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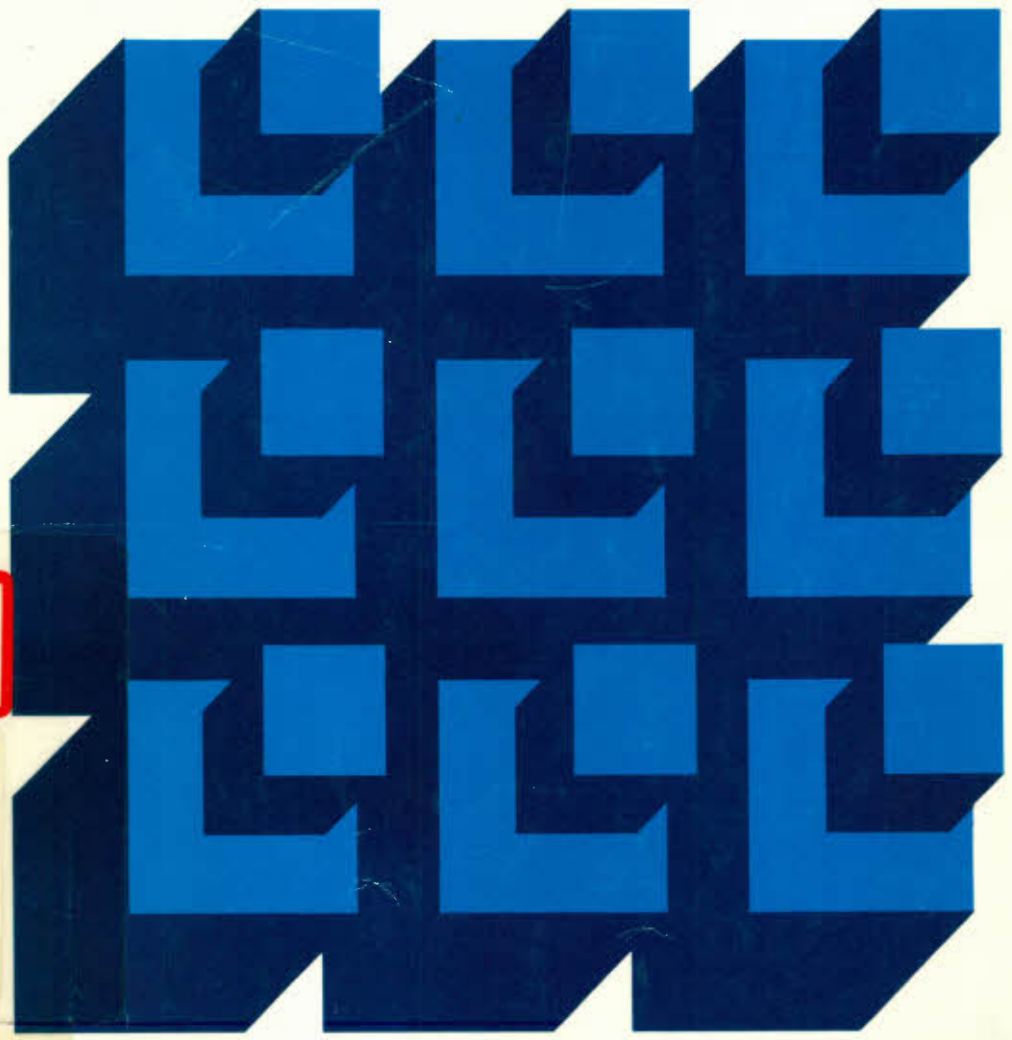

DISCUSSION PAPER NO. 338

Collective Bargaining Over Technological Change in Canada: A Quantitative and Historical Analysis

by

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RÉSUMÉ

À mesure que s'accélère l'évolution de leur milieu de travail, les travailleurs canadiens s'inquiètent de plus en plus du risque de perdre leurs emplois ou une partie de leurs revenus. Plusieurs aimeraient avoir un mot à dire dans la mise en place des innovations. Or, il ressort des recherches effectuées par le Conseil économique relativement au rapport Innovations, emplois, adaptations, publié récemment sur l'incidence du progrès technologique sur le marché du travail, que ce genre de consultation avec les travailleurs contribuerait à promouvoir l'efficacité ainsi que l'équité. Par exemple, une étude sur les négociations au sujet des nouvelles technologies dans cinq pays européens indique que non seulement la coopération entre les syndicats et le patronat concoure à apaiser les préoccupations des employés dans une large gamme de situations, mais aide aussi à accélérer le rythme du progrès technologique.

Les travailleurs peuvent contribuer au progrès technologique de diverses façons. Dans le présent document, nous nous penchons sur l'apport que peut fournir la négociation collective officielle. Nous voulons déterminer, entre autres choses, quelle est la fréquence de certaines clauses importantes sur le progrès technologique dans les conventions collectives canadiennes, et si leur fréquence a beaucoup évolué au fil des ans. Il est intéressant en particulier de vérifier si les clauses pertinentes sont beaucoup plus fréquentes dans les quatre domaines de juridiction ayant légiféré sur le progrès technologique (le gouvernement fédéral et les provinces du Manitoba, de la Saskatchewan et de la Colombie-Britannique).

Là où une telle législation est en vigueur, les travailleurs ou leurs syndicats peuvent demander que ces lois soient appliquées par les commissions des relations du travail lorsqu'ils estiment qu'elles ont été violées par les employeurs. Mais les commissions n'ont pas à ouvrir de nouvelles négociations au sujet du progrès technologique lorsqu'une demande leur est soumise. Donc, pour déterminer combien les lois existantes ont été efficaces pour protéger les intérêts des travailleurs, on doit considérer avec quelle fréquence les commissions ont permis la négociation et comment elles ont interprété les dispositions législatives qui la régissent.

Il ressort de notre analyse qu'en général, les clauses sur le progrès technologique ne sont pas très fréquentes dans les conventions canadiennes, et qu'elles ne sont pas beaucoup plus fréquentes depuis l'adoption d'une législation sur le progrès technologique au début des années 70. Nous avons constaté au cours de notre étude que les travailleurs et leurs syndicats n'ont pas eu beaucoup de succès lorsqu'ils ont soumis des cas aux commissions des relations du travail. Une raison à cela, c'est que les commissions s'en sont généralement tenues à une définition très restreinte du progrès technologique.

Cela revient à dire que, dans l'ensemble, le système de négociation collective ne s'est pas très bien accommodé des questions relatives au progrès technologique. Autre préoccupation, plus de la moitié des travailleurs canadiens ne sont pas syndiqués et ne jouissent donc d'aucune protection contre les effets négatifs du progrès technologique. En conséquence, il semble que la négociation collective officielle devra être complétée par des politiques couvrant tous les travailleurs, si nous désirons vraiment créer un climat de relations professionnelles où les changements qui surviennent dans le milieu de travail sont bien accueillis par toutes les parties.

ABSTRACT

As the pace of workplace change increases, many Canadian workers are becoming increasingly concerned that such change could put their jobs at risk or cost them part of their earnings. Many others would like to have a say in the implementation of such change. Research done by the Economic Council for Innovation and Jobs in Canada, the recently published report of the Labour Markets and Technological Change group, indicates that providing workers with such a say could help promote efficiency as well as equity. For example, a study on bargaining over new technologies in five European countries indicated that not only were employee concerns over a range of work issues more effectively handled when genuine union/management cooperation took place; the pace and success of technological change were also increased.

Worker involvement in the technological change process can take many forms. In this paper, we emphasize the type of involvement afforded by formal collective bargaining. Our aim is to discover, among other things, how frequently certain key tech change clauses occur in Canadian agreements and whether the incidence of any of all of these clauses has changed appreciably over time. Of particular interest is the question of whether relevant agreement clauses are notably more frequent in those four jurisdictions (federal, Manitoba, Saskatchewan, and British Columbia) which have technological change legislation in force.

In those jurisdictions which have tech change legislation on the books, workers or their unions may request that the labour board enforce that legislation in cases where workers feel it has been violated by employers. But labour boards are not required to open bargaining over tech change when an application is brought before them. Accordingly, in order to discover how effective existing legislation has been at protecting workers' interests, it is necessary to consider both how often labour boards have granted leave to bargain and how they have interpreted the relevant legislation.

Our analysis indicates that, in general, technological change clauses are not very frequent in Canadian agreements, and that, furthermore, these clauses are not much more common than they were before the passage of tech change legislation in the early 1970s. Our review of relevant labour board cases suggests that for the most part, except to a certain extent in British Columbia, workers and their unions have not been successful in bringing cases before labour boards. One reason is that, in general, labour boards have remained wedded to a highly restrictive definition of technological change.

These results indicate that, on the whole, the collective bargaining system has not accomodated itself very well to tech

change issues. Another concern is that more than half of Canada's workers are not unionized and thus enjoy no protection at all against the adverse effects of tech change. Accordingly, it appears that formal collective bargaining will need to be supplemented by policy approaches covering all workers if we wish to create an industrial relations climate in which workplace change is readily accepted by all parties.

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FOREWORD

This paper is based on research done for the Council's recently published report on Labour Markets and Technological Change, Innovation and Jobs in Canada. An important aim of that report was to discover the likely impact of technological change on Canadian industrial relations. Two questions of paticular interest were: What kind and degree of protection do Canadian workers have against possible adverse effects of technological change, and are there ways of improving current legislative arrangements for dealing with technological change, in order to provide Canadian workers with greater protection and thereby make workplace change more acceptable.

After analysing about one thousand agreements held by the Collective Bargaining Division of Labour Canada, the paper reviews relevant labour board and arbitration cases dealing with technological change. It concludes with a discussion of possible alternative legislative arrangements.

Jonathan Peirce, who has studied industrial relations at Queen's University, wrote this paper while a member of the Labour Markets group. He is presently a researcher-writer with the Trade Policy Options group.

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Chairman

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Most of all, I should like to thank Gordon Betcherman who, from the start, encouraged me to pursue this study, who did much to shape and refine it, and whose knack for distinguishing the forest from the trees is, in my view, unsurpassed.

Naturally, none of the individuals just mentioned is responsible for any errors which remain. These are the sole responsibility of the author.

INTRODUCTION

The use of technology has been a contentious issue between workers and those employing or managing them from time immemorial. Long before the post-war debate on automation began,[1] workers were asserting their right to use technology as they saw fit, while management was equally determined to assert what it saw as its natural right to run the enterprise as it saw fit. In the absence of some compromise, such as we find embodied in the technological change clauses of collective labour agreements, conflict over the issue was -- and is -- inevitable. Much labour history, indeed, is based on precisely this conflict.[2]

Clearly, technological change is a subject of vital interest to unions and employers -- the two major players in the industrial relations system. But, particularly if the full economic impact of tech change is considered, it will readily be seen to be a subject of interest to <u>everyone</u> in modern society, not just workers and their employers. It will be seen, as well, that there are no simple answers to the problems posed by tech change.

For instance, it is now generally accepted that if certain types of workplace innovation are <u>not</u> adopted, then society as a whole may suffer from a less competitive economy, at considerable cost to all. But by the same token, the innovations needed to make the economy more competitive can be had only at a price -- sometimes a

substantial one. As one commentator recently noted, "Robots are not free."[3]

In addition to the direct, first-order costs of implementing the new technology, there are intermediate, second-order costs, such as severance pay and other expenses associated with the displacement of those workers affected by the introduction of the new equipment. More profoundly still, there are indirect, long-term costs which may not be readily apparent at the time the new equipment is installed but which may nonetheless in the long run come to dominate all others.

Particularly when workers are displaced at a time of general slackness in the national economy, there are such things as unemployment insurance benefits, welfare payments, and foregone income and sales tax revenues to consider, as well as the increased crime, alcohol and drug addiction, spousal and child abuse, and mental and physical illness believed by many observers to accompany high unemployment.[4]

Given the high social costs associated with tech-change related unemployment -- and here we do well to recognize that the list in the preceding paragraph probably represents but the "tip of the iceberg" as far as such costs are concerned[5] -- one might fairly question whether the whole issue of tech change might not more fairly and efficiently be dealt with at the national rather than the workplace level. Certainly, no one could deny that many of

the impacts of this change are national. And some recent evidence advanced by such economists as Ezio Tarantelli suggests quite strongly that those countries which have a relatively centralized industrial relations system (Sweden, Denmark, West Germany) have tended to suffer less economic "misery" (i.e., unemployment and inflation) than countries with relatively decentralized I.R. systems, such as Canada, the United States, and the United Kingdom.[6]

While Tarantelli does not deal directly with the issue of tech change, it is worth noting that in the centralized systems just mentioned, tech change tends to be raised as a national issue far more often than in the decentralized ones (including Canada's). One reason is the national scope of bargaining over major issues (including money) prevalent in the centralized systems. Another reason has to do with the close links which unions in centralized systems typically form with the governments in power (generally social democratic ones). These links make it relatively far easier for unions to get issues like tech change onto the national political agenda and, indeed, enacted into legislation.[7]

Of course, this is not to suggest that even in the most highly centralized systems, such as Sweden and Denmark, unions invariably "get their way" on issues like tech change. It is to suggest that in centralized systems, in which unions have close links with government, they have, on the whole, a far greater chance of winning a respectful hearing on those issues.

