there is less need for incentives to control levels of employment in a monopoly situation than in a competitive market (Shavell, 1988 at page 62).

#### 5.3.4 Implementation

The dimensions of the compliance deficit are reviewed in Chapter 4. In many work places, hazards governed by standards are not controlled as the law requires. Economic incentives offer employers an added inducement to take precautions against these perils.

Incentives pose their own problems of implementation, however, similar in one respect to those associated with legal standards but different in another. The implementation of either of these regulatory strategies can be seen as a two-step process. First information must be gathered about the conduct of regulated firms in order to determine what action is required; then appropriate action must be taken. Each of these steps is a major hurdle for conventional regulation. Resource constraints limit the number of inspections and regulators are reluctant to punish offenders, even after persuasion and education fail to produce compliance.

Unlike legal standards, experience rating does not require inspection or monitoring of workplaces. The information necessary to calculate an employer's assessments is supplied by the claims its workers file for compensation. The challenge in implementing an experience rating scheme is to ensure that employers do not respond by resisting valid claims, thereby rendering claims data an unreliable record of injuries.

Exposure fees do entail monitoring workplace conditions. Indeed, they require more complete information about the conditions prevailing at a worksite than conventional regulation, which does not demand that all infractions be detected. Even if inspectors detect only one of many violations, law breaking can be deterred, at least in theory, with a penalty far in excess of the cost of compliance. In other words, large penalties can compensate for the limited information generated by infrequent inspections. As exposure fees equal the actual social cost of a hazard, not some multiple thereof, reasonably accurate information about hazard levels over time is required. This information is available at reasonable cost only for hazards which remain constant over long periods or are subject to only minor variations.

At the second stage in the implementation process, both experience rating and exposure fees enjoy several advantages over conventional regulation. As Chapter 4 points out, in order to deter profit-maximizing firms from violations, penalties must far exceed the cost of compliance because potential offenders discount the nominal penalty by the low probability of detection and punishment. Prosecutors and judges may be reluctant to impose such fines; they may be reserved for violations which actually result in serious harm, as opposed to those that pose a risk but hurt nobody, because causing harm is perceived as more blameworthy than creating risk. Even if large penalties are imposed, they will be ignored to the extent that they exceed the offender's resources.

Experience rating and exposure fees are not likely to have substantial spill-over effects and are applied in an evenhanded fashion to all regulated firms. Experience rated assessments are a direct reflection of harm suffered by employees. In short, the barriers

that militate against imposing appropriate fines are much less likely to preclude the levying of charges under a system of economic incentives. Moreover, such charges are unlikely to exceed an employer's wealth and to be discounted accordingly.

Another advantage of economic incentives over conventional regulation is that they can take the form of both positive and negative reinforcement. Existing experience rating schemes already take both forms. Employers whose ratio of claims to payroll is below the industry average receive a discount on their base assessment, while those whose ratio is above average pay a surcharge. An exposure fee scheme could also be implemented through discounts and surcharges on worker's compensation assessments. In contrast, conventional regulation places much greater emphasis upon the negative form of reinforcement -- i.e., penalties -- than the positive. While the penalties provided in conventional regulatory statutes are not extensively used, these statutes make no provision at all for the recognition of good performance.

The use of positive reinforcement along with the negative is advantageous in several ways:

- Employers with very good health and safety records have an incentive to do even better,
- Employers receiving discounts form a constituency in favour of experience rating to counter opposition from those paying surcharges.

The resulting balance makes incentives more likely to survive the political process than stringent enforcement of legal standards, which generates great opposition and very little support in the business community.

#### **5.4 Compensation and Rehabilitation**

While the purpose of experience rating, like that of all regulatory strategies, is to prevent injuries, it has unintended side effects. As its critics point out, it gives employers an incentive to resist compensation claims filed by injured workers. While the critics suggest this resistance causes claims data to understate the true incidence of injuries, thus undercutting the incentive to prevent injuries, their primary concern is that employer resistance to claims impairs the compensation and rehabilitation of injured workers, either by denying compensation to employees who are entitled to it, or by promoting conflict between employees and employers in the processing of claims, leading to delays (Ison, 1986).

Proponents of experience rating counter that its impact on compensation and rehabilitation is not entirely negative. As well as noting that experience rating encourages employers to defend against unfounded claims, they contend that it gives them an incentive to offer continued employment to injured employees who might otherwise remain on the compensation rolls after recovering from their injuries (Weiler, 1983).



## 5.5 The Need for Empirical Research

The preceding two sections reviewed the theoretical arguments concerning the effect of experience rating on injuries as well as on the compensation and rehabilitation of injured workers. To date, little effort has been made to conduct empirical tests of these theories.

The only existing study of the impact of experience rating on compensation and rehabilitation is a survey of union representatives about the practices of 33 employers, approximately half of whose assessments were experience rated (Walker, 1986). The results suggest that experience rating does lead employers to pressure employees not to file claims, to fight claims and to press employees to return to work before they are able.<sup>23</sup> The two somewhat contradictory published studies of the impact of experience rating on injury rates are summarized in Appendix II.

In designing future studies, researchers must bear in mind that experience rating, like any economic incentive, is likely to affect not just the precautions that employers take, but also their employment levels. In other words, a comparison of the injury rates of employers who are experience rated with the injury rates of those who are not would capture only part of any beneficial effect of experience rating on injuries. In order to capture the full effect, researchers must also determine the impact of experience rating on the distribution of employees among jobs with varying degrees of risk.

Further research may confirm that experience rating both prevents injuries and impedes the compensation and rehabilitation of injured workers. If it is shown to have these effects, any final judgment of this mechanism should turn upon the relative magnitude of these effects, as well as upon the importance of preventing injury as compared with taking care of injured workers.

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<sup>23</sup> An unexpected and inexplicable finding is that the proportion of the experience rated employers who returned injured employees to suitable employment was smaller than that of employers who were not experience rated.

## **6.0 WORKER PARTICIPATION**

Many of the employers governed by occupational health and safety legislation are organizations, corporate or otherwise, comprised of numerous workers and managers. All other things being equal, a large corporate employer poses a greater risk of injury and disease than a small firm, for the obvious reason that more employees are exposed to occupational hazards. Yet large organizations, with extensive resources at their command, also have a greater capacity to control occupational hazards than do small employers. The challenge for health and safety regulators is to harness this organizational capability.

Organizational structure plays an important part in determining the level of risk to which employees are exposed. A company with an effective labour-management committee, a competent health and safety director and a chief executive officer who is well informed about occupational risks is very likely to have a substantially lower injury rate than a competitor without these strong points. In short, an organization that is well structured is more likely to behave in a socially responsible fashion than one that is not (Stone, 1975, 1980 and 1988; and Braithwaite and Fisse, 1985).

One legal strategy for controlling occupational risks thus is to promote organizational responsibility by requiring employers to adopt structural safeguards. This chapter considers structural safeguards which give workers a voice in the control of occupational hazards through labour-management health and safety committees (HSCs). Structural regulations governing the role of company health and safety directors and senior management representatives are discussed in Chapter 7.