This rather different European experience[8] takes on added relevance at a time when workers and their unions are showing an increasing awareness of the potentially adverse effects of tech change on their job security, income, and health and safety,[9] and when, in particular, existing tech change legislation has come under sharp criticism from many prominent labour leaders.[10] The gist of their criticism is as follows:

- the legislation (even if enforced) does not provide workers with sufficient protection;

- evidence from the Canada Labour Relations board and various provincial boards indicates that the legislation is not enforced, except to a limited degree in British Columbia;

- many workers (including most unionized federal and provincial government workers as well as those in jurisdictions which have not passed tech change legislation, in addition to the unorganized) have no legislative protection at all against the effects of tech change;[11]

- tech change provisions are relatively infrequent in Canadian agreements, even in provinces which have tech change legislation in force, and the frequency of these provisions has not increased greatly over time;

- many issues of concern to Canadian workers, such as health and safety aspects of new technology, the possible loss of skills due to the introduction of new technology, and even the possible loss of workplaces due to such technology[12] are never, or virtually never, dealt with under existing arrangements.

Given both the increasing speed with which technological change is being introduced into Canadian workplaces and the increasing concern felt by Canadian workers and their unions over the issue, it is clear that Canada stands at a crossroads. Should we continue with existing arrangements, on the grounds that to do otherwise would be to interfere with unions' and employers' ability to bargain as they see fit? Should we maintain the existing structure but strengthen certain legislative provisions such as those dealing with advance notice, recognizing that today's slacker economy makes adjustment more painful for workers than it was 15 years ago? Or should we rather admit that our decentralized industrial relations system, has not proved an effective forum for dealing with the issue, and seek to make a more fundamental structural change?

Obviously, before we can propose <u>any</u> solutions we must know with some precision just what the problem is. To this end, I begin by indicating, first in qualitative and then in quantitative terms, just what Canadian unions have been able to achieve in terms of collective agreement clauses dealing with tech change. This

examination of the record is necessary in order fairly to evaluate the unions' claim that, by and large, tech change clauses have not been written into Canadian agreements.

For the most part, this analysis is based on data provided by the Collective Bargaining Division of Labour Canada, covering agreements for 500 or more workers. Restricting oneself to such "large" agreements obviously poses certain problems; therefore I have supplemented my large agreement analysis with a brief discussion of some small agreements (covering fewer than 500 workers), based on a personal sample of agreements held by Labour Canada but not coded by them. A major rationale for the small agreement analysis is to see whether the small agreements contain the same types of tech change clauses as do the larger ones, and in the same quantity. Since the industrial relations literature contains few discussions of such small agreements, this section of the paper should be of particular interest to academics with a theoretical interest in the field, as well as to trade unionists and other practitioners.

Existing legislative arrangements under the Canada Code and the provincial labour acts of Manitoba, Saskatchewan, and British Columbia are discussed in some detail. General remarks about the legislation have, to the extent possible, been supported with specific reference to relevant labour board and arbitration cases.

The brief concluding section explores some possible solutions to the question posed earlier, that of how society should deal with the problems raised by rapid workplace change. The major "solution" proposed there, that of works councils or, as I prefer to call them, joint labour-management tech change committees, should at this point be considered highly tentative. We shall need to find out more, both about how such committees have worked in Europe and how similar ones such as health and safety committees have worked here, before we can assert the merits of the idea more definitely. At this point, I can only say that of all the possible solutions I have examined, joint committees come closest to meeting the standard industrial relations criteria of equity (in that all would be involved) and acceptability (in that they would not represent a fundamental departure from existing practice).

It is my hope that, far from being the final word on the question, this paper sparks others to begin their own research. If it does so, it will have served a useful purpose.

HISTORICAL ANALYSIS

PRE-LEGISLATION PERIOD (TO 1972)

Our analysis begins with the mid-1960s because this is the first point at which Labour Canada's Collective Bargaining Division began systematically to enumerate nonwage changes in collective agreements and to publish the results in its Collective Bargaining Review.[13] But tech change clauses had certainly been written into agreements prior to the mid-'60s, because some of the provisions mentioned in the 1966 and 1967 CBRs were described not as new provisions, but as improvements on or modifications of existing ones.

The most common early tech change provisions dealt with such matters as advance notice to workers and consultation with their unions prior to the introduction of workplace change, retraining opportunities, income and employment guarantees to protect workers against the adverse effects of tech change, and severance pay for those not covered by such guarantees. As a rule, the language of these provisions was vague by today's standards, and the protection they afforded was extremely modest. The typical advance notice clauses of the late 1960s, for example, did not specify a given notice period, but merely said that the company would provide the union or individual workers with as much advance notice as possible. Employment and earnings provisions

were usually limited to those who had been with the firm for some years, and rarely provided full income guarantees. A typical income guarantee clause might state that income would be maintained at its old level for six months or a year following a tech-change-related demotion. Partial demotion cushions, providing for the maintenance of earnings at a rate mid-way between the old and new ones, were also quite common.

Then as now, severance pay provisions were normally based on the number of years of service, but benefits were quite low by today's standards. In a not unrepresentative clause, the Quebec North Shore and Labrador Railway Agreement (1969) provided that an employee on layoff with three or more years' service might elect to terminate employment and receive severance pay of 50 per cent of basic weekly earnings multiplied by the number of years of service, assuming he was not eligible for an annual pension which was greater than the severance pay.

A good many of the relatively few early tech change provisions which offered workers substantial protection came from the province of Quebec, which, for reasons that are not entirely clear, has long been something of a trend-setter in this regard. To give just one example, a late 1965 agreement between the support and maintenance staff of Montreal's Catholic schools and the school administration protected regular employees against discharge, layoff, or reduced earnings on account of technological

innovation. (An identical provision appeared in a Quebec Hydro agreement signed at just about the same time.)

Among the industries that pioneered in writing tech change protection into their agreements, pulp and paper and garment manufacturing are particularly worth noting.[14] A 1966 Pulp and Paper Industrial Relations Bureau of British Columbia agreement contained a six-month advance notice period -- extremely long for the '60s -- as well as a tech change labour-management committee provision and provisions for retraining and severance pay. The garment workers went even further, especially in the area of employment security. A 1966 Dress and Sportswear Manufacturers' Guild of Toronto agreement contained an outright guarantee against layoff or earnings reduction due to tech change, in addition to an improved severance pay provision and an agreement to discuss technological changes with the union prior to their introduction. Even stronger contract language negotiated at the same time with the firm's Montreal union provided extra benefits for workers over 50, retraining if necessary, and maintenance of earnings during the retraining period, in addition to most of the items contained in the Toronto agreement. An employment guarantee provision likewise found its way into the 1968 agreement of the Ladies' Cloak and Suit Manufacturers of Winnipeg.

Formalized third-party resolution procedures for tech change disputes were definitely the exception rather than the rule during the 1960s, although such third-party resolution was, to be sure,

an important provision in the 1967 Canadian National and Canadian Pacific Railway agreements. More typical of the agreements of this period were the Dosco (Halifax Shipyards) Company agreement provision (1967) stating that the company would discuss major automation changes with the union, the 1967 Fry-Cadbury Company (Montreal) guarantee of protection against layoff for those with five or more years of seniority, Canadair Quebec's 1968 provision granting improvements in seniority rights for laid-off workers, and the City of Winnipeg's 1967 agreement with its workers, which provided for a tech change labour-management committee and for city assistance to workers seeking alternate work or retraining. In another representative provision, Stancor Upholsterers of Whitby agreed, in 1968, to "take every reasonable step to retrain and relocate employees displaced by automation or technological change". Vague management guarantees and an emphasis on defensive protection, particularly for more senior workers, were the order of the day.

By 1968, tech change provisions were beginning to appear in collective agreements covering workers who had recently been granted collective bargaining rights under the Public Service Staff Relations Act (1967). While in most respects public sector unions' tech change provisions were similar to those earned by private sector unions, even the earliest public sector agreements show a marked tendency towards definite notice periods, as opposed to the indefinite ones more prevalent in the private sector, and

the use of joint labour-management committees as a means of resolving tech change disputes.

In 1968, the Graphic Arts group won a provision requiring the government to give 45 days' written notice before installing new equipment and to establish new classifications for the positions required to operate the equipment during that 45-day period. As well, the agreement contained a tech change labour-management committee provision. Later in that same year, the air traffic controllers received a guarantee of 90 days' notice in advance of changes which could lead to a reduction in staff levels, and, in early 1969, an agreement between the government and the CBC contained a 30-day advance notice provision, a provision requiring three months' notice or the equivalent in severance pay before layoffs due to tech change, and a moving expense provision related to tech change. An agreement later in 1969 between the government and the clerical and support staff of the National Research Council contained, in addition to a minimum 90-day notice period, a clause providing for joint consultation on retraining. Joint consultation committees covering tech change matters were also established, during these years, between the government and its drafting and illustration, secretarial, education, and biological science groups.

Provisions dealing with the health and safety aspects of tech change have never been common in Canadian agreements; they were particularly rare during the 1960s and early 1970s. A notable

exception was a clause contained in the 1970 agreement between the Bowaters Pulp Company of Newfoundland and its workers, which provided that a noise level survey be made immediately and that a subsequent check also be made whenever a change in equipment or process caused an appreciable change in noise levels. As well, the agreement stipulated that all employees would be given a hearing test every five years and that those working in areas where the noise level was above 85 decibels would get such a test every six months. In many ways this clause anticipates and is similar to the video display terminal (VDT) clauses that have become a major issue in recent years.

At the end of the decade -- perhaps as a result of rising unemployment -- retraining clauses became a more common part of Canadian agreements. Such clauses appeared in the agreements between the city of Calgary and its transit workers (1968), Dominion Glass (1969), the CBC, De Havilland Aircraft, and Stelco (all 1969), and Canadian Westinghouse and the general Calgary city workers' agreements (both 1970). In addition, training programs were sometimes put forward as a possible option for employer and union to bargain over in the event of tech change; this was true, for instance, in the 1969 Iron Ore of Canada and Quebec North Shore and Labrador Railway agreements.

Occasionally these early training clauses specified the amount of training for which affected employees would be eligible. This was the case with the Canadian Westinghouse agreement mentioned

earlier, which provided up to ten days' training. More often, the agreement simply indicated that the employer would "make every reasonable effort" to retrain affected workers, as in the case of the CBC, or would set up programs "wherever practicable" as in the case of the general 1970 Calgary city employees' contract.

The protection which transferred or demoted workers could expect from reduced earnings remained spotty as the '60s became the '70s. To be sure, there were some exceptions to this rule; the 1970 Calgary City agreement just mentioned specified that an employee transferred to another position because of an inability to cope with technical or technological improvement would continue to receive his original wage rate until the lower rate had reached the former level of the old one (red-circling). Rather more common, however, were provisions such as those in the 1970 Bruck Mills (Quebec) agreement, specifying that the "demotion cushion" would last eight weeks only. Other agreements gave strong rate protection to the most senior workers and a proportionally lesser degree of protection to less senior ones. Varying degrees of protection had previously been written into such agreements as those of the Montreal Catholic School Board (1965), Polymer Corporation of Sarnia (1968), and the two major railways (1969).

Yet another, though a relatively uncommon, adjustment mechanism was the technological change fund, designed to ease the financial burden on those laid off due to such changes. Such a fund was established in the 1970 Burlington Steel agreement. It

appears to have functioned quite like a supplementary unemployment insurance fund, and, indeed, it received money from the company's supplementary UI fund, up to the level of its maximum funding -- $5,000. This maximum figure suggests that the amount of help any one individual could expect to receive was decidely limited.

Such tech change funds were to become more common in the difficult economic climate of the late 1970s and early 1980s. They are, for instance, found in the agreements of International Harvester (1983) and Zinc Electrolytique of Quebec (1984), as well as that of Pacific Press (1977). In the case of International Harvester, the fund was part of a package negotiated at a time when plants were being closed and employees were being asked to make concessions in other areas.

Contracting-out deserves to be considered in conjunction with technological change. Not only is work frequently contracted out by employers at times when new equipment is being introduced, but the practice itself, particularly when newly initiated, represents a change in work methods worthy of description as a technological change, according to the broad definition used throughout this paper.

While we have not spoken of contracting-out thus far, the matter was of concern to unions as early as the 1960s, and in 1968 the E. B. Eddy Company agreement contained the earliest post-war Canadian contracting-out provision known to this writer. The

clause barred contracting-out of repair and maintenance work normally done in-house and the contracting-out of further cartage work without the union's prior approval. Later in that same year, an agreement between the federal government and its correctional service workers provided for joint consultation between management and the union over contracting-out as well as tech change, and a guarantee that management would "continue past practice in giving all reasonable consideration to continued employment in the Public Service of employees who would otherwise become redundant because work is contracted out". The joint consultation committee is perhaps of more significance than the distinctly vague employment guarantee language.

There was an apparent hiatus of about two years in new contracting-out provisions, but in 1970 and 1971 a sizable number of those provisions began to appear. These included a 1970 Metro Toronto guarantee of employment to outside workers with two or more years' service in the event of contracting-out, a similar Metro Toronto guarantee, made that same year, to its inside workers and police, and a 1970 Eastern Canada Newsprint clause providing for notification of the union in the event of contracting-out. In that same year, the agreement of the Price Pulp and Paper Co. of Newfoundland specified a week's advance notice of contracting-out except in cases of breakdown or emergency.

Stronger provisions were included in the 1971 St. Lawrence Seaway and B.C. Telephone agreements. The former barred the practice altogether except in cases where not enough workers were available or an unusually heavy volume of work existed. The latter specified the type of work that could be contracted out without notifying the union; to this day, B.C. Telephone agreements continue to contain such specifications.[15] As well, the agreement stated that the company must negotiate with the union prior to contracting-out any kind of work not specifically permitted and that the two sides must submit to binding arbitration if agreement were not reached. Furthermore, no contract was to be let while regular employees capable of doing the work in question were laid off or would be laid off as a result.

TECH CHANGE LEGISLATION

In 1972, the federal government passed for the first time specific technological change legislation, as part of a series of revisions to Part V of the Canada Labour Code (that section of the Code concerned with industrial relations). Within the next year, similar legislation would be passed in Manitoba, Saskatchewan, and British Columbia.

This is not the place for a detailed consideration of the federal or provincial legislation, all of which will be discussed at some length in later section of this paper. For the present, suffice it to say that the federal legislation required at least

90 days' (now 120 days') detailed written notice in advance of any technological change "likely to affect the terms and conditions or security of employment of a significant number of his employees" to the bargaining agent (normally the union). Technological change was defined as the introduction of different equipment or material or a change in the manner in which the operation was carried out, directly related to the new equipment or material. As the reader may perhaps already have guessed, both the definition and the circumstances under which it was to apply were to prove quite difficult for courts, arbitrators, and labour boards to interpret.

The tech change legislation was specifically the product of years of intense lobbying by trade unionists and pressure from others, including academic industrial relationists, who had long felt that existing mechanisms did not provide workers with sufficient protection against the adverse effects of tech change.[16] More generally, the late 1960's and early 1970's were a time of ferment in the area of Canadian labour legislation and, indeed, in the larger political arena as well. There was the impact of the Public Service Staff Relations Act, which we have already discussed. Then, too, this was the era of the Woods Commission Task Force on Canadian Labour Law, whose report, published in 1968, recommended sweeping changes in many areas, including tech change.

It is a generally accepted maxim of industrial relations that trade unions are unlikely to achieve many of their legislative goals if they do not have at least a relatively sympathetic government in power. Therefore, one of the factors undoubtedly facilitating the passage of tech change legislation in the three Western jurisdictions between 1972 and 1973 was the presence of three provincial New Democratic Party (NDP) governments in these jurisdictions.

The economy was also behaving in new and strange ways. unemployment rose significantly during this period -- in large part as a spinoff from a major American recession in 1970 -- and for the first time since the Second World War, college graduates, professionals, managers, and other educated white-collar workers were significantly affected as well as blue-collar workers.[17] Particularly during the latter part of the period, inflation rose as well, to the point of becoming a major Conservative issue in the 1972 federal election campaign[18] and of prompting U.S. President Richard Nixon to establish peace-time wage and price controls in that country. Indeed, the general state of the economy appeared to defy conventional economic wisdom. For the first time in anyone's memory, inflation and unemployment were going up together, even though all the economic nostrums of the day said that this could not happen.

With unemployment and inflation both on the rise, workers were understandably concerned both for their jobs and for the

maintenance of their earnings. Because of its impact on employment and income, tech change was a major concern for organized labour and the addition of tech change legislation to the Canada Code was a key item on labour's agenda.

The labour movement, however, gave only qualified approval to the actual legislation, which fell short of its expectations in a number of ways. While pleased at the notice provision of the new legislation, which it cited as evidence of "increased recognition of unions as members of the social community," the Canadian Labour Congress (CLC) was concerned at the degree of control over tech change bargaining left with the Canada Labour Relations Board. In addition, the CLC was also worried that some provisions were, "in effect, escape hatches." Both of these concerns were to prove well-founded over the years. Still, while admitting that the amendments to the Canada Code dealing with tech change were "not ideal," the CLC said that they did represent a "forward step."[19]

POST-LEGISLATION PERIOD

One of the developments which might have been expected was a significant increase in the incidence of agreements containing provisions requiring advance notice in the event of tech change. But this did not come to pass, at least on the national level. For instance, the percentage of large agreements containing an advance notice provision rose only about 1 per cent, from 27.4 per cent to 28.5 per cent, between 1972 and 1978, and the percentage

of workers whose agreements included such a clause actually declined very slightly, from 35.5 to 34.9 per cent (see Table 1). This quantitative evidence is examined in more detail in the next section of this paper.

Qualitatively, the provisions observed in the post-legislation period did often represent improvements over earlier provisions from labour's point of view. For instance, by about 1972 most contracting-out provisions were becoming stronger than the equivalent provisions had been at the start of the decade. In one notable example, a late 1971 B.C. Hydro agreement specified not only that regular employees would not lose their jobs or have their rate classifications reduced because of contracting out, but that sub-contractors would be obliged to maintain the same wages and working conditions as Hydro itself. And an early 1972 agreement between the Newfoundland provincial government and its workers guaranteed continuing employment to those who would otherwise be made redundant by the practice.

While training clauses as a whole did not increase in the data pool, various individual agreements either added such clauses for the first time or strengthened existing ones. Sometimes these clauses were combined with advance notice and/or employment security provisions. A late 1971 agreement between the regional municipalities of Niagara and their nursing home employees, for instance, stated that no employee would lose his job as the result of any tech change after passing probation, that the union would

receive 90 days' advance notice of any such changes, and that on-the-job training or study courses would be offered "where practicable." And, the following year, a Manitoba Hydro agreement combined retraining with earnings protection; the earnings were to be retained at prior levels for a minimum of 52 pay periods for employees being retrained.

Other agreements, such as the 1972 Dominion Textile (Montreal) one, combined training clauses with bumping rights; this agreement stipulated that workers would have a right to bump if qualified for the new job after a maximum two-week training period. Still other agreements, such as the 1972 CBC-NABET one, combined the possibility of retraining with other alternatives, such as relocation or re-assignment. The appropriate alternative for any given worker was to be decided by a joint union-management committee. This agreement, one of the most comprehensive of its day in terms of the protection afforded workers, combined the relocation-re-assignment-retraining alternative with a joint consultation mechanism, a 60-day advance notice clause, and, perhaps most important of all, a guarantee that no worker past probation would be laid off or have earnings reduced due to tech change during the life of the agreement.

NABET was not the only union to take part in a consultative forum for dealing with tech change issues. Throughout the 1970s, these became more common, especially in government unions and in quasi-public-sector areas such as hospital work. A 1973 agreement

between the federal government and the postal workers established a joint parity labour-management committee which was given broad authority to discuss the effects of workplace change (including tech change) on the workforce. The committee's jurisdiction included tech change, job description and job content changes arising from the introduction of such change, the wages to be paid to those working in the restructured jobs, the relationship between change and the hours of work, the use of casual employees, and the question of the automatic coder. While the contract did not contain an employment security provision, it did state that no seniority rights or privileges would be affected by the implementation of any changes in job content during the life of the contract. In 1977, in a subsequent agreement, the independent chairman of the manpower committee (similar to the consultative mechanism described above) was given the authority to make binding decisions on issues concerning which the Letter Carriers' union and the government could not agree. In that same year, the St. Boniface Hospital agreement, in Manitoba, provided for joint discussion of tech change matters as well as a general re-opener clause including tech change issues. Unresolved questions were to be referred to the agreement's arbitration and grievance procedures.

While not as common there, consultative mechanisms for dealing with tech change did on occasion find their way into private sector agreements. A 1977 Pacific Press (B.C.) agreement provided that a reclassification committee, previously discontinued, would

resume operations in order to decide on the reclassification of employees using new equipment already installed and other equipment yet to be brought in. A mediator would make binding decisions in cases in which the reclassification committee had not worked out changes agreeable to both sides within a specified time frame.

A far more elaborate consultative mechanism was established by the B.C. Telephone Company in its 1978 agreement. There was to be a joint standing committee on tech change and contracting out. The committee was to be comprised of four union and four management representatives with a neutral chairman empowered to decide tech change issues in the event that the committee could not agree. This committee replaced the earlier arbitration procedure. It was coupled with an employment security provision which, unlike most others, guaranteed protection against job loss not only for those who were already on the company's staff (as of November, 1978), but also for those hired at a later date, providing they attained two or more years' seniority. Thus a common criticism of employment security provisions, that they protect only existing workers, is not valid in this case.

Yet another type of consultative mechanism was established between the United Auto Workers and the Ford Motor Company in a 1979 agreement. In this agreement, a national committee on technological progress was established to discuss the impact upon, or erosion of, the bargaining unit. Traditional jurisdictions of

work by plant location were to remain intact as a matter of policy. There were training provisions, and alterations (if necessary) could be made to the apprenticeship curricula then in use. When tech change was to be introduced, a plan of implementation was to be submitted by the affected local parties which, if not accepted by the national committee, might be submitted to the agreement's grievance procedure.

On the whole, however, new or revised tech change provisions were a relatively uncommon feature of Canadian agreements during the middle and late 1970s. Many fewer such provisions were noted by Collective Bargaining Review during this period than had been the case during the late 1960s and early 1970s. And, as previously noted, aggregate tech change frequency figures stayed virtually static during this period, except in the case of employment security provisions, which increased moderately. A variety of explanations could be advanced for this apparent lack of change.

Earlier, we noted that the passage of labour-oriented legislation (like that concerning tech change) is most likely at times when the general political climate is relatively progressive. During the mid-1970s, the country's general political climate became more conservative, and the NDP lost support both federally and provincially. In the 1974 federal election, in which Pierre Trudeau's Liberals won a majority government, the NDP lost not only its de facto balance of power

position, but also half of its seats in the Commons, including that of its leader, David Lewis. The party's share of the popular vote declined significantly, as well, although not as much as did its share of parliamentary seats.[20] This federal election "loss" was followed by provincial defeats in B.C. (1975) and Manitoba (1977), leaving Saskatchewan as the only province in which the NDP still controlled the government. This change in political climate suggested that governments would not be as sympathetic to labour's aspirations as they had been in the past.

Still more important, public attitudes toward organized labour became less favourable at this time, in large part as a result of some major public-sector disputes, including a three-month nationwide postal strike in 1975 and a large number of strikes on the Montreal transit system.[21] While the lion's share of public wrath was undoubtedly directed against public sector unions, some portion of this feeling almost certainly spilled over into the private sector as well. Combined with the generally more conservative political tide, such a decline in public sympathy for organized labour may well have encouraged management to take a harder line in negotiations over issues like tech change.

For labour-oriented issues generally, if not for tech change in particular, it appears that the mid-70s were naturally a period of contraction following the heady "expansion" of the late '60s and early '70s. But this is not the only explanation for the relative lack of union action during the period. For one thing, the

passage of the tech change legislation undoubtedly made tech change less of a hot media issue than it had been, a development which in turn probably helped lower rank-and-file union members' awareness of and interest in the issue.[22] Those issues that are not front-page items in the newspapers (as tech change was in the late '60s and early '70s but has not often been since then, until the past few years), are probably less likely to make their way into collective agreement clauses than issues which are. Negotiators and union officials, no matter how aware they may be of certain issues, can move only so far beyond their membership's "threshold of awareness," as it were, without losing credibility. In democratic unions, it is the membership which must decide which issues are put on the negotiating table in the first place, to a large extent, and which remain there as priority items after the first hard round or two of bargaining. By and large, tech change appears not to have been such a priority item for most unions during the period after 1972.

What is known is that a number of other issues, including the rapid increase in inflation during the decade's early and middle years, the mid-'70s increase in unemployment triggered by the very severe 1974-75 U.S. recession, and the government's anti-inflation program, begun in 1975 and vigorously opposed by organized labour, pushed their way to the top of the labour movement's agenda. In Quebec, at least until 1976, workers and unions were also very much occupied by their political activities against the Liberal regime.[23] And, following the election of René Lévesque and his

Parti Québécois in 1976, the media -- and Canadians generally -- became almost obsessively preoccupied with the issue of national unity, leaving still less time, energy, and newspaper space available for less immediately dramatic issues like tech change. Such space as was available was devoted very largely to labour's activities against the anti-inflation program, such as the Day of Protest held in October, 1976.[24]

The one area of tech change provision which did seem to attract the unions' attention during this period was that of employment and income security. The unions' concern with these matters is not at all surprising, in view of the sharp increases in both unemployment and the cost of living taking place then.[25]

In some cases, the definition of tech change used in the agreement was tied, either explicitly or implicitly, to the direct effects on employment of the change in question. The 1978 Canadian Kenworth agreement in British Columbia defined tech change as a change in plant process, equipment, or method of operation, diminishing the total number of employees with more than one year's service. Other agreements, such as the 1972 Pacific Press one, had tech change provisions which were "triggered" only by employment displacement effects of a certain magnitude or proportion. In this agreement, the company was specifically permitted to reduce the workforce by attrition but was obligated to pay the union a certain amount for each worker displaced over and above five per cent of the total work force. A

1973 Aluminum Company of Canada agreement had a provision which did not take effect until the changes in question had affected 20 per cent or more of the workforce. Still other agreements had clauses which were not "triggered" until a given number, rather than proportion, of workers had been affected.

As in the 1960s, protection under employment and income security clauses was limited to workers who had accrued a certain amount of seniority in addition to having passed their probation periods; the necessary amount of seniority might vary from a few months to five years or longer. In some cases, as in the 1977 Pacific Press agreement, employment guarantees were limited to a particular occupational group (printers, in this agreement). Rare -- then and now -- were agreements like that between the government of Canada and the postal supervisors (1976), which provided not just a guarantee of continuous employment until the signing of the next agreement, but full pay and benefits for that period of guaranteed continuous employment, a guarantee of the employee's classification, and reimbursement of the expenses occasioned by any employee as a result of relocation. Rather more typical was the 1976 agreement between the University of British Columbia and its maintenance and service workers, which stated that the university would make every effort to place employees affected by tech change in alternate positions and to provide them with retraining opportunities.