Structural safeguards can aid in the control of occupational hazards in two very different ways: They can enhance the implementation of both conventional regulation and economic incentives, and may lead employers to take precautions that other regulatory approaches could not elicit even if fully implemented.

### **6.1 Joint Health and Safety Committees (HSCs)**

#### **6.1.1 Function and limitations**

Employees have a greater stake than anyone else in the control of workplace hazards, because they are the ones at risk. By virtue of their intimate knowledge of both the tasks they perform and the conditions under which they work, they are also well suited to determining what acts and conditions are dangerous, to detecting the existence of such dangers and to formulating methods of hazard control. Workers' self-interest and knowledge provide excellent public policy reasons to foster their participation in controlling occupational risks.

Labour-management committees are the primary vehicle for worker participation in Canada. This section explores the mechanisms by which joint committees might reduce the incidence of injury and disease, as well as the inherent limits of committees

which lack any decisionmaking authority. In the last resort, such limitation renders committees dependent upon regulatory enforcement. Attention turns in the next section to the contribution that training, resources and trade unions make to committee success. Against this backdrop, the final section reviews the available empirical data about the impact of committees on the level of occupational risk and about the factors which determine that impact.

### 6.1.2 Joint HSCs and the reduction of injury and disease

Occupational health and safety legislation typically provides for the creation of joint HSCs although the breadth of coverage of the committee system varies widely. Some jurisdictions require that a committee be established in every work place with more than a minimum number of employees -- 20 is a common figure -- in most or all industries. In a few provinces, a committee is required only at work sites designated by the Minister responsible for occupational health and safety (Brown, 1982). Some statutes call for the appointment of worker health and safety representatives, either in addition to a committee or at work places where a committee is not required. Although only the joint committee is discussed here, worker representatives perform much the same function as worker committee members.

The activities of a joint committee may increase the amount of information about hazards and how to control them for all concerned. A joint labour-management committee may offer a receptive forum for individual workers to air their concerns about occupational hazards and to offer suggestions for abatement. In addition, committee members trained in health and safety may recognize hazards and solutions unnoticed by others in the work place. One way for committee members to do this is by reviewing cases of injury and disease as well as high-risk incidents without harmful consequences. Committee members should also assess existing and proposed materials, equipment and facilities as well as work procedures, training programs and supervisory practices.

Committee members enjoy an important advantage over regulators in identifying hazards and developing ways to control them. To a large extent, the inability of conventional regulation to prevent the majority of injuries that presently occur is a product of the poor mesh between uniform legal standards and diverse work settings. Committee members who understand their own circumstances are much better suited to dealing with specific matters, such as worker conduct, the length of the work day and production bonuses, than regulators who must write rules that apply to all.

Identifying hazards and devising abatement procedures does little good unless changes actually occur in the work place. HSCs, let alone worker committee members, have no decisionmaking authority. Committees may have more information than regulators about some hazards, but regulators have power, committees do not. Many costly changes advocated by worker committee members are likely to be rejected by management unless backed by regulatory officials.

While regulatory support may be necessary to achieve some changes, committees may bring about other improvements without calling upon officials to enforce regulatory

requirements. To the extent that employees can control hazard levels by altering their own behaviour, the activities of a joint committee may lead to better protection. Committee activities also may increase worker motivation, through the example set by committee members who demonstrate a commitment to health and safety.

The activities of a joint HSC may also prompt employers to take precautions not demanded by regulatory officials. Inspections conducted by committee members, or complaints made to them by employees, may alert employers to the existence of matters or conditions contrary to existing management policies. In addition, committee activities may cause management to change existing policies and practices, for example, by providing information about the risks posed by workplace conditions, about strategies for controlling hazards, and about the costs arising out of injuries that are borne by an employer. Where experience rating is used, committee members may be able to show an employer how to reduce worker's compensation assessments by controlling hazards. In other words, the committee system may facilitate the implementation of an experience rating scheme. As well as appealing to an employer's financial self-interest, the committee system may appeal to moral sensibilities. Interaction with committee members, especially worker members, may cause management to give the prevention of injury and disease higher priority.

Along with these direct effects, committee activities may indirectly influence management by causing "rank-and-file" employees to press for health and safety improvements. This pressure may bolster management's moral commitment to controlling occupational risks; an employer who ignores employees' concerns may face a costly loss of workforce morale.

### 6.1.3 The limits of HSC powers

Yet appeals to morality and self-interest have obvious limits as a way to control workplace hazards. Inevitably, employee representatives will seek changes management does not wish to adopt because they are too costly.<sup>24</sup> The HSC system does little to alter the balance of power between labour and management. When worker committee members find their proposals rejected, all they can do is call in regulatory officials. Only if regulators determine that legal requirements have not been met will the employer be ordered to take remedial measures. In the last resort, worker committee members are entirely dependent upon regulators, because management prerogatives prevail except to the extent that they are limited by law.

The prerogatives of management are not significantly affected by an employees right to refuse to perform unsafe work -- a right commonly found in Canadian occupational health and safety legislation.<sup>25</sup> The reason is that regulators are the ultimate

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<sup>24</sup> While an employer's resistance to change typically may be based upon the cost of taking precautions, labour's demands occasionally may be rejected because they are seen as an intrusion upon management's right to manage, irrespective of financial considerations.

<sup>25</sup> Nonetheless, a refusal to work may exert some pressure on management, due to interruptions of production. Yet the interruption is likely to be brief if regulators find no violation; they respond very rapidly to notification of a refusal to work. In addition, employees may hesitate to refuse because they are subject to discipline if their perception of danger subsequently is found to have been unreasonable and -- in most jurisdictions -- they are not entitled to pay for time not worked, even if their refusal to work was justified. For a fuller discussion of the right to refuse see Brown (1983).

arbiters of what is unsafe. If, upon due consideration, the regulatory official who investigates a refusal to work concludes that no violation exists -- neither of the employer's general duty to take reasonable precautions nor of a more specific standard -- then no remedial order is issued and an employee who continues to refuse to work is subject to discipline.

Nor would management prerogatives be significantly curtailed by legislative amendments currently pending in Ontario.<sup>26</sup> The proposed legislation would permit worker committee members, certified by a bipartite Workplace Health and Safety Agency, to stop unsafe work,<sup>27</sup> but allows them to halt production only long enough to obtain an official ruling as to whether the employer is in contravention of legal requirements. Under the proposed scheme, a "stop work" direction would be rescinded by the investigating regulatory official if he or she concluded that there was no violation. Like the right of employees to refuse unsafe work, the proposed right of a worker representative to issue a "stop work" order would effect only a very temporary change in the balance of power between labour and management.

In no Canadian jurisdiction does occupational health and safety legislation authorize workers to make decisions that are binding upon their employer. The Quebec statute comes closest to giving employees such power.<sup>28</sup> A joint committee in that province is authorized to choose the physician in charge of health services, to approve her health program, to design training programs and to select personal protective equipment. Yet the law in Quebec, as elsewhere in Canada, permits management to have as many representatives on a committee as workers. If the two sides are unable to reach agreement on any matter over which the committee has decisionmaking authority, the ultimate determination is made by regulators. In other provinces and the federal jurisdiction, not even a unanimous committee, let alone worker committee members on their own, can make legally binding decisions.