1980 TO THE PRESENT: THE RECESSION AND POST-RECESSION PERIOD

The early 1980s also saw no significant increase in new or improved tech change provisions as against the mid- and late-1970s. Again, this may well have been the result of other issues' having commanded more of labour's attention (protection against inflation in 1980 and 1981, protection against layoffs thereafter). For the most part, the unions appear to have simply been marking time on the issue. Strong provisions in Collective Bargaining Review stand out as distinct rarities.

Some of the most significant of the provisions that did appear were a no-layoff guarantee in the event of tech change in the various Imperial Tobacco agreements in 1980; a guarantee, in the 1981 agreement between the CBC and its news staff, that no employee past probation would be laid off or would lose earnings as a result of the introduction of new or modified equipment; and a guarantee of wages and/or employment in the event of tech change or contracting-out in the 1981 agreement between Metro Toronto and its outside workers. The CBC agreement provided for retraining, relocation, or reassignment as possible alternatives to layoffs; the Metro Toronto agreement stated that retraining would be used "if necessary".

With the 1981-82 recession came large-scale layoffs and plant closings, and an increased interest on the part of unions in

minimizing, as much as possible, the effects of such layoffs and closings on their memberships. A 1983 International Harvester agreement provided for a termination plan with a maximum $300,000 employer liability; it was negotiated as part of a package involving employee concessions in other areas. Similarly, a 1983 Canadian General Electric agreement provided for severance pay in connection with redundancies and plant closings. Given the continuing poor employment prospects in manufacturing, one might well look for more such provisions in the future.

In one area, the contracts of the early 1980s did break some important new ground. As video display terminals (VDTs) became more common in Canadian workplaces, there were increasing concerns about the health risks incurred by VDT operators, particularly pregnant operators. And the introduction of such electronic devices as surveillance cameras into workplaces caused workers and their unions to fear that the devices would be used for surreptitious monitoring of employee performance. Such concerns began to be addressed in certain collective agreement provisions during the early 1980s.

The 1981 agreement between the federal government and the inside postal workers represented by CUPW contained, in addition to its pioneering maternity leave provision, perhaps the earliest surveillance camera provision known to this writer. The clause stated that no new closed-circuit TV units would be added and the use of existing ones would be restricted. A similar but stronger

provision was inserted into the 1984 agreement between Carleton University and its support staff, represented by CUPE Local 2424. The relevant article of this agreement barred surveillance cameras from employee-occupied areas during normal working hours without the knowledge of the employees concerned and of the CUPE local if the employees were union members. The employer was not permitted to use the cameras for monitoring of work, and no information obtained by means of the devices was to be used against employees at any time unless such information constituted evidence of criminal activity (i.e., theft).[26]

More important, by 1983, VDT provisions had begun to make their way into Canadian agreements. In that year, the Canadian Pacific agreement, in addition to establishing a joint Health and Safety Committee for the specific purpose of investigating and recommending safety standards for the use of VDTs by the company, also gave the pregnant VDT user various alternatives. She might request an exchange of positions with another worker in the same classification, request leave of absence with the stipulation that she be able to apply for any available vacant post for which she was qualified, or request an extended unpaid pre-natal leave. (It is not clear from the wording whether such requests were automatically to be granted.)

VDT provisions soon found their way into other agreements, particularly those of government workers and telephone company

workers. The Canadian Union of Public Employees appears to have been particularly concerned about the issue quite early on.[27]

A mid-1984 agreement between the Nova Scotia government and its clerical group, provided, among other things, one free eye examination per year for operators spending half or more of their working time at the terminals. Like the CP workers, the Nova Scotia government workers were, in the case of pregnancy, free to request a transfer for the duration of their pregnancy, though here again, it is not clear whether the government was obligated to honour such requests.

One of the quite rare instances to date of such a provision in the private sector appeared in the late 1984 agreement of Denison Mines Company at Elliott Lake. The VDT provision here established a committee to oversee "all related matters" concerning VDTs and provided an employee operating a VDT for four or more hours a day with a ten minute per hour break away from the terminal, during which time the employee could be assigned other duties if the employer wished. Meanwhile, the Carleton University support staff wrote into their 1984 agreement a potentially most comprehensive provision, though it had only the status of a letter of intent. Among other things, the letter of intent called for an 8-person parity committee empowered to make recommendations to the parties within 120 days on "matters of concern related to the installation and use of the VDTs". These recommendations were to address the following issues: the testing of all university VDTs used by

bargaining unit members; the method of transferring employees away from VDT areas for health-related reasons; the scheduling of installation or proper VDT-related safety equipment; and the plan for dealing with VDT-related health hazards.

At present, we lack a systematic VDT "large agreement" clause data for Canada as a whole since these clauses have not been coded by Labour Canada. My examination of a group of telephone and telecommunications agreements suggests that, at least in that industry, such provisions are becoming relatively common as tech change provisions go.[28]

But the telephone industry is not representative of Canadian industry as a whole. It is worth noting that a small agreement sample, conducted by this writer for the Economic Council and covering 183 agreements with fewer than 500 workers, turned up only four such provisions (2.2 per cent of the total sample) and an additional letter of agreement.[29] While large agreements in the Labour Canada data base have typically contained, as we will recall, about twice as many tech change provisions as did the small agreements, it is plain to see that doubling or even tripling the small agreement incidence of VDT provisions would still leave a very low percentage of the workforce covered by such provisions. More comprehensive data appears in an analysis of VDT provisions undertaken by the Manitoba Labour Department. A report issued by the Research and Planning Branch of that department in 1984, based on agreements in force as of January 1, 1983,

indicated that of 640 current agreements of all sizes, only 11 (1.7 per cent) of such agreements contained provisions for paid eye examinations for VDT operators. Most employees covered by the provision were in the Manitoba Government Employees' Association, which had recently negotiated a VDT provision, including a paid annual eye examination, with the provincial government. Eighteen, or 2.8 per cent of the province's agreements, contained a guarantee of the right to transfer to alternate work for pregnant VDT operators; again, most covered employees were in MGEA (p. F-5). Ten (1.6 per cent) agreements contained a provision guaranteeing that a worker who had spent two continuous hours operating a VDT would be assigned to alternate duties for ten minutes as a break from the intense eye work necessitated by the machine. Most significantly, no agreements at all contained provisions covering the selection, installation, inspection and maintenance of VDT equipment.[30]

The very low incidence of VDT provisions in Manitoba led the authors of the provincial labour department report to conclude that "The collective bargaining process, at least in Manitoba, has not been a successful vehicle for guaranteeing workers a safe and healthy work environment." (p. F-6).

Still, workers and their unions may, to some extent, feel heartened on the VDT issue if only because, for whatever reason, the issue appears to have made a fairly significant impact on Canadian public consciousness. In other areas there is no room

for even the guarded optimism that workers and their unions may legitimately feel with respect to VDTs. While the Canada Post and Carleton University support staff agreements do contain surveillance camera provisions, the provisions do not appear to have made their way into any significant number of other agreements. This suggests, for whatever reasons, that surveillance camera provisions do not appear to be "taking." No such provisions appeared in the small agreements sample. Also not appearing in the small agreements sample were clauses pertaining to surveillance of workers through electronic auditory devices, cooperative work-management job design, or the use of robots exclusively or primarily in situations considered too hazardous, dirty, repetitive, or other unpleasant for human workers to be involved in. Yet these are also important areas of concern, as is suggested by the large numbers of articles in management and industrial relations literature devoted to these subjects.[31]

Skills provisions appeared in a miniscule fraction of the small agreement sample; to be precise, there were three such provisions, from only two different agreements (just over 1 per cent of the small agreement sample). The 1984 CJCH Radio agreement, entered into with NABET, long a pioneer in the area of tech change, provided: a) that the union be notified and consulted with in the event of significant skill change, and b) that workers not be penalized for errors on new tech-change related assignments. Another small agreement, that of the Hamilton Spectator with its graphic arts department, established that certain machinery could

be operated only by certain staff or departments. To the extent, then, that the small agreement sample may in fact be considered representative of the Canadian workplace as a whole, it appears that Canadian labour agreements simply have not contemplated the idea that skills are the worker's capital, in the same sense that machinery may be thought of as the employer's capital. Whether skills provisions or the various "new technology" provisions just discussed will become more frequent in future Canadian agreements must, of course, remain to be seen.

Tech Change In the Post-Recession Period

Since 1983, there appears to have been a modest increase in the incidence of tech change clauses in Canadian agreements. The 1984 Current Industrial Relations Scene reported that, in 1983, the number of agreements covering 500 or more workers introducing or changing tech change provisions increased substantially, from seven the previous year to 16. In 1984, according to the 1985 edition of the same reference work, the number of such new or improved provisions increased still further, to 19. These figures are borne out by the increase in provisions reported in Collective Bargaining Review during this time period. Manufacturing was the sector in which the lion's share of the new or revised provisions (nine in 1983, 11 in 1984) occurred.

In general, defensive protection has been the order of the day. In 1983, according to the Current Scene, the key issues were

recall rights related to tech change-related layoffs and severance pay. In 1984, the key issues were retention of seniority, bumping rights, and the term of notice before the introduction of tech change. Early retirement provisions were also quite frequent; these were found, for instance, in the 1983 International Harvester agreement and the 1984 Consolidated Bathurst agreement.

Among the few provisions which sought to give workers some input into the process of introducing tech change was one contained in the agreement between the province of Prince Edward Island and its hospital workers. This 1984 agreement established a joint committee to examine the implications of tech change and to make recommendations on how best to deal with it. A reopener clause on tech change items was to go into effect in April, 1985, and the union was given the ability to go to arbitration over the issue.

In early 1985, the pace of tech change provision adoption seemed to pick up. That year's agreement between Canada Post and its inside workers, for example, stipulated that no employee would be laid off during the life of the agreement, providing he or she were willing to accept transfers within a 40-kilometer radius. Another no-layoff guarantee was contained in the agreement between the government of Manitoba and its government employees' union. All workers with more than 12 months' continuous service (including, most atypically for such a provision, term employees), were covered by the guarantee.

As in the two previous years, most provisions in 1985 dealt with bread-and-butter issues such as employment security, the length of notice period, and severance pay. Varying types of employment security provisions were contained in the agreements of the Cape Breton Development Corporation, Canadian National Railways, the Sidbec-Dosco; the last of the three agreements just mentioned protected jobs affected by tech change for a maximum of 18 months. Air Canada employees earned an improvement in their previously indefinite notice clause, to a definite notice period of 160 days. And a provision in the agreement between Memorial University of Newfoundland and its support staff, represented by CUPE, stated that in the event of the introduction of new methods or machines requiring new skills or skills greater than those possessed by current employees, affected employees would be given a "reasonable" period of time, with no change in pay, to master the skills required by the new methods of operation. The Memorial agreement also contained a strong VDT provision.

But although individual agreements have contained tech change provisions which have improved the lot of certain workers, on the whole, it would appear that Canadian workers do not have a great deal more protection against the effects of tech change than they 15 or 20 years ago. The truth is that, even if we restrict ourselves to workers covered by collective agreements involving 500 or more employees -- arguably a privileged elite within the overall Canadian workforce -- even significant <u>defensive</u> protection is afforded only to a minority of that elite.

Protection of workers' skills, the involvement of workers in substantive planning for and implementation of tech change, protection of workers against unwarranted electronic surveillance, and the use of robots to eliminate dangerous or dehumanizing work, to name just four of the more important contemporary tech change issues one might expect agreements to deal with, are so rare in Canadian agreements as to be virtually non-existent.

The failure of Canadian agreements to address these or equally pressing tech change-related issues raises serious questions as to the efficacy of collective bargaining as the preferred mechanism for dealing with tech change in the workplace. In later sections of this paper, I shall discuss some possible alternatives to and improvements in collective bargaining with respect to tech change.

QUANTITATIVE ANALYSIS

Only by looking at actual collective agreements can we determine just how successful unions have been at protecting their members against the adverse effects of technological change. Accordingly, we focus here on two main questions:

- How frequently do certain key tech change clauses occur in Canadian agreements?

° Has the incidence of any or all of these clauses changed appreciably over time?

In answering the latter question, we shall be particularly interested in seeing whether tech change clause incidence increased markedly, in those jurisdictions which have tech change legislation, during the period immediately after passage of that legislation.

Throughout most of the chapter, we shall be dealing solely with agreements covering 500 or more workers, since these are the only ones regularly coded by Labour Canada's Collective Bargaining Division throughout our study period. But agreements covering 500 or more workers may well not be representative of the workplace as a whole. Smaller organizations are likely to face some different problems in adjusting to tech change -- and to use different types of solutions.[32] Accordingly, our large agreement analysis will be supplemented by a look at how tech change has been negotiated in smaller bargaining units. In this way, we can also consider the relative advantages of larger, as opposed to smaller bargaining units in attaining tech change provisions and can consider certain tech change areas, such as skills provisions, tech change definition provisions and clauses dealing with video display terminals, not regularly coded by Labour Canada.