In Sweden, worker committee members do have some power. More than one-half of the committee members must be worker representatives. The worker-dominated committee approves the selection of the company doctor, nurse, safety engineer and industrial hygienist, and directs their work (Elling, 1986). Serious consideration should be given to adopting a similar approach in Canada.

Although the worker rights currently embodied in the committee system and the right to refuse unsafe work cannot be used to force employers to take precautions not required by law, these participatory rights may help to ensure that employers comply with legal requirements. Committee members are able to conduct inspections more often than can regulatory officials, given the limited resources devoted to regulatory enforcement. Committee members intimately familiar with their place of work, especially if they are trained in occupational health and safety, may detect violations that would escape the attention of an outside inspector. In addition, committee members may provide a communication channel for employees. Workers may be more likely to report violations

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<sup>26</sup> An Act to Amend the Occupational Health and Safety Act and Workers' Compensation Act, Bill 208.

<sup>27</sup> The exercise of these rights is limited to situations which pose a serious risk of immediate harm. Insofar as other violations are concerned, employees must continue to work and bring their concerns to the attention of their employer or regulators through normal channels.

<sup>28</sup> Occupational Health and Safety Act, R.S.Q. 1988, c. S-2.1, ss. 78(1) to (4) and 79.

to their representatives on a committee than to register an official complaint. If committee members are unable to persuade an employer to rectify violations so uncovered, they can bring these infractions to the attention of regulatory officials.

#### 6.1.4 HSC interaction with regulators

The committee system may also influence the way regulators respond. All other things being equal, an inspector may be more likely to issue a written compliance order, or to initiate a penalty, when a complaint is issued by trained committee members.

Finally, worker participation could have a subtle impact on the way legal requirements are interpreted. In particular, it may affect the application of the "general duty" clause, commonly found in occupational health and safety legislation, which requires employers to take all reasonable precautions.<sup>29</sup> Regulators are more likely to utilize the general duty clause to address the hazards found in diverse work settings, and not adequately addressed by uniform standards, if their attention is drawn to them by worker committee members seeking to protect their co-workers. The committee system increases the likelihood of this sort of interaction between employees and regulators.

Whether or not committees actually do affect the way legal requirements are interpreted and enforced is likely to depend upon the approach taken by regulatory officials. The Ontario Ministry of Labour has been criticized for its reluctance to reinforce worker participation by enforcing occupational health and safety legislation,<sup>30</sup> perhaps most notably by the Ontario Public Service Employees Union (OPSEU), the bargaining agent for Ontario's inspector corps. OPSEU complained that inspectors were prevented by their superiors from prosecuting employers for violations and were restricted to mediating disputes between labour and management committee members.

An independent task force appointed by the Deputy Minister of Labour to investigate OPSEU's allegations found that many were unfounded, but concluded that the Ministry had been slow to enforce legal standards in a significant number of cases. The authors of this report expressed particular concern about lax enforcement of legal standards governing the use of toxic substances. Noting that the Ministry should not be faulted for allowing employers a period of grace to make the substantial investment required to comply, the authors nonetheless concluded that in numerous cases "the Ministry did not take sufficient measures to ensure that levels of toxic substances were reduced within an acceptable period of time" (McKenzie and Laskin, 1987 at 29).

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<sup>29</sup> Regulators are most likely to invoke such a clause to direct an employer to remedy a hazard not specifically addressed by legal requirements. They might also rely upon a general duty clause to deal with a hazard that is the subject of a specific legal standard, but which poses a greater danger in the particular context than it usually does. While regulators could require an employer to take greater precautions than specifically required, the legality of such action is debatable and the probability that regulators would act in this way is low.

<sup>30</sup> See also Fidler (1986) and Parsons (1988).

## 6.2 Criteria for HSC Success

The committee system may have little or no impact on the level of occupational risk unless committee members enjoy various kinds of support. As noted in the preceding section, the enforcement practices of regulators are likely to play a very important role in determining what effect a committee has on the implementation of legal standards. Committee members may need other kinds of support if the potential of the committee system to facilitate both conventional regulation and experience rating, and to enhance employer self-regulation, is to be realized.

### 6.2.1 Training

Training of committee members in hazard identification and control and in occupational health and safety law will have a significant effect on the success of joint committees. To date, public policy has not met the need for training. Even in a wealthy province like Ontario, the public and private funds made available for training have been grossly deficient. Two thirds of all worker committee members have received no instruction in hazard recognition; the same proportion have no training about the Occupational Health and Safety Act (Advisory Council, 1986 and 1987). Only Saskatchewan and Quebec require employers to grant committee members paid educational leave to attend courses offered by the government agency responsible for occupational health and safety.<sup>31</sup>

### 6.2.2 Access to information

The success of joint committees also hinges upon access to information about potentially hazardous work place conditions, including information concerning materials, equipment and facilities as well as work procedures, employee training programs and supervisory practices. The Workplace Hazardous Materials Information System (WHMIS), recently implemented through complementary federal and provincial legislation, ensures that committee members have access to information about hazardous materials. Employers in several jurisdictions are required to provide employees with information necessary to protect their health and safety, but this vague requirement does not entitle committee members to other necessary information.<sup>32</sup>

### 6.2.3 Time and facilities

Committee members also need time and resources to discharge their responsibilities. While most Canadian occupational health and safety statutes provide that members must be paid for attending committee meetings, only a few jurisdictions allow them paid time off to prepare for such meetings.<sup>33</sup> Only in Quebec is an employer

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<sup>31</sup> Occupational Health and General Regulations, Sask. Reg. 55/81, s. 27; Occupational Health and Safety Act, R.S.Q. 1988, c. S-2.1, s. 91.

<sup>32</sup> See, for example, Occupational Health and Safety Act, R.S.O. 1980, c. 321, s. 14(2)(a).

<sup>33</sup> Canada Labour Code, R.S.C. 1985, c. L-1, s. 84.1(7); Occupational Health and Safety Act, R.S.Q. 1988, c. S-2.1, s. 76; Occupational Health and General Regulations, Sask. Reg. 55/81, s. 24.

required to provide committee members with office space, equipment and clerical assistance.<sup>34</sup>

#### 6.2.4 Unionization

The impact of a committee may be greater at a worksite where employees are represented by a trade union, especially a strong union concerned about health and safety. As collective bargaining protects individual employees from retaliation at the hands of their employer, unionized employees may be more willing to voice their health and safety concerns and to play an active role as committee members. Union dues may provide a fund that can be used to hire a health and safety specialist or finance other related activities to which all employees must contribute. The economic pressure of a strike may allow a trade union to win concessions from management.

Just as a trade union may influence the functioning of a health and safety committee, a committee may influence the functioning of a trade union. The activities of a committee may alter the approach union officials take to occupational risks by increasing the information available to them, and by leading employees to demand greater protection.

### 6.3 Empirical Studies of the Impact of Committees

#### 6.3.1 United States

Only a handful of empirical studies have examined joint HSCs. The only published study of their impact on injury rates examined committees established through collective bargaining in the United States. The existence of a committee was found to be associated with a small and statistically insignificant reduction in injuries in workplaces with less than 300 employees; it was associated with an extremely large, but only marginally significant reduction where the work force exceeded this number. The researchers noted that the veracity of this later finding is placed in doubt by its magnitude and marginal significance as well as by the contrary finding for smaller work places (Cooke and Gustachi, 1981).

Two other American studies suggest that union-management committees may reduce the number of infractions cited by regulators. One study found some evidence that "an active union-management committee and especially the existence of a high level of problem solving within such a committee are associated with a lower issuance of citations" (Kochan, Dyer and Lipsky, 1977). The other study found that a committee's effectiveness, as perceived by its members, was negatively associated with the number of serious citations per inspection hour; the strength of the association was not reported (Boden, Hall, Levenstein and Punnett, 1984). To the extent that the number of citations issued gauges the level of hazard, these studies suggest that effective committees, if not all committees, lead to a lower incidence of injury and disease.

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<sup>34</sup> Occupational Health and Safety Act, R.S.Q. 1988, c. S-2.1, s. 51(15).



### 6.3.2 Saskatchewan

The Occupational Health and Safety Branch of the Saskatchewan government collected data on the activities of the approximately 2,400 committees in that province over several years; committee members were asked to complete and submit a standardized report form after each meeting. In 1981, for example, according to the data compiled from these forms, employers took preventive action to address just over 18,000 of the approximately 25,000 health and safety matters raised at committee meetings. By far the most common measures were modification of existing equipment or purchase of new equipment (33.8 per cent), better maintenance (33 per cent) and better worker safety training (21.9 per cent) (Bryce and Manga, 1985). Whether the steps taken actually solved the problem to the satisfaction of worker committee members is not known.

### 6.3.3 Ontario

Perhaps the most comprehensive study of joint committees is a survey of approximately 2,000 committees in Ontario conducted under the auspices of the province's Advisory Council on Occupational Health and Safety (Advisory Council, 1986 and 1987).<sup>35</sup> In keeping with the American studies cited earlier, the Ontario survey found a negative association between workers' perception of committee success in controlling occupational risks and the issuance of orders by an inspector over the last 12 months.

This survey also utilized subjective measures of the impact of the committee system on the level of occupational risk. Approximately 60 per cent of both worker and management representatives rated the overall record of their committee in reducing accidents and potential health hazards from "more than adequate" to "excellent". The committee's ability to obtain changes in equipment, materials and work practices was rated marginally higher than the committee's success in promoting concern and knowledge on the part of either the work force or management.<sup>36</sup>

A moderately strong inverse relationship was found between committee members' assessment of their success and the level of perceived hazards. In other words, members in high hazard work places rated their committees as less successful than those in low hazard work places.

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<sup>35</sup> The stratified, random sample surveyed by researchers included over 2,800 committees; the response rate for both worker and management representatives was approximately 75 per cent.

<sup>36</sup> See also the Alberta survey of committee members reported in Bryce and Manga (1985), which produced broadly similar results.

As well as examining the impact and workings of committees, the Ontario survey set out to determine the rate of compliance with legislation calling for the establishment of committees at all workplaces with more than 20 employees or where a designated hazardous substance is used. A committee was found at 93 per cent of workplaces with more than 20 employees. The rate of compliance at workplaces with less than 20 employees, where a designated substance was in use according to Ministry of Labour records, was much lower -- 66 per cent. (Compare the very low rate of compliance with British legislation requiring the appointment of safety representatives as reported by Beaumont and Leopold [1982].)

A substantial number of the committees in existence were not constituted in full compliance with legal requirements. For example, the worker representatives on over one-third of all committees were not chosen by workers (or their union representatives) as required, but were either selected by management (19 per cent) or volunteered for the post (16 per cent).

The Ontario survey sheds some light on what factors contribute to the success of a joint committee. In general, the presence of a trade union had only a modest beneficial effect on the success of a joint HSC in controlling occupational risks as perceived by committee members. Not surprisingly, there was also a moderate and positive association between union leaders' understanding and concern about health and safety matters and a committee's success -- both as perceived by worker members. One of the studies of union-management committees in the United States distinguished between strong and weak local unions, according to the assessments of union business agents. Workers' perception of management's responsiveness to health and safety concerns was found to be directly and strongly related to the strength of the local union (Kochan, Dyer and Lipsky, 1977).

The Ontario survey suggests that the role played by regulators has an important bearing on the success of a joint committee. The frequency with which inspectors review the minutes of committee meetings, offer advice on how to improve committee effectiveness and attempt to resolve disputes were strongly and positively associated with both worker and management members' perception of their committee's success in controlling occupational hazards.

As already noted, this survey found that the issuance of any orders by regulators in the last 12 months was negatively associated with workers' perception of committee success. Based upon these findings about orders and other kinds of regulatory support, the consultants who conducted the survey suggested that the effectiveness of a committee depends less upon the enforcement of regulatory requirements than upon regulators providing assistance in other ways. This interpretation is very facile. It ignores the very strong possibility that the causal relationship between committee success and regulatory orders flows in both directions: The existence of an effective committee may influence the issuance of orders, just as the issuance of orders may influence the success of a committee. For example, it is entirely possible that the effectiveness of a committee depends partly upon the willingness of regulators to write orders that resolve particularly thorny disputes between worker and management committee members, while an effective committee is able to resolve matters about which inspectors would otherwise be required to write orders. If committees and inspectors interact in this way, the existence of a negative association between orders and committee success is perfectly consistent with that success being dependent upon the willingness of regulators to issue orders when necessary.

Indeed, a substantial number of committee members in Ontario think that their success depends in part upon enforcement. Over one half of the worker members, joined by over one quarter of their management counterparts, indicated that "stronger enforcement" by the Ministry of Labour would make their committee "work better." In the same vein, one study of union-management committees in the United States found that a committee's success in obtaining concessions from management increased with the stringency of OSHA's enforcement activities<sup>37</sup> (Kochan, Dyer and Lipsky, 1977).

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<sup>37</sup> The researchers found a positive and strong association between worker members' perception of management's responsiveness to employee concerns and their perception of the strength of OSHA's "impact on the amount of concern management gives safety issues."

## **7.0 MANAGEMENT STRUCTURE**

Corporations and other organizations are comprised of numerous managers as well as employees. The preceding chapter considered how the law might control occupational hazards by encouraging worker participation through joint HSCs; the role played by individuals within the management hierarchy also has a major bearing on the incidence of injury and disease. This chapter considers how organizational performance might be improved by requiring employers to engage a qualified health and safety director (HSD) and by holding a designated senior manager personally liable for regulatory infractions in appropriate circumstances.