Examination of Aggregate Data

How frequently do tech change clauses in fact appear in Canadian agreements? The short answer, which stands up quite well to more detailed analysis, is "not very." Even though, as the small agreement analysis will demonstrate, workers in units of 500 or more are far more apt than workers in smaller establishments to have tech change protection written into their agreements, such protection is afforded to only a minority, even of these relatively more privileged workers.

The most common tech change clause in Canadian agreements is, and always has been, advance notice and/or consultation prior to the introduction of a workplace change. In 1985, 37.7 per cent of all "large" agreements covering 42.9 per cent of all "large agreement" workers contained such a provision (see Table 1).[33]

Canadian workers fare even worse in other tech change areas. As Table 1 also shows, the percentage of workers covered by these other tech change clauses ranges from a high of 31 per cent (training and retraining) to a low of 9 per cent (relocation allowances). Only 21 per cent of the sample's employees work in establishments where there is a labour-management committee to deal with tech change. Given that the Canadian Labour Congress believes workers should have protection in all these areas,[34] unionists are quite unhappy at the present state of affairs.

In 1972 and 1973, as we have already said, the federal government and three of the provinces (Manitoba, Saskatchewan, and British Columbia) passed technological change legislation. One might well have expected tech change clauses to have become more frequent in Canadian agreements as a result. But (see Table 2) an examination of time-series data covering four particularly important tech change clauses (advance notice/consultation, training/retraining, labour-management committees, and tech-change related employment security) suggests that such an increase has not, for the most part, taken place.[35]

In only one of the four areas just mentioned, employment security, was there a significant increase between 1972, when 12 per cent of agreements covering 15 per cent of workers contained such a clause, and 1985 (22 per cent of agreements covering 24 per cent of workers). The other three areas showed only a slight increase or remained virtually static. What is more, there was, by and large, a greater increase in frequency between 1978 and 1980 than between 1972 and 1978 -- the immediate post-legislation period.

While this evidence cannot be considered conclusive, it suggests that other factors, such as rising unemployment or an increase in the rate of workplace change, may well have been more responsible for the increase in tech change frequency between 1972 and 1985 than the legislation. Of course, in order to get at the precise impact of the legislation, we shall have to look specifically at

tech change frequency in the relevant jurisdictions, which we shall do presently.

Breakdown by Industry

Table 3 presents frequency counts of the major technological change clauses, broken down by industry.

The first fact worth noting is that, by and large, tech change clauses are fairly strongly localized in a comparative handful of industries -- usually "older" industries with steady or declining employment. Those industries with the highest average tech change frequency (see Table 4) fall, without exception, into this "sunset industry" category.[36] That such industries would have a relatively high incidence of tech change clauses is quite understandable, given that workers in declining industries would certainly be very much concerned for their jobs and would undoubtedly urge union negotiators to do whatever they could to protect their jobs and otherwise cushion the impact of tech change as much as possible. Except in the case of advance notice and training/retraining clauses (the two most common types), the typical pattern is for two to four industries to account for a very sizable portion of the total number of such clauses contained in the large agreement pool -- sometimes as many as half.

By far the highest average tech change frequency is found in the pulp and paper industry. The average tech change frequency in

this industry (68.4 per cent) is more than half again that of the second highest industry, smelting and refining (44.8 per cent). All but one of the 43 pulp and paper agreements in the large agreement pool contain an advance notice clause; likewise only one pulp and paper agreement lacks a guaranteed employment/earnings clause. Likewise, the industry is far ahead of all others in the areas of labour-management committees and tech-change-related notice of layoff. In training clauses, it ranks second to smelting and refining, and in contracting-out prohibitions, second to shipbuilding. Only in the area of relocation allowances -- generally quite rare in Canadian agreements - is the pulp and paper industry not a factor. Here it should be noted that relocation allowances are probably more important bargaining items for workers in transportation and communications industries, who are transferred fairly routinely, than for those who, like pulp and paper workers, tend to be more attached to a particular geographical regions.[37] (For more detailed time series data on the pulp and paper industry, see Appendix 1-B).

This pattern of long-established tech change protection is quite different in the "sunset" pulp and paper industry than in the newer telephone industry, in which the number both of agreements and workers covered has increased significantly since the start of the study period. Here the largest increase in tech change incidence came between 1978 and 1980 -- a pattern which suggests that other factors (such as inflation or unemployment) were probably more significant than the influence of any legislation.

Likewise, the legislation can be said with certainty to have had nothing or virtually nothing to do with the incidence of tech change clauses in the pulp and paper industry, since the great bulk of these clauses were in place before the legislation was passed. (See Appendices for details).

The high incidence of tech change provisions in the pulp and paper industry is sometimes a factor in the jurisdictional incidence of those provisions. For example, a good many pulp and paper agreements are from British Columbia, which has a tech change incidence above the national average. But such a correlation between industrial and jurisdictional frequency is probably more often the exception than the rule. Other factors, as we shall see in the next section, have more to do with the varying frequencies of tech change provision within different Canadian jurisdictions.

By Jurisdiction

In our breakdown of tech change provision incidence by jurisdiction, we shall be particularly interested in seeing what effects (if any) the tech change legislation has had on the frequency with which tech change provisions occur within those jurisdictions covered by legislation, as compared to the frequency in jurisdictions which have not passed such legislation. In addition, we shall be interested in seeing whether institutional factors (such as the relative numerical strength of a

jurisdiction's union movement, as measured by standard "union density" figures) have had a significant effect on such incidence. We shall further be interested in seeing whether specific tech change provisions serve as a substitute for comparatively similar general ones (i.e., occur more frequently when the comparable general provisions are not present), or as a complement for such provisions (i.e., occur more frequently when the comparable general provisions also occur).

AGGREGATE MEASURES

The national simple average tech change frequency is 21.8 per cent. This figure, which is simply the arithmetic mean of the seven individual tech change frequencies we have throughout this analysis,[38] is stark evidence of just how little the union movement has been able to do in getting tech change clauses inserted into Canadian agreements. Some recent American evidence, however, suggests that, as low as this figure is, it is probably quite a bit higher than the comparable figure would be in that country.[39]

When we consider aggregate tech change frequency by jurisdiction (see Table 5), there appear to be few significant regional differences. One of the four highest ranking provinces (Newfoundland) is in Eastern Canada, another (Quebec) is in Central Canada, and the third (B.C.) is in the West. (The fourth is the federal jurisdiction.) Similarly, of the four

lowest-ranking jurisdictions, one (New Brunswick) is in the East, another (Ontario) is in Central Canada, and the two others (Saskatchewan and Alberta) are in the West.

On the other hand, there does appear to be at least a moderately strong correlation between aggregate tech change frequency and union density, as a percentage of paid non-agricultural workers.[40] The commonsense notion that tech change provisions favourable to workers are likely to be more frequent in the present of a strong than a weak labour movement thus receives fair empirical confirmation. Union density would appear to be more reliable than other possible indicators of aggregate tech change frequency, such as the presence in agreements of similar general clauses. Our correlation of average aggregate tech change frequency and average aggregate "echo" clause frequency by jurisdiction (13 jurisdictions) produced a rather weak relationship.[41]

Similarly, there does not appear to be a very important connection between the existence of legislation in a particular jurisdiction and aggregate average tech change frequency. While British Columbia has perhaps the "strongest" legislation from the worker's point of view of any jurisdiction in Canada, its simple average frequency is lower than that of Newfoundland and not appreciably higher than that of Quebec, neither of which has tech change legislation. Manitoba ranks somewhat above the national average, but not greatly; its average tech change frequency is well below that of the two "non-legislation" jurisdictions just

mentioned and only marginally higher than that of Nova Scotia. And Saskatchewan ranks near the bottom of the list despite its legislation. This would again suggest that if the legislation has had any impact, it has been slight.

The story is much the same when we examine the frequency of particular tech change clauses by jurisdiction. Of these, perhaps the most significant are advance notice clauses, since advance notice provisions are invariably specifed in Canadian tech change legislation and one might well suppose that employers would prefer to write such provisions into their agreements rather than having labour boards do the job for them.

The evidence may readily be found in the third column from the left in Table 5. As the table shows, the national incidence of advance notice/consultation clauses is 38 per cent. These clauses are most frequent in Manitoba (65 per cent) -- a province which has tech change legislation, and second most frequent in British Columbia (54 per cent), another "legislation" province. But the latter figure and the federal jurisdiction is 52.4 per cent virtually the same as Newfoundland's 53 per cent and Nova Scotia's 52 per cent, these both being "non-legislation" provinces. Moreover, Saskatchewan, a province which has legislation very similar to Manitoba's, ranks well <u>below</u> the national average at 28 per cent. In any event, only Manitoba's incidence is enough higher than the national average or other "non-legislation"

jurisdictions to suggest that the legislation may have had a dramatic impact.

If anything, the "evidence" for the legislation's having worked would appear to be somewhat stronger in the case of training/retraining provisions, which rank well above the national average in three of the four "legislation" jurisdictions -- including Saskatchewan, which is well below the national average in most other tech change areas. But, again, the highest incidence is not in one of the "legislation" jurisdictions but in Newfoundland (52.9 per cent); this finding would seem to work against positive evidence in favour of the legislation. Likewise, Quebec, at 41.5 per cent, has very nearly the same incidence as British Columbia, 41.6. Perhaps the most that we could conclude with respect to training clauses is that while tech change legislation may be something of a help in obtaining such clauses, so may other factors (i.e., high union density, as suggested by the cases of Newfoundland and Quebec). Again, if there is a "case" to be made on behalf of the legislation's effect, it is an extremely weak one.

In other tech change areas, it is safe to say that the legislation has had little or no effect. RELOCATION ALLOWANCE clauses are found far more often in the federal jurisdiction than elsewhere. This reflects the fact that such provisions are apt to be "front-burner" items for workers in such industries as railways and telephones -- industries which under Canadian labour law are

considered as falling under federal jurisdiction. LABOUR-MANAGEMENT COMMITTEE clauses are most common in British Columbia, Quebec, and the PSSRA jurisdiction. Earlier, in the historical section, we noted that federal government workers have historically had a fondness for this type of approach to tech change problems in the workspace. It is perhaps less clear why British Columbia and Quebec should have a higher than average incidence. Likewise, there is no ready explanation of why these committees should be so uncommon in the Prairie provinces.[42]

GUARANTEED EMPLOYMENT AND EARNINGS provisions are most common in Quebec, British Columbia, and Newfoundland, the three "leaders" in both aggregate tech change frequency and union density. The fact that this clause (rather than the more commonly discussed advance notice) appears to be the most "typical" of all tech change clauses would perhaps be worth a more detailed study at a later date.[43]

NOTICE OF LAYOFF clauses are most common in British Columbia and Newfoundland; they are more or less evenly distributed throughout other jurisdictions. CONTRACTING-OUT prohibitions are the only tech change clauses which appear to be regionally distributed. These prohibitions, which appear in about 30 per cent of all agreements nation-wide, have a frequency rate of 50 per cent or more in all but one of the provinces east of Ontario (the exception being Nova Scotia) but are well below that figure in all provinces from Ontario westward. Of the "legislation" provinces,

only British Columbia, at 34 per cent, has a frequency rate above the national average, while Manitoba (26 per cent) and Saskatchewan (16 per cent) are well below it, and the federal jurisdiction, at 32.9 per cent, is very near the national average.

While the picture presented by the large agreement data is obviously a partial one, and needs to be supplemented by small agreement data, the evidence we have considered here would suggest that tech change legislation has had at most a minimal influence on the incidence of tech change clauses within various Canadian jurisdictions.

Small Agreement Analysis

Since workplaces employing 500 or more people are not necessarily representative of workplaces as a whole, we decided to look at a representative sample of "smaller" agreements, covering fewer than 500 workers. As Labour Canada does not systematically code data for the small agreements, the exercise involved an individual examination of each agreement in the sample - 183 in all.

As noted earlier, I am interested primarily in two issues here: a) the "size" issue, or the question of whether larger bargaining units are relatively more likely to attain tech change clauses favourable to workers; and, b) the "new technology" issue, or the

frequency with which VDT clauses, clauses restricting surveillance cameras and electronic monitoring equipment and the like, have been reflected in Canadian agreements.

As I have shown elsewhere, aggregate tech change frequency measures are often easy to calculate across a group of agreements (such as the small agreement pool). In another paper,[44] I have calculated three different types of aggregate frequency measure for both the large agreement pool maintained by Labour Canada and the small agreement pool which I examined personally. These include a simple average frequency, in which the actual number of occurrences of all tech change provisions which the researcher wishes to consider is divided by the possible number of occurrences of such provisions; a single-weighted average frequency, in which the strength of various provisions (contracting-out, advance notice, and notice of layoff) is taken into account; and double-weighted average frequency figures which also take into account the fact that unionists may well consider some clauses more important than others.[45]

Table 6 shows that, in general -- and contrary to some previous discussions in the industrial relations literature[46] -- size is a distinct advantage to unions in winning favourable tech change clauses. For instance, the large agreement pool's simple average frequency was 21.7 per cent, compared to a figure of 13.2 per cent for the small agreement pool. When single and double-weighting were used, the advantage to size became even greater --

nearly 2.1. The single-weighted average was 16.0 per cent for the large agreement pool, 8.3 per cent for the small. And the double-weighted average was 18.4 per cent for the large agreement pool, as compared to 9.5 per cent for the small.[47]

These admittedly somewhat crude aggregate measures suggest that large agreements (those covering 500 or more workers) are nearly twice as likely as small agreements to contain some kind of tech change provisions. But how do the two types of agreement compare when we start looking at individual provisions? The answer is that the large agreements are "ahead" in every category of tech change provision which we have studied. Table 7 provides a detailed comparison of the relative frequency of the seven tech change clauses under study here in the small and large agreement pools.