### **7.1 Regulating Managerial Competence**

A first step in regulating management structure is to require an employer to engage a qualified health and safety director. While this might be a full-time position in large companies, in a smaller organization he might also perform other duties. The director's impact on the incidence of injury and disease depends in part upon his or her competence in health and safety management, personal commitment to protecting employees and clout within the employer's organization.

The HSD should be required to meet a minimal level of competence in safety management, a level that increases with the size of the workforce and the degree of risk. Directors should be trained, not just in technical matters of hazard identification and control or legal requirements, but also in such skills as communication and motivation, because effective health and safety management requires influencing the behaviour of both management and labour. Except in very small or very low risk work places, the director would be expected to demonstrate a higher level of competence in hazard control than expected of most HSC members.

Although the most obvious reason for certifying HSDs is to ensure their competence, certification may also bolster their commitment and clout, especially where the required level of competence is high. An individual with professional qualifications in occupational health and safety is likely to assign a higher priority to the welfare of employees than other management representatives, all other things being equal. Requiring that office holders be competent health and safety managers is likely to increase their clout as well as their commitment; both senior management officials and line managers are more likely to heed the advice of a well-qualified safety director.

Another way to motivate the HSD to safeguard employees is to require him or her to ensure that certain essential tasks are performed on pain of penalty. Among the required tasks should be inspecting and monitoring the work place; for violations of both legal standards and in-house rules, and keeping records of such violations as well as of all cases of injury and disease and high-risk incidents.

Perhaps the most effective way to enhance the director's commitment to controlling occupational risks is to give workers a voice in his selection and in supervising his activities. The Swedish approach, whereby corporate health and safety

officers are appointed and supervised by worker-dominated HSCs, offers one model that might be followed in Canada (Elling, 1986).

## **7.2 Holding Management Responsible**

### **7.2.1 Determining accountability**

While the appointment of a qualified HSD can increase the information available to managers, information itself does not ensure that their endeavours of failures to control occupational hazards are socially acceptable. An important question of public policy is how to force individuals within the management hierarchy to act in a responsible fashion (Stone, 1975; Coffee, 1981; Braithwaite and Fisse, 1985; and Fisse and Braithwaite, 1988).

Individual responsibility can be enhanced by holding managers personally accountable for the role they play in regulatory offences. This could be accomplished in two very different ways:

1. Public officials determine who within an organization is responsible for the occurrence of violations and punish wrongdoers through the administrative or judicial process.
2. The alternative approach is to rely upon organizations to identify the responsible individuals and to impose private sanctions, subject to public audit.

For example, two leading commentators have suggested that convicted organizations be allowed an opportunity to identify and sanction wrongdoers before sentence is passed; an organization which took appropriate steps would receive a lighter sentence (Fisse and Braithwaite, 1988; Coffee, 1981).

Those who favour this approach to controlling the conduct of managers note that organizations enjoy several advantages over public officials. In large organizations, the acts and omissions of many people often play a role in the creation of occupational risks -- including middle managers striving to meet production targets, sales staff who push for timely deliveries, engineers engaged in designing machinery and structures, purchasing agents who select materials and equipment and first-level managers who supervise workers. When something goes wrong, those at the top of an organization are better able than outsiders to determine what various individuals did and what they should have done. Moreover, forcing companies to use their own resources to ferret out individual wrongdoers allows public enforcement budgets to be spread over a larger number of organizations (Fisse and Braithwaite, 1988).

### 7.2.2 The merits of the approach

One problem with relying upon regulators or organizations to sanction blameworthy individuals is that those held responsible under either approach are not likely to include organizational leaders. Far removed from the operational level where most infractions happen, they play no direct role in causing, or even allowing, violations to occur. Although their acts and omissions indirectly contribute to many offences, there is a common perception that they are not morally responsible for the occurrence of these offences (Stone, 1975). Accordingly, they are almost never prosecuted. There is little reason to think top level executives would be sanctioned more often if the task of holding individuals accountable was performed under the scrutiny of public officials. If senior managers are to be accountable, organizational structures must be modified and legal requirements redefined so that these individuals are no longer so remote from regulatory offences.

Holding organizational leaders accountable is important because they are better equipped than any other single individual within an organization to control occupational hazards. Senior managers have the ultimate authority to establish health and safety policies and to allocate resources to prevention. By setting the production or financial targets that lower level managers are expected to meet, top level executives determine how much pressure subordinates feel to cut health and safety corners in order to increase output or profits (Stone, 1975; Coffee, 1981; and Joint Federal-Provincial Commission of Inquiry, 1981).

Organizational leaders can also hold subordinates accountable for the health and safety consequences of their actions. In addition to determining who is to blame when something goes wrong, senior managers can clarify lines of responsibility *ex ante*, thereby minimizing *ex post* disputes over who should have done what. As well as making it easier to hold individuals accountable, clear lines of responsibility increase the likelihood that people feel morally responsible and act accordingly, even if there is little chance they will have to account to someone else (Monahan and Novaco, 1980; and Stone, 1980).

### 7.2.3 The role of senior managers in compliance

These observations suggest that the role played by senior managers is an important determinant of the incidence of injury and disease. The very limited amount of empirical evidence that is available supports this conclusion. One study examined the safety practices of 42 matched pairs of companies; the companies in each pair were located in the same region, were roughly the same size and belonged to the same industrial classification, but the injury rate of one company was very low, the other very high. The researchers found that "more of the low accident rate companies had their highest level safety officials at top management levels of their firms" (Cohen, Smith and Cohen, 1975). Another study of several mining companies with excellent safety records found that the senior management of each demonstrated a commitment to safeguarding employees (Braithwaite, 1985). The same conclusion was reached by the Joint Federal-Provincial Commission of Inquiry into the Safety of Mines and Mining Plants in

Ontario (1981), which reviewed the performance of two mining companies with very good safety records.<sup>38</sup>

The challenge for public policy is to prod organizational leaders to use their influence to bring occupational hazards into line with public expectations. One way to accomplish this objective is to craft a legal duty appropriate for a chief executive officer, or another senior manager designated by the organization, and to hold this person liable for failing to live up to this obligation. As previously noted, top executives are so distant from the production level where violations actually happen that they are commonly perceived as not being morally responsible for infractions. However, there is no moral objection to holding them responsible for not taking reasonable steps to remedy a major compliance problem after they have been informed (or easily could have learned) of it. If an executive is liable, it must be for failing to make a reasonable effort to remedy a known compliance problem, not for any involvement in the initial occurrence of regulatory infractions. As senior managers cannot be expected to attend to minor details, their liability should be limited to major compliance problems as defined below.

#### 7.2.4 Internal reporting requirements

The key to imposing this type of liability upon organizational leaders is force awareness of major compliance deficiencies or readiness to find out about them. In many organizations there is a natural screening of "bad news" which prevents it from reaching the top. Such screening is all the more likely to occur if a leader's awareness of "bad news" carries potential legal liability (Stone, 1975). If personal liability is to be imposed upon senior managers, organizational structures must be modified to ensure that news of major compliance problems are spread.

To this end, the HSC should be required to conduct regular inspections and to monitor workplace conditions. HSC members should be authorized to participate in these activities. The director should also be required to submit internal compliance reports, listing all known infractions and flagging major compliance problems, to the responsible senior manager. HSC members should be invited to append their comments to these reports. Such surveillance by the director and committee members are likely to uncover violations which escape the attention of regulatory officials; nonetheless, copies of inspection reports issued by regulatory officials should also be provided to the responsible senior manager. The responsible senior manager should be under a duty to keep abreast of major compliance problems recorded in any of these documents, and a failure to do so should not be accepted as an excuse.

Major compliance problems can take two forms: A single occurrence of an infraction can give rise to a high risk of serious injury or disease; another scenario involves a large number of less serious violations. In other words, the severity of a compliance problem is a function not just of the risk posed by a single infraction, but also

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<sup>38</sup> Further evidence of the importance of involving senior managers is demonstrated by a study of the implementation of the Health and Safety at Work Act in Great Britain. The researchers found that firms with a member of senior management specifically responsible for industrial relations were more likely to be in compliance with legal requirements concerning safety representatives and joint committees than other companies (Beaumont and Leopold, 1982).

of the number of infractions that occur. A large number of minor offences add up to a major problem.

While the first responsibility of the senior manager is to take reasonable steps to ensure that existing violations are rectified, his duties should not end there. He should be required to take reasonable steps to prevent similar violations from occurring in the future. Depending upon the circumstances, these steps might include allocating resources to purchase necessary equipment, changing standard operating procedures, and disciplining or otherwise holding subordinates accountable.

The responsible organizational leader actual actions may depend in part upon the likelihood that inadequate steps would come to the attention of regulatory officials. As regulators conduct inspections only infrequently, they may fail to recognize that a major compliance problem has not been unresolved. In order to increase the probability that a delinquent senior manager would be detected, regulators should be allowed routinely to review internal compliance reports. An alternative approach would be to rely upon the HSD or committee members to notify regulators when the responsible organizational leader fails to do what the law requires.

It might be thought public scrutiny of all compliance reports is the better way to ensure that regulators learn of neglect on the part of senior management, since the director or committee members may hesitate to blow the whistle on the boss, especially in a nonunion shop. If they are reluctant to get a senior manager into legal trouble, however, they are just as likely to submit watered down compliance reports. In other words, these two approaches may differ very little in their capacity to reveal senior management neglect to the outside world.

A second difference between these two approaches is in their capacity to bring problems to the attention of senior management. Internal compliance reports and written comments of committee members may be less candid if regulators are free to review these documents than if they are for the eyes of senior managers only. This consideration leads Braithwaite (1982) to suggest that regulators should not have routine access to these documents. If this approach were adopted, the law would have to rely upon HSDs and committee members to blow the whistle on managers who do not live up to their responsibilities, and upon regulators to catch them in the act.

In any event, internal compliance reports should be admissible as evidence in an enforcement proceeding against a senior manager in order to prove he or she had been put on notice of a major compliance problem. The director's duty to file compliance reports with management and to notify regulatory officials of management neglect should be backed by legal penalties. To the extent possible, the law should protect the director, or anyone else within the organization, against any form of retaliation for "blowing the whistle" on management.

### 7.2.5 Punishment and its alternatives

The success of holding organizational leaders personally responsible for regulatory infractions depends in part upon the threat of legal penalties. However, there are limits to what punishment can accomplish in this context. Even if legislation is amended to impose new duties on senior managers, prosecutors and judges may be reluctant to punish relatively high status individuals for this type of offence.

When penalties are imposed, the organization may seek to reduce their impact by indemnifying managers against whom fines are levied. While the law can attempt to prohibit indemnification, indemnities can be cloaked in so many guises as to defy effective prohibition (Stone, 1982). Still, the law's deterrent effect on individuals cannot be totally offset by any financial indemnity. Money cannot rub out the stigma of punishment, and stigma may be the most effective deterrent of all for management officials. Money also cannot undo the hardship of incarceration, although jail sentences for regulatory infractions are very rare.

While the deterrent threat of legal penalties is subject to limitations, deterrence is not the only channel by which personal liability may alter the conduct of organizational leaders. Penalties aside, the imposition of a legal duty is likely to generate both psychological and social pressure to obey the law (Monahan and Novaco, 1980; Stone, 1980).

Under the proposal outlined here, the only legally enforceable obligation imposed upon the responsible senior manager should be rectification of major compliance problems. However, the imposition of personal liability may have an impact that extends beyond such problems, by increasing the salience of all health and safety matters for at least some organizational leaders, thereby changing their overall approach to occupational hazards. For example, they may take a new interest in the information generated by the HSD or joint committee about sources of danger or about the costs that injuries impose upon the organization. In some cases, the senior manager may respond by holding operations managers accountable for the total cost to the organization caused by cutting health and safety corners, even if no regulatory requirements are contravened. In other cases, the response may be to demand a reduction in risk levels on compassionate grounds.

The case for holding senior managers accountable rests upon the premise that personal liability is more effective in controlling their conduct than organizational liability. At first blush, this premise might seem uncontroversial: The separation of ownership and management in large organizations means that the financial brunt of organizational penalties is not borne by managers. In addition, such penalties entail little individual stigma.

Yet some economists argue that organizational penalties are more than adequate to control the conduct of managers of private corporations and other profit-seeking organizations. According to this argument, companies can be relied upon to dismiss or demote a manager who sacrifices profits by exposing them to legal punishment. In other words, these organizations can be counted on to convert a publicly imposed,



organizational penalty into a privately imposed, personal one whenever that is the profitable thing to do (Posner, 1977). However, the relevance of this economic model to real life is put in serious doubt by available data about the treatment of senior managers convicted of regulatory offences which exposed their organization to legal liability; very few were dismissed or demoted (Coffee, 1980 and 1981).

One explanation for the scarcity of this type of private sanction may be that the penalties actually levied against organizations are seldom large enough to make regulatory infractions unprofitable (Coffee, 1980 and 1981). As discussed in Chapter 4, penalties capable of ensuring that regulatory infractions do not pay must be hundreds of times larger than the cost of compliance, given the low probability of their being imposed. Such large penalties are rarely imposed because they are likely to harm employees, creditors and other innocent parties, or they are likely to exceed the company's wealth and are discounted accordingly.

While these limitations prevent penalties from making regulatory infractions unprofitable for organizations, they are not an impediment to deterring individuals. As individual penalties have little effect beyond the offender's family, concern for innocent parties is not likely to preclude punishment capable of deterrence. In addition, a person's wealth does not set an upper limit on the severity of punishment because people can be shamed and incarcerated.