In some cases, the "advantage to size" is relatively moderate -- of the order, let us say, of 4 to 3. This is roughly the ratio we find in the case of the advance notice and contracting-out provisions. The former occurs in 27.9 per cent of the small agreements as opposed to 38 per cent of the large ones; the latter appears in 23.5 per cent of the small agreements and in 30.9 per cent of the large ones. Elsewhere, the large agreement/small agreement frequency ratio approaches more closely to 2:1 or, in some cases, an even higher figure. Training and retraining provisions appear in 30.8 per cent of the large agreements, but only 17.8 per cent of the smaller ones. A tech

change-related guarantee of employment or earnings is found in 22.1 per cent of the larger agreements, but in only 11.5 per cent of the smaller ones. And notice of layoff provisions are likewise almost twice as common in large agreements (12.6 per cent) as in smaller ones (7.7 per cent). The difference becomes overwhelming in the case of tech change labour-management committees (found in 14.5 per cent of larger agreements, but in only 3.3 per cent of smaller ones) and tech change-related relocation allowances (provided for in 4.1 per cent of larger agreements but no smaller agreements at all).

One's first impulse might be to wonder whether one reason for the difference was that tech change-related matters might, in smaller organizations, be handled under general provisions of the agreement, such as those providing for notice of layoff, general earnings guarantees, and general training and moving allowance clauses. But a quick examination of the aggregate data will suffice to show that this is in fact not the case at all. As with the specific tech change clauses, the similar "general" clauses (such as those just mentioned) likewise all occur more frequently in the larger than in the smaller agreements (see Table 8 for details).

The most modest difference is in the notice of layoff provision, which is found in 57.6 per cent of larger agreements, 49.6 of smaller ones, and in the general guaranteed employment and earnings provision, found in 9.1 per cent of larger agreements,

7.7 per cent of smaller ones. Elsewhere, as in the case of the specific tech change clauses, the difference is generally of the order of 2:1 or greater. The most profound difference is in the incidence of general labour-management committees, provisions concerning which appear in 60 per cent of the larger agreements but in fewer than 20 per cent (19.7, to be exact) of the smaller ones. Clearly, then, we are not dealing with a situation in which smaller bargaining units are obtaining "substitutes" for tech change clauses in some other way; size of bargaining unit appears to be just as important a factor in winning general provisions of the sort mentioned here as it is winning specific tech change provisions.

The small agreements are not only useful in showing the importance of size. Because they must, of necessity, be examined individually by the researcher, they afford the opportunity of determining the frequency of other types of tech change provisions not picked up by the Labour Canada data base. Among these are clauses providing specific definitions of tech change, provisions dealing with video display terminals (VDTs) health and safety provisions connected with tech change, and the use of surveillance cameras and electronic monitoring equipment in the workplace. Many of these items have been on organized labour's agenda for some time.[48]

It is not possible to tell, of course, whether the "size" argument will hold for the new technology and definition clauses,

as well as for those clauses picked up by Labour Canada. In the absence of evidence to the contrary, however, one must consider it probable that just as larger bargaining units have appeared to have had more success writing advance notice and employment security provisions into their agreements, so they likely will be relatively more apt to have success writing in VDT, surveillance camera, and tech change-related health and safety provisions. Certainly the incidence of such provisions at present (as given in Table 9) would appear to be extremely low. Within the small agreement sample, about 5 per cent of agreements were found to contain definition clauses, about 1.5 per cent comprehensive employment security clauses relating to tech change, and just over 2 per cent, clauses dealing with VDTs. Surveillance camera provisions, which have by this time been written into such large agreements as the Postal Workers' one, do not appear at all in the sample, nor do general tech change-related health and safety provisions. Perhaps most surprising of all, given the considerable literature that has emerged on the subject of deskilling, specific provisions dealing with skills as related to new technology or new jobs created by that technology were found in only two small agreements -- just over 1 per cent of the sample.

This brief discussion of the "small agreement" pool has not pretended to do more than scratch the surface. There are many questions concerning these agreements which would bear further investigation. The following list raises a few such questions:

- Is it possible that in some industries, large bargaining units are at an advantage, while in others, there is no advantage to size or even a disadvantage?

- Does the relative impact of bargaining unit size vary from jurisdiction to jurisdiction, either within Canada or between Canada and other countries?

- What is the impact of unions like the Canadian Union of Public Employees which, while tending to have many smaller bargaining units, offers its members many of the advantages normally associated with large bargaining units (i.e., a strong centralized research department and national tech change policy)?

- Related to the previous question, might the size of the union (national or international) be a relevant factor to consider, as well as the size of the particular bargaining unit?

- Could we envisage arrangements for dealing with tech change issues which might in fact be more or less neutral with respect to size?

The last of these points will be particularly important when we come to the final section of this paper, where we are concerned with various policy options. The other issues will have to be

left for a later date or other hands. They should at least provide researchers and practitioners with some food for thought.

Having observed that tech change provisions are indeed quite infrequent in Canadian labour agreements, the next question one might logically ask is why such provisions are not more frequent. Are unions not aware of the issues involved? Have they failed to bring such issues to the negotiating table? Or is management resistance to any type of tech change provision which limits management's freedom to run enterprises as it sees fit rather the more probable explanation?

The evidence we have been able to gather on this subject would tend to suggest that both management resistance and unions' inability or unwillingness to raise tech change issues are significant factors. The Council's own survey of about 1,000 industrial establishments[49] showed that while tech change has been nearly universal, occurring in 75 per cent of all establishments and 80 per cent of all unionized establishments over the past five years, negotiations over tech change were carried out in only 46 per cent of unionized establishments. When unions in fact raised tech change issues at the bargaining table, they were successful about half the time, winning an advance notice clause in 19 of 31 cases, training clause in 15 of 26 instances, a job or income security provision in 11 of 22 cases, a joint consultation mechanism in 9 of 20 cases, a notice of layoff clause in 12 of 18 cases, and a tech change related health and safety clause in

11 of 18 cases. This evidence suggests that if unions were to raise tech change issues more frequently, agreement provisions would probably become more frequent.

In addition to labour's inability or unwillingness to bring tech change issues up for negotiation, there is also the matter of management's reluctance -- or in some cases outright unwillingness -- to bargain over the issue.

It is a known historical fact that the original federal tech change legislation was fiercely opposed, not just in detail but in principle, by employer groups, a fact which suggests strongly that many if not most in the Canadian management community regarded tech change as a management right, pure and simple.[50] The experience of working within the parameters of tech change legislation and of negotiating with workers over the issue on a more or less regular basis may well have lessened management recalcitrance on this score. But some data from the Ontario Task Force on New Technology and Employment suggests that it is by no means a universally accepted management principle that workers should be involved in the implementation of tech change in Canadian workplaces.

Table 10, in which various industries are broken down by SIC number, shows a highly variable rate of worker participation mechanisms in different industries. The figures range from 0 per cent in food stores and telegraph and cable systems to 85 per cent

in the federal government. Among manufacturing industries, iron and steel makers and makers of store and office machinery had the highest rate of formal participation mechanisms (65 per cent each). Aside from the federal government, the highest rates in service industries were found in computer service firms (60 per cent), insurance brokers and telephone systems firms (both 55 per cent), and management and business consultant firms (50 per cent). But perhaps the surprising finding is that the rate is as low as it is among computer systems and management and business consultant firms, given the great importance of computer technology to such firms and the very considerable awareness of technological issues one would expect of workers for such firms.

Table 11, again dealing with a breakdown by SIC industrial grouping, is devoted entirely to new technology, specifically the percentage of firms within each industrial grouping regarding various roles as appropriate for workers. Unfortunately, space does not permit a detailed discussion of these very interesting findings. A few of the highlights are as follows:

- In five of nine manufacturing industries and four of 14 in the service sector, a sizable percentage (25 per cent or more) of firms regarded no worker involvement whatever as appropriate;

- The provision of information only was regarded as appropriate by the same "sizable percentage" of firms in five manufacturing and four service industries;

- In only two manufacturing and three service industries did any firms regard advance notice as appropriate; the incidence was in all cases extremely low (never more than 30 per cent);

- Providing an explanation concerning job security implications of tech change was regarded as significant by any firms at all in only five manufacturing and seven service industries. Again, the incidence was always low (never more than 30 per cent and in one case as low as 5 per cent);

- Prior consultation was regarded as appropriate by firms in seven manufacturing and ten service industries; the incidence ranged from 10 to 65 per cent but was most typically between 30 and 45 per cent;

- Explanation of training was regarded as appropriate by firms in six manufacturing and five service industries; in only three of these industries did the incidence exceed 25 per cent;

- Full involvement was regarded as appropriate by some firms in all of the manufacturing industries and nine of the service industries. The incidence ranged from 5 to 35 per cent of firms in manufacturing industries and from 0 to 60 per cent in service industries, where it was highest in banking and insurance. In only three instances did more than half the firms in any industry regard such involvement as appropriate.

While this evidence will obviously need to be supplemented by data from other industries and other jurisdictions, it points in the direction of continuing significant (though certainly not universal) management resistance to workers' involvement in technological change processes.

From the evidence mentioned in the preceding discussion, it follows that alternatives to existing legislative arrangements for dealing with tech change should seek to inform workers more fully about tech change and its implications while at the same time lowering management resistance to worker involvement in the process. In the next section, we consider what experience has been in Canada under existing legislative arrangements. In the section after that, we discuss some possible alternatives.

ENFORCEMENT OF TECHNOLOGICAL CHANGE PROVISIONS

Technological Change Legislation

Before looking at specific labour board and arbitration cases, it is important to note that four Canadian jurisdictions have passed legislation directed at collective bargaining and technological change. In the federal jurisdiction (Canada Labour Code, Sections 149-153) legislation passed by Parliament in 1972 required an employer proposing to introduce technological change "likely to affect a significant number of employees" to notify the bargaining agent by means of a detailed notice well in advance of

the data when the change was to be effected. Originally 90 days, the notice period was increased to 120 days after a 1984 amendment to the Canada Labour Code. Upon receipt of the notice, the bargaining agent can apply to the Canada Labour Relations Board for permission to begin bargaining over those provisions of the agreement to be affected by the proposed change. When such an application has been filed, the employer cannot legally introduce the change until the Board has refused the application, a negotiated settlement has been reached, or until the parties are in a legal strike/lockout position.

Technological change legislation was also passed during the early 1970s in three provincial jurisdictions -- Manitoba, Saskatchewan, and British Columbia. The Manitoba provisions (sections 72-75 of the Labour Relations Act) and Saskatchewan provisions (section 43 of the Trade Union Act) are generally similar to the federal ones, except that neither province has increased its 90-day notice period. Like the federal law, Manitoba's requires a detailed written notice; when this notice has been given, the bargaining agent may, as in the federal jurisdiction, serve notice to begin negotiations for revision or renewal of the agreement. Under Manitoba law, an agreement will terminate 90 days after such notice is given or on its expiry date -- whichever comes first. In addition, disputes relating to notice or the failure to give notice may be submitted to arbitration.

Like the original federal and Manitoba laws, Saskatchewan's prescribes a 90-day notice period; it differs in that it gives the trade union a set length of time (30 days) to serve notice to begin bargaining after the notice has been received. The employer is not legally free to introduce the technological change in question unless the Board has relieved him of the duty to bargain, or until the parties have either reached agreement or come to a legal strike/lockout position.

An important feature of these three pieces of legislation is the so-called "opting-out" provision. For instance, Section 149(2) of the Canada Code states that the technological change provisions do not apply: a) when the employer has given notice "substantially" in accordance with the notice period required by the Code, b) when the collective agreement "contains provisions that are intended to assist the employees affected by any technological change to adjust to the change's effects; and c) when the agreement states the provisions of the Code do not apply during the life of the agreement. Manitoba's "opting-out" provisions are similar. The Saskatchewan provision is rather more limited; only if the agreement actually contains provisions for negotiating and settling technology-related disputes is the employer relieved of the necessity to comply with the legislation.

British Columbia is generally considered to offer workers the best protection of any jurisdiction against the effects of technological change. British Columbia's law differs

significantly from that of the other three jurisdictions we have been considering.* To begin with, the B.C. Labour Code in effect mandates technological change provisions, or at least provisions for dealing with disputes arising over the issue of change. Specifically, the B.C. Code states that every agreement shall contain provisions for resolving, whether through arbitration or otherwise, disputes over technological change, and that if no provisions are contained in an agreement, the Minister of Labour may prescribe them. When an employer intends to institute a change affecting a significant number of employees, the matter may be referred to an arbitration board, which may order a number of possible remedies for the affected employees. The arbitration board may also recommend the appointment of a special officer or order negotiations to begin, for the purpose of revising the provisions relating to terms, conditions, or security of employment; in the latter case, the prohibition against strikes or lockouts during the life of the agreement does not apply. And the B.C. Code does not contain the opting-out provisions which are prominent features of tech change legislation in other Canadian jurisdictions.

*As this document was going to press, the Government of British Colombia proposed certain changes in the provincial Labour Code. We wish to make it clear that our discussion refers to the provisions that existed in April 1987.