### **7.3 Existing Regulation of Management Structure in Canada and Abroad**

Canadian occupational health and safety legislation makes little or no use of structural safeguards to regulate the qualifications of corporate health and safety officers or to encourage the involvement of senior managers. Nowhere are the qualifications of corporate occupational health and safety directors regulated by law. Only in Quebec are employers legally obliged to designate individuals responsible for health and safety, but even in that province there is no requirement that the person designated hold a senior post.<sup>39</sup> Elsewhere, the legal system makes no effort to focus responsibility upon individual managers. While employers are generally expected to monitor workplace conditions, there is no requirement that either internal or official inspection reports be placed in the hands of senior management. Although in theory the individuals responsible for a regulatory infraction are subject to legal punishment, the vast majority of penalties are levied against companies. The relatively few individuals prosecuted are almost all workers or front-line supervisors. That prosecutions against senior managers are virtually unknown is not surprising, given that the law does not require them to play a role in ensuring regulatory compliance.

Several examples of the use of structural safeguards to focus management responsibility have been noted in the literature on regulation. In the United States, the Food and Drug Administration (FDA) requires a pharmaceutical company engaged in toxicological testing to appoint a "study director" for each drug being tested (Braithwaite and Fisse, 1985). Employers in California must nominate a person in charge of

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<sup>39</sup> Occupational Health and Safety Act, R.S.Q. 1988, c. S-2.1, s. 51(2).

occupational health and safety (Bardach and Kagan, 1982, 8). Australian Mine Safety legislation demands a number of management positions and sets out detailed obligations for incumbents (Braithwaite and Fisse, 1985).

The leading American case in which a senior manager was held liable for regulatory infractions arose out of a prosecution initiated by the FDA.<sup>40</sup> Park, the chief executive officer of a national food retailer, had previously been notified by the FDA of the presence of rodents in the company's Philadelphia and Baltimore warehouses. When rodents were again discovered in Baltimore, Park was charged and convicted. His defence was that he generally relied upon subordinates to attend to such matters, and that when the rodent problem at the Baltimore warehouse was first brought to his attention, he referred the matter to a vice-president for correction. The Supreme Court upheld Park's conviction, stating that the first two infractions had put him "on notice that he could not rely upon his system of delegation to subordinates to prevent and correct unsanitary conditions." In other words, the basis for imposing personal liability upon the chief executive officer was his failure to take adequate steps to correct a recurring problem which had been brought to his attention. This case provides a useful model of how the law can harness the influence wielded by organizational leaders.

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<sup>40</sup> United States vs. Park (1975), 95 S.Ct. 1903.

## 8.0 SUMMARY AND RECOMMENDATIONS

This report compared and contrasted the conventional approach to regulation, the use of legal standards, with two other regulatory mechanisms: Economic incentives designed to make employers internalize the full social cost of the harm suffered by employees, and structural safeguards which address the roles played by worker representatives, corporate health and safety directors and senior managers in the control of workplace dangers.

Regulation through legal standards was found to have inherent limitations:

- Even with complete compliance, the incidence of injury and disease remains unacceptably high;
- Standards fail to address the physical characteristics of specific worksites, worker behaviour, work hours, methods of remuneration, and other aspects of the broader industrial relations context;
- Standards fail to take advantage of technological advances that would reduce the costs of hazard control and does not demand their installation in a timely fashion;
- Standards are vulnerable to overestimates of the costs of hazard control, leading to excessive leniency;
- Standards have little effect on the distribution of workers between high-hazard and low-hazard industries, allowing excessive numbers of employees to remain in high-risk jobs; and
- Prices of goods and services in a system based on legal standards alone do not reflect the full costs to society arising from risks and actual harm occurring in their production.

The capacity of conventional regulation to adequately control occupational hazards is limited not only by these inherent deficiencies of legal standards, but also by the difficulties encountered by regulators attempting to bring employers into compliance with legal requirements.

The major contributing factors to the deficit currently existing in the areas of detection of violations and enforcement of standards include the following:

- Inspections are costly, and fail to detect violations of a transient nature;
- Prosecutors are reluctant to single out individual offenders;
- Courts hesitate to impose penalties of significant enough size to have a deterrent effect due to perceptions of unfairness or the offenders inability to pay;

- Potential offenders discount the costs of hazard control or potential penalties against the low probability of detection and conviction.

The inherent deficiencies of legal standards and the difficulties encountered in enforcing them underline the urgent need to buttress conventional regulation with other regulatory mechanisms.

## **8.1 Solution #1: Economic Incentives**

Under an experience rating scheme, the workers' compensation assessment paid by employers is tied to the cost of claims paid by their individual workforce. A properly designed experience rating scheme can force employers, except small employers in low-risk industries, to bear an approximate measure of the social cost of safety hazards.

Experience rating prompts employers to safeguard workers against all sources of injury, including those not addressed by legal standards.

Exposure fees are based upon the degree of hazard observed in the workplace. Exposure fees can make employers shoulder a rough measure of the cost of noise and certain hygiene hazards.

Economic incentives provide an inducement to employers to adopt the best existing control technology, and to generate new methods to the extent that such investments are less than the resulting payoff in reduced assessments or exposure fees. Employers are forced to determine their own costs of risk reduction, eliminating the frequent overestimates of such costs that lead to a weakening of legal standards.

The monitoring of employers is easier and more cost-effective under an assessment scheme, since all necessary information is contained in compensation claims filed by workers.

Finally, incentives steer production from high-hazard employers to low-cost producers who minimize their own costs, and consumer-paid prices, by taking appropriate precautions.

The virtue of economic incentives is that they force employers to internalize the social cost of occupational hazards, leading to greater efficiency than legal standards alone. However, without concomitant legal standards, economic incentives would lead to disparities among companies, and inequities among workers, in instances where hazard control is more costly for one employer than another.

## **8.2 Solution #2: Organizational Restructuring**

Both conventional regulation and economic incentives should bring pressure to bear upon an employer to elicit internal changes within its organization which lead to an

appreciable reduction in the level of occupational risk. Such in-house safeguards may include the following:

- Labour-management health and safety committees, which
  1. permit worker participation in identifying site-specific hazards undetectable to regulatory monitoring,
  2. have the ability to conduct more frequent inspections, and
  3. are in a position to demonstrate to an employer the cost savings in assessments and fees that may result from adequate precautions;
- Competent and qualified health and safety directors (professional or part-time);
- Chief executive officers who are required to be well-informed about occupational risks, and who are fully and personally accountable for any failure to remedy hazards of which they had, or ought reasonably to have had, knowledge or notice.

No single regulatory mechanism, on its own, is able to contain occupational hazards within acceptable limits. Any regulatory strategy that intends to give employees adequate protection against the perils encountered at the workplace must therefore combine conventional legal standards, economic incentives and structural/organizational safeguards.

## **APPENDIX I**

# **A REVIEW OF THE LITERATURE ON THE IMPACT OF OSHA INSPECTIONS AND PENALTIES ON INJURY RATES**

Four studies of the impact of inspections on injury rates have produced very mixed results:

1. Smith, 1979

Inspections conducted in 1973 were found to reduce injury rates by 16 per cent, with a larger decrease for small employers and a smaller decrease for medium and large employers; 1974 inspections were found to have no statistically significant effect.