While the other jurisdictions' tech change legislation is confined almost solely to the question of advance notice, the B.C. legislation is focused on dispute resolution, a broader conception, and one which allows for a relatively greater degree of worker involvement. The emphasis in the Code is on encouraging the parties to work out their own solutions, with government serving essentially as a facilitator.[51]

ENFORCEMENT OF TECHNOLOGICAL CHANGE PROVISIONS

Federal and Provincial Experience: An Overview

The Canada Labour Relations Board has accepted only one case to bargain over technological change of all the applications which have been brought before it. Indeed, it was not until 1981 that the Board even gave written reasons for a rejection, in the Ottawa-Carleton Regional Transit Commission case.[52] To that point, there had been eleven other applications made since 1973 when the technological change provisions first came into force. These cases had been dismissed for a number of reasons: because the change in question was not effected by the employer, the application was untimely, the case was withdrawn, or the Board found the case not to be a technological change without a hearing. Since OC Transpo, the basic story has been much the same. The Board has accepted only one of 13 applications submitted to it after 1981, the 1984 Prince Rupert Grain

Terminal Ltd. case, which we shall presently discuss in some detail.[53]

Except in British Columbia, provincial experience has been little different. In Manitoba, according to the Registrar of the province's Labour Relations Board, not only has the Board never granted leave to open bargaining over tech change; it has never even had such an application brought to its attention.[54] The Saskatchewan Labour Relations Board, as of 1985, had had 17 technological change cases brought before it.[55] Five were withdrawn, and one was ruled not to be a technological change under the Trade Union Act. The remaining applications were dismissed for a variety of reasons, ranging from lack of timeliness to failure to meet the "significant number" criterion.

Unions in British Columbia have had more success in winning favourable Board consideration of technological change cases than have their counterparts in the other jurisdictions. Of nine applications brought to the Board, four have been resolved in the unions' favour.[56] While there is no readily available quantitative data on relevant arbitration cases, it would also appear that B.C. unions have fared better at this level.

Issues Involved in Interpretation

What, precisely, have been the problems regarding enforcement in technological change cases? First, there is the matter of restrictive definitions of "technological change". Another problem has been the "opting-out" clauses included in the federal, Manitoba, and Saskatchewan laws. The requirement (found in all provincial legislation) that a "significant number" of employees be involved has posed difficulties, as has the requirement that the employment effect be significant. As well, a number of arbitrators have required that technological change be the primary cause of any given layoff or other employment dislocation; this has posed problems in that it is often difficult to separate technological change from other factors. With respect to skills, unions seem to have had very little success in gaining compensation for workers either for the "deskilling" effects of some technological changes, or the greater degree of skill required to perform their jobs following other kinds of changes.

The first step in enforcement concerns acceptance that a technological change has, in fact, taken place. How the term is defined, in agreements as well as in labour legislation, is clearly pivotal. Under the Canada Labour Code, a technological change is only deemed to have occurred when the employer has introduced new equipment or materials and when there is a change in work methods directly related to the introduction of that new equipment or material. This definition, then, excludes all

workplace changes -- regardless of employment impact -- where there is little in the way of new equipment or material.

The most restrictive arbitral and board decisions have required that technological change must involve the introduction of technology completely different from anything previously found in the workplace. For instance, in the 1971 Prince George Pulp and Paper Ltd. case, the company had discontinued its barking and chipping operation. The arbitration board ruled that "There has been no change of any kind in technology although certain machines may have been speeded up, given more power, or increased in size".[57] Similarly, in the 1974 Forest Industrial Relations case,[58] the arbitration panel ruled that bringing a boiler back into operation was not a technological change even though it led to the layoff of an underqualified operating engineer.

A recent and more subtle illustration of definitional difficulties is provided in the 1985 "phantom codes" Canada Post Corporation case.[59] In this instance, the post office had developed "phantom" or dummy codes to allow machine sorting even of mail sent out without the proper postal code attached. For instance, mail destined for Winnipeg was assigned the code R4R 4R4 (case, p. 6). Phantom coding eliminated one stage of hand sorting of mail. The union argued this was a technological change and that management had violated the collective agreement by not adhering to its 120 days' notice stipulation. Under the agreement, technical change was defined as:

> ...the introduction by the Employer in the internal processing of mail, of equipment different in nature, type or quantity from that previously utilized...a change, related to the introduction of this equipment, in the manner in which the Employer carries on the internal processing of mail and any change in work methods and postal services operations affecting one or more employees.

In a previous case involving the post office, arbitrator David Beatty had ruled that technical change must involve a change in equipment as well as in work methods and that all the conditions outlined in the definition must be met.[60] In the "phantom codes" case, arbitrator Kenneth Swan, while admitting that the wording of the clause in question was uncertain, chose to agree with the earlier interpretation of technological change. He did so both because he believed Beatty's interpretation to be preferable to the alternative interpretation advanced by francophone arbitrator Rodrigue Blouin (of whom more presently) and because he felt that after Beatty's decision the interpretation of the tech change provision should have been settled once and for all (case, p. 24). In his view, the introduction of phantom codes did not involve any introduction of new or modified equipment; without that, technological change had not taken place. "The only adjustments apparently necessary to use the Phantom Codes were a reprogramming of the equipment, and in certain cases the addition of bins into which mail can be sorted in accordance with the Phantom Code".

The result is that, like Beatty, Swan winds up favouring a traditional management-rights approach to tech change. It is worth noting that he criticizes the broad interpretation of tech

change advanced by Blouin as "opening up virtually every aspect of the Management of the Post Office" to consideration under the tech change provision of the agreement. The role of that provision, he maintains, is "only trivialized" by an interpretation which detaches tech change protection from any notion of a change in technology (case, p. 26).

Among other things, a restrictive notion of technological change seems to take insufficient account of the potential impact of new computer technology, particularly software.[61] Of special relevance here, in addition to the Canada Post case just discussed, is a 1983 case involving the University of Toronto Library.[62] Here the union had extremely strong technological change provisions by Canadian standards, including an advance notice and consultation clause, a dispute resolution procedure for job reclassification problems related to tech change, an employment guarantee for all regular employees, and a skills provision allowing for retraining of displaced employees on new equipment. Nonetheless, arbitrator K. A. Hinnegan did not agree that changes in software, which were followed by the layoff of six workers, amounted to a technological change within the meaning of the agreement. He arrived at his decision even while admitting that various definitions of technological change were possible since the agreement contained no definition at all. The case is an excellent illustration of unionists' contention that no package of tech change provisions, however strong, will afford workers

much protection in the absence of a broad definition which applies to changes in organization as well as equipment.[63]

An indication of what is required to meet the standard of technological change, at least for the CLRB, is provided in the Prince Rupert Grain case mentioned earlier. Here, the changes were so radical that, in the words of Board vice-chairman Brian Keller, it was like "going from the horse and buggy age to the jet age." In the old terminal, a blackboard had been used to mark the contents of each bin. At the new terminal, on the other hand, practically all aspects of the operation were computerized in what Keller described as "state-of-the-art" fashion. The applicant, the Grain Workers' Union, claimed that the move to the new terminal constituted a technological change and that the employer was in violation of the Canada Code by not giving at least 120 days' notice. The Board had little difficulty in deciding that the move, whose employment effects were profound -- a reduction of nearly three-quarters of the previous workforce -- constituted a technological change, though curiously enough, even this favourable ruling did not result in any tangible gain for the union, in terms of a requirement that the employer give further notice.[64]

But few technological changes are as clear-cut as those at Prince Rupert Grain. While technological advance may be popularly conceived of as a change from horses and buggies to jets, most technological change is relatively gradual, involves a minority of

the workforce at any one time, and is introduced concurrently with other organizational and production changes.[65] While there have been exceptions, these realities of technological change usually have not been recognized in the enforcement of contract language or legislative provisions. Arbitrators and labour board members have generally remained wedded to restrictive interpretations of what constitutes technological change.

Two notable exceptions are a 1985 Canada Post arbitration case heard by Quebec arbitrator Rodrigue Blouin,[66] and the 1983 Metropolitan Toronto Library Board and CUPE, Local 1582 case,[67] heard by arbitrator Pamela Picher.

The first of these cases involved issues quite similar to those just discussed in the Phantom codes case. But Blouin rejected Beatty's narrow definition of technological change, arguing that if any of the three conditions in the relevant article (Art. 29) of the Canada Post agreement were satisfied, a technological change would have occurred. In his view, change in work organization may be just as much technological change as changes in equipment. For the term to be defined as narrowly as Beatty would have it, he argues (case, p. 18) that the parties would have had to enumerate the various criteria required in point form, with an "and" after each point.

In the Metro Toronto Library case, Picher ruled that the introduction of less advanced computer equipment, following the

cancellation of a project which resulted in the demotion of a programmer, should be considered a tech change, at least in the absence of specific agreement language to the contrary. If the parties had intended "technological change" to mean "technological improvement," she noted, they would have written the latter term into the agreement. This is one of the rare cases in which the absence of a precise tech change definition has helped, rather than hurt, a union before an arbitration panel or labour board case.

"Opting-out" clauses represent another enforcement problem. It was noted earlier that all technological change legislation except that of British Columbia contains language which states that the legislative provisions do not apply under certain circumstances. In the Canada Code, for example, this is the case if the agreement contains provisions "intended to assist employees to adjust to the effects of any technological change." CLRB chairman Marc Lapointe has suggested that these "opting-out" clauses are one reason why so few technological change applications have been brought under that legislation.[68] My analysis suggests that opting-out features discourage serious bargaining over technological change.

All jurisdictions with tech change legislation require the change in question to affect a "significant number" of employees before the legislation can be triggered. Of the four, only Saskatchewan has attempted to set out what it means by a "significant number": where the firm has over 30 employees,

20 per cent must be affected for the change to be considered significant.[69] Quite severe employment effects can result, then, without meeting the significant number threshold. This is also the situation in the other jurisdictions (with the exception of British Columbia). A good example is the Manitoba Pool Elevators case (1985), where the CLRB agreed that a switch to computerized record-keeping constituted technological change but was unwilling to accept the layoff of more than half of the Pool's clerical group as "significant". In the Board's view, the layoffs should have been measured against the total number of employees covered by the relevant agreement -- that is, the total Pool workforce. According to this criterion, the layoffs affected about 4 per cent of the workforce and were judged not to be significant.[70]

In this connection, it is also worth noting that four of the 17 Saskatchewan cases brought to the board level (all of which have been rejected) failed because they did not meet the "significant number" criterion.

Some arbitrators have also ruled not only that the technological change must be significant, but that the employment effect must be significant to constitute technological change. An example is the 1983 University of Toronto Library case discussed earlier. Here, although admitting that a significant change had taken place, the arbitrator was not willing to admit a significant effect, given that other changes (such as work rescheduling) had been occurring at about the same time. Similarly, in Pacific Western Airlines

and Canadian Airline Dispatchers' Association (1977),[71] the arbitration board ruled that assigning customer service agents the job of inserting flight movement information directly into a new computer system rather than having the agents send messages to dispatchers who would then control that information led to employment effects "too minimal to affect the security and integrity of the dispatchers." Like many other cases in Canadian arbitral and board jurisprudence, this one reveals the failure to consider effects in quality as well as continuity of employment.

Related to "significant effect" is the problem of separating technological change from other factors. Employers may argue that employment effects in question are not the result of technological change but, rather, a "change undertaken for economic reasons", "change designed to increase competitiveness", or a "response" to "recessionary" or "inflationary" pressures.[72] We have noted, in earlier chapters, the fact that technical change rarely occurs in isolation, but is usually accompanied by other changes. Sorting out the effects due to various factors can be an extremely difficult problem for a labour board or arbitration panel.

In some cases, arbitrators have been able to disentangle technological change effects. For instance, in the Canadian Newspapers Co. and Vancouver Typographical Union case (1980), the arbitrator agreed that only four of 24 layoffs were the result of the merger of two Victoria newspapers, and ordered the other 20

reinstated since they were protected by a tech change clause originally negotiated in 1974.[73]

More often, however, this has not been the case. In Reichold Chemical (1975),[74] an employee was laid off due to a variety of changes, including the introduction of a secretarial pool, changing job functions, the upgrading of a part-time worker to full-time, and the replacement of a computer terminal with a new machine. Only the last of these was considered technological change, and the arbitration board held that technological change must be the primary cause of job loss for the contract provisions to apply.

Technological change can have other employment effects than straight dislocation or wage reduction. In some cases, the introduction of new machines may demand that employees acquire more skills, work at a more rapid pace, or perform more difficult tasks. This can lead to difficulties concerning job classification and compensation. Some of these issues were raised in a 1986 case involving the Manitoba Museum of Man and Nature.[75] The grievor was working as an executive secretary when management introduced IBM display writer equipment into the workplace. Because of the efficiency and capabilities of the display writer, she began doing work that would not have been possible previously. Accordingly she maintained that the nature of her job had changed substantially and that her position should be reclassified. Museum management admitted that the productivity-enhancing

equipment had expanded these duties somewhat. But management's argument -- accepted by the Board -- was that the work nonetheless remained basically secretarial and that the nature of this work was not consistent with the responsibilities of positions classified at a higher level.