2. Cooke and Gautachi, 1981

This study of inspections conducted between 1970 and 1976 found an association between the number of compliance orders issued to a large employer and its injury rate, but no such association for small employers. The researchers estimated that citations resulted in an employer with more than 200 employees experiencing an average reduction of 0.29 in the number of days lost per employee. To place this change in perspective, they noted that the average number of days lost per employee was 1.22 for employers of this size. (For a critique of the methodology in this study see Viscusi, 1986.)

3. McCaffrey, 1983

This study found that inspections conducted between 1976 and 1978 had no effect on the injury rates of inspected employers.

4. Robertson and Keeve, 1983

This examination of the injury rates of employers inspected between 1973 and 1980 found that the experience of being inspected had a beneficial effect on injury rates.

Rather than examining the impact of an inspection or citation on the inspected employer's injury rate, other researchers have explored the association between the injury rate for an industry and the number of inspections per employee (or per employer) in that industry. Once again the results are mixed, but the most recent data suggests that inspections do have a benign impact. In three studies using data from the early or mid 1970s, researchers found no statistically significant association between the probability of an inspection and injury rates (Smith, 1976; Viscusi, 1979; and Bartel and Thomas, 1985). Two other studies reached the opposite conclusion (Robertson and Keeve, 1983; Viscusi 1986). One of these studies used data from 1973 to 1983, a time period ending much later (and of much longer duration) than that examined in any of the other studies (Viscusi, 1986).

The fact that some of the industry-level studies found no association between the probability of an inspection and injuries does not necessarily suggest that inspections have no effect. It is entirely possible that the actual experience of being inspected precipitates a reduction in an employer's injury rate while a mere increase in the probability of an inspection does not. Accordingly, if an increase in the probability of inspection within a given industry yields only a marginally higher number of employers who are inspected, injury rates for the industry, might not be noticeably reduced though injury rates of those employers who are inspected do fall.

Four studies have examined the impact of OSHA penalties on injury rates; three of these, using data aggregated at the industry level -- data from 1972 - 1975 in one case, 1974 - 1978 in another and 1973 - 1983 in the third -- found no statistically significant association between either the number of penalties per employee or the mean penalty in an industry and the corresponding injury rate (Viscusi, 1979; Bartel and Thomas, 1985; and Viscusi, 1986 respectively). The fourth study, using data for individual employers from 1979 - 1985, found that their injury rates were inversely related to both the probability of being penalized and the mean penalty (Gray and Scholz, 1988).

Two additional studies of the impact of OSHA on injury rates have already been mentioned in Chapter 3 (Mendeloff, 1979; and Curington, 1986). Both compared industry level injury rates in the pre-OSHA era with the corresponding rates in the early 1970s, finding a decrease for some types of injuries, but no change in the overall injury rate.

Several of these studies may have failed to capture the full impact of inspections or penalties on injury rates. Some do not control for a steady rise in workers' compensation benefits, even though it may have led employees to report more injuries and to receive benefits for a longer period, thereby offsetting the beneficial effect of regulatory enforcement on injury rates (Robertson and Keeve, 1983). Moreover, several studies may have used time horizons that were too short. Some of the impact of inspections and penalties in any given year may not be reflected in injury rates until two or even more years later (Scholz and Gray, 1988).

A final study was based upon the assumption that the only route by which inspections and penalties affect injuries is through compliance with legal standards, taking no account of the possibility that regulatory enforcement may reduce injuries by inducing employers to take precautions not required by law. The researchers first estimated the impact of inspections and penalties on compliance rates, finding a negative association; they then estimated the impact of compliance on injuries, finding no association (Bartel and Thomas, 1985).

All of the studies that focus exclusively upon inspections, penalties or both ignore the possibility that regulation might affect injuries by other avenues, such as increased employer and employee awareness of hazards.



## **APPENDIX II**

### **A REVIEW OF THE LITERATURE ON THE IMPACT OF EXPERIENCE RATING ON INJURY RATES**

Many American states follow an experience rating scheme designed by the National Council on Compensation Insurance. Under this program, the workers' compensation assessment paid by the smallest firms are based on their own claims cost instead of industry claims cost. Larger firms, with a certain annual assessment, pay experience rated premiums based upon a weighted combination of their own claims experience and that of the industry, with the weight attached to the firm's own experience increasing with its size. Although the exact formula varies from state to state, generally only the very largest employers -- those with 1,000 or more employees -- pay an assessment that is fully experience rated.

1. Chelius and Smith (1983)

The first published study of experience rating in the United States was conducted by Chelius and Smith (1983). Recognizing that any attempt to compare the injury rates of experience rated firms with those who are not would be confounded by the fact that the two groups differ dramatically in firm size -- a factor that is itself correlated with injury rates -- the researchers adopted a different strategy. Their methodology was based upon the assumption that, all other things being equal, experience rating provides the greatest incentive for employers to take precautions where worker's compensation benefits are highest. Benefit levels vary among states and industries due to differences in the percentage of lost wages replaced and/or initial wage levels. The authors compared the difference between injury rates of large and small firms in a state and industry with high workers' compensation benefits with the difference between corresponding groups of employers in a state and industry with low benefits. Not knowing which firms were experience rated to what extent, they used plant size as a proxy for the degree of experience rating. Assuming that experience rating leads to a reduction in injuries, they predicted that the injury rates of large firms would be lowest relative to small firms in states and industries with the highest benefits.

Chelius and Smith utilized 1979 data for 37 states and 15 manufacturing industries. For each industry, they ran four regressions, comparing time loss injury rates for large and small employers; each regression defined "large" and "small" in a different way. Of the total of 60 regressions, only 5 produced a statistically significant association between benefit levels and the differences in injury rates between large and small employers across states. They concluded that the evidence did not demonstrate that the degree of experience rating influenced injury rates.

Unfortunately, Chelius and Smith did not report the magnitude of differences in benefit levels among the employers studied. If the differences were small, then experience rated employers in high benefit states and industries would have little more incentive to prevent injuries than those in low-benefit states and industries.

2. Ruser (1985)

The second study by Ruser (1985) was primarily concerned with the effect of increases in workers' compensation benefit levels on the propensity of workers to file claims. Assuming that an employee's incentive to avoid injury or return to work decreases as benefit levels increase, Ruser predicted that this association would be weakest for the largest firms because their assessments are experience rated to a larger degree than those

paid by small firms. The greater the degree of experience rating, the more an increase in benefit levels enhances an employer's incentive to prevent injuries.

Ruser used data for over 3,000 employers spanning 25 manufacturing industries and 41 states between 1972 and 1979. Two variables were used to capture benefit levels: the percentage of lost wages replaced and the percentage of lost days for which compensation was paid. Ruser employed two alternative definitions of injury rates, the rate for all injuries and the rate for time loss injuries. As predicted, he found that the relationship between each of these benefit variables and the rate of all injuries was smaller for larger firms. Turning to time loss injuries only, he found that the association between the percentage of wages replaced and the injury rate was smaller for larger firms, but he found no statistically significant differences between small and large firms in the relationship between firm size and the percentage of lost days for which compensation was paid.

Both of these studies focused exclusively upon the impact of experience rating on levels of care and made no attempt to measure its impact on levels of hazardous employment.

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