As we note elsewhere in this document, technological change can have "deskilling" as well as skill-enhancing effects. Of particular relevance here is a 1985 Canadian Newspaper Company. case dealing with bargaining unit exclusion. In this instance, the union argued that the introduction of a new computer had completely changed the duties of a Chief Operator of Accounting Machines, who had been in an excluded position under the collective agreement for about 12 years. The union's point was that the technological change had eliminated the supervisory work the work had previously performed and had also resulted in her performing considerable bargaining unit work. Therefore, in the union's view, there was no further basis for exclusion, since in British Columbia, the jurisdiction in question, only management and confidential labour relations personnel are excluded from collective bargaining rights. But the Board rejected the union's "community of interest" argument for inclusion in the unit and held that once the parties had agreed to define the boundaries of the bargaining unit and had incorporated these boundaries into their collective agreement, there were "good industrial relations reasons" to maintain the status quo.[76]

The British Columbia Alternative

On balance, the legislative arrangements in British Columbia are more effective than in any other Canadian jurisdiction. One reason is the different definition of technological change contained in the provincial Labour Code.[77] Also, as previously noted, the B.C. law does not contain an opting-out provision.

Perhaps as a result of these differences, B.C. Board and arbitration cases have diverged from the national mainstream on a number of important issues. Arbitrators in that province have frequently interpreted change far more broadly than their counterparts elsewhere in the country. And in the two Eurocan Pulp & Paper cases (1982 and 1983),[78] the B.C. Board held that the employer's closure of a woodmill which it had formerly used to make wood chips needed in its operation constituted a technological change. The Board (in 1983) was not satisfied with the employer's argument that the closure had been made for economic reasons; as it noted, most technological changes are made for those reasons. In 1983 the Board also agreed that the employer's attempt to contract out of Section 84 of the B.C. Code was ineffective.

In an earlier case, Tahsis Company and International Woodworkers of America (1979),[79] the B.C. Board arrived at one of the broadest conceptions of tech change to be found anywhere in Canadian jurisprudence on the subject. Here, employees working jointly as

production workers and shiploaders had an agreement clause which entitled them to refuse to load deep-sea barges without the refusal's being considered a strike. (The loading of deep-sea barges was not a normal part of the workers' duties at that time.) The agreement also required the employer to negotiate with the union any proposed changes in work assignments (including the loading of such ships and barges).

On two previous occasions, workers had agreed to unload deep-sea barges following ad hoc agreements with the employer. But in 1977, negotiations for a third, similar agreement broke down, whereupon the production-shiploaders refused to continue unloading. Their work stoppage continued for 11 days. In retaliation, the company did not schedule a production shift for them, even though the employees in question were ready, willing, and able to perform such work. On finding that the workers were not to be paid for the 11 days, their union grieved, and the matter was subsequently taken to arbitration, where the arbitrator found the company in violation of the agreement and ordered that the employees be "made whole" by being paid for the 11 days at issue. While admitting that the company's case had some merit, the Board recognized that language entitling employees to refuse to perform new tasks was in reality a form of tech change provision; such provisions being the one exception to the B.C. Code's mid-term strike ban. As a cautionary note, however, the Board said that Tahsis should not be regarded as a precedent

for any broader proposition about the meaning of the term "strike" in the B.C. Code.

In some cases, the Board and arbitrators have allowed indirect as well as direct employment effects to be considered within the orbit of technological change.[80] And they have been much more flexible in their interpretation of the "significant number" concept, at times allowing the layoff of a single worker to be considered significant in the sense of the Code.[81]

Policy Options

Adopting a B.C.-style legislative arrangement for dealing with tech change in unionized environments would certainly facilitate the adjustment process for workers. It would increase the likelihood of finding a comparatively speedy and efficient resolution to workplace disputes over the issue. Just as important, it could help make workplace change more acceptable by giving workers and their unions more of a sense of involvement in the implementation process, since legislation providing for a dispute resolution process allows both earlier and broader worker/union involvement than legislation merely providing for "after the fact" notice. Similarly, the broader B.C. definition (under the old Code) and absence of an opting-out provision make it more difficult for employers to avoid or sidestep the issue, as the evidence suggests they have often done in other jurisdictions.

But adopting a B.C.-style legislative arrangement would by no means solve all the current problems surrounding the issue of tech change. For example, both the collective agreement analysis discussed earlier and the subsequent review of relevant case-law jurisprudence suggest that skill-related questions are seldom dealt with adequately in collective agreements.[82] (To be fair, it should be noted that analysts in Europe, where tech change is far more often dealt with through sophisticated national framework legislation, have admitted that skills questions pose difficulties there as well; nonetheless, the Europeans appear to have gone a good deal farther with the problem than we have in North America.)

It should also be noted that even in cases where unions have "succeeded," and have won their cases at arbitral or Board level, the remedy has typically been "too little, too late." Restoring laid-off workers to a seniority list or providing them with back pay lost during a tech change-related labour dispute may be "make-whole" remedies in the legal sense of the term, but they are not useful strategies for ensuring that workers have a genuine voice in implementing workplace change. Providing workers with such a voice must surely be a concern of any truly democratic society. Indeed, there may be economic, as well as philosophical reasons for doing so, in that there is evidence to suggest that comparatively "consensual" industrial relations systems offering a relatively high degree of workplace voice tend to outperform decentralized "adversarial" systems in broad macro-economic terms,

such as Arthur Okun's "misery index."[83] It is important to note that research into the relationship between the degree of social consensus prevailing in any given country or workplace, and social or other economic costs (such as those imposed by strikes, vandalism, and the like) is only beginning. Even more rudimentary is the research into the systems costs (including lawyers' fees, lost worktime, lost productivity due to lower morale, and the like) imposed by various industrial relations arrangements. To give just one example, it would be helpful to know how much productive worker and management time (and thus, in due course, how much money) has been saved by firms like Shell Canada in Sarnia, which have moved away from the standard, highly technical collective agreement characteristic of most Canadian workplaces and in the direction of a much simpler and briefer "framework agreement" consisting primarily of general principles. Here, surely, is an area where a great deal of useful research work can and should be done.

It can be said, with a bit more certainty, that with specific reference to technological change, we are finding generally higher diffusion rates of new technology in countries providing national-level framework mechanisms for dealing with innovation than in countries where technological change is handled entirely through the collective bargaining system.[84] This is not to say that free collective bargaining over tech change should be supplanted. Far from it. It is to suggest that in order for genuine bargaining to take place over the issue, conventional

voluntary mechanisms need to be supplemented by legislative mechanisms of various kinds, in order to help ensure the full participation of both parties.

That voluntary collective bargaining systems do not adapt well to technological change issues has been noted by commentators for at least the last twenty years.[85] This is not surprising, perhaps, when we consider the nature of both collective bargaining and technological change. The former works by fixing terms and conditions of employment for a set period of time; it may thus be considered a stabilizing mechanism. Technological change, by contrast, would appear to be basically a destabilizing mechanism, since it is a dynamic and (generally) ongoing process which, particularly if left as a management right not subject even to modification from the workforce, may well render much of the collective agreement essentially meaningless -- in fact if not in name. This is my reason for preferring to conceive of technological change as a kind of "special case" within our industrial relations system, requiring as a consequence special -- and specific -- mechanisms, at the national or provincial as well as the establishment level, if it is to be properly accommodated at all.[86]

A more immediate problem is the necessarily limited impact of collective bargaining policies. While tech change (as the Council's survey shows)[87] affects the unorganized to just about

the same extent as the organized, the former have virtually no protection other than that afforded by mass termination legislation. Such legislation applies only in certain Canadian jurisdictions,[88] and even where it applies, is a highly imperfect adjustment mechanism, at its best dealing with the problem only "after the fact" rather than in proactive fashion.

Only about 40 per cent of the country's paid non-farm workers are represented by unions; and many of those not represented are excluded from unionization rights by provincial labour legislation.[89] A great many public-sector workers, including most notably those under the Ontario Crown Employees Act, do not enjoy the right to bargain over tech change; this group nation-wide represents about one-quarter of the country's organized labour force.[90] And there is also the problem posed by part-time workers and others in the secondary labour market whom trade unions have historically often been less than enthusiastic about organizing and who, in any case, must frequently operate under severe disadvantages when they do seek to engage in collective bargaining.[91] If Canada's labour market continues along the path it has been following recently, and which other countries such as Australia and West Germany have been following, such secondary labour force members are likely to become relatively more numerous in the future.[92]

Unless we are to have a situation where a small minority of the workforce is granted certain rights while the far greater majority

is not -- a situation which most Canadians would probably regard as politically and philosophically unacceptable -- we shall have to consider legislative arrangements which apply to the unorganized as well as to the organized.

It is true that some unionists might argue that applying protection against tech change would weaken unions, by taking away one incentive which workers currently have for joining unions. But the truth is that, as I have shown earlier in this paper, Canadian unions (for whatever reason) have simply not done much with tech change so far and are perhaps not in a position to do a great deal more than they are doing. It should also be noted that while a major expansion of trade unionism might well be desirable in principle, realistically it is not likely to occur, at least under existing economic conditions.[93]

Assuming that one accepts that government must do more in order to protect workers against the effects of tech change, there are two basic approaches government could follow. The first of these approaches is a process-oriented approach which does not specify what the outcomes will be but is designed to insure a process where workers and employers bargain on something approaching an even footing; the emphasis here is on preventing gross imbalances of power in either direction. The second of these is an outcomes-oriented approach which operates primarily through legislation, and which might, in the case of tech change, specify

certain provisions with respect to training, severance pay, moving allowances, and the like.[94]

For a variety of reasons, I feel that a primarily process-oriented approach is more in keeping with dominant North American political, philosophical, and moral values than is an outcomes-oriented one. Accordingly, the approach I would favour for dealing with tech change, that of joint labour-management committees which would deal with relevant issues in all establishments, emphasizes the former. In the following section, I shall be discussing such committees in more detail.

Joint Committees

The notion that tech change in the workplace is best handled through joint labour-management committees has been put forward on a number of occasions in recent years. Both a federal task force on tech change and one commissioned by the Ontario New Democratic Party have recommended such committees.[95] The most detailed discussion of how these committees would work appears in a 1985 Monthly Labour Review article by Roy Adams, a McMaster University industrial relationist.[96] Adams proposes a variation on the works council approach to non-monetary issues taken in a number of western European countries (notably West Germany) under which, by statute, decisions on such issues are made jointly by workers and employers. While works councils typically cover a broad range of

issues, Adams would have them cover a single issue -- technological change.

This idea may admittedly sound a bit foreign to some traditionally-oriented North American readers. But if we translate "single-issue works councils," into "joint labour-management committees," we will see that there are indeed some homegrown precedents, notably in the area of health and safety and to a lesser degree that of mass termination.

As Adams notes, joint labour-management health and safety committees are already legally required in many Canadian jurisdictions. Far from being thought of as an intrusion on either labour or management prerogatives, these committees are generally regarded as useful mechanisms for dealing with health-and-safety programs in the workplace in a comparatively "depoliticized" fashion. Noting that few abuses (such as frivolous workers refusals to work under "unsafe" conditions) appear to have taken place under the joint committee legislation, Adams sees these committees as the start of an "emerging Canadian model" which will set in motion a "different dynamic by making designated issues individually subject to arbitration" (27) or, in the case of health and safety disputes, the intervention of a government health and safety officer who will serve a similar arbitral function.

It is true that employers might in some cases resist the legislated imposition of such councils, or committees, on the grounds that such regulation would hinder management's ability to respond quickly to changing conditions, thereby causing the enterprise's productivity and competitiveness to suffer. But the evidence examined by Adams does not support this proposition. Indeed, a review of the West German co-determination system, of which works councils are a prominent part, suggests that the councils have had a positive effect. In the coal and metalworking industries, where massive technological change was carried out during the 1970s, workers were consulted extensively, with the result that the changes were in fact brought about with little disruption (28).

Other analysts, in Canada and the United States, have supported the general principle of joint decision-making but have argued that it should be voluntary rather than mandatory, on the grounds that "imposed systems would generate low trust and hostility instead of the cooperative attitudes and behavior essential to joint decisionmaking." Again, Adams notes, experience with such councils or committees in both Canada and West Germany does not support such a concern; rather, the evidence suggests that such councils and committees generally operate in a cooperative, non-adversarial manner. In most cases, Adams says, Canadian joint committees designed to deal with mass terminations managed to reach agreement without the necessity of arbitration, though he admits that the experience here is limited. In West Germany, the

evidence is rather firmer; of some 6,240 works council agreements negotiated between 1970 and 1979, only 70 -- slightly over 1 per cent of the total -- required mediation or arbitration. While one cannot automatically assume that success in one country will translate into success in another, this extraordinary success rate surely entitles the experiment to a try here, particularly in view of existing Canadian precedents.

Adams also rebuts a possible union-oriented criticism to the effect that works councils provide disincentives for workers to join unions on the grounds that the councils would provide many of the services currently being carried out by unions.

In the first place, unions have not, as already noted, generally succeeded in the area of tech change negotiations. Indeed, as also noted, they often have not even put proposals on the table. Thus it would not appear that the committees would be depriving existing unions of their current "business". Secondly, the function of the Canadian committees would be much more limited than that of either Canadian trade unions or European councils. Those unorganized workers who wished to bargain collectively over money, hours of work, fringe benefits, and most other conditions of employment would still need to join a trade union in order to do so. A mandated tech change committee would be no more of an "intrusion" on the union's function than comparable committees in the health and safety area. Indeed, as Adams points out:

> ...there are reasons to believe that a works council policy in (the United States and) Canada might encourage rather than discourage the expansion of collective bargaining. First, once unorganized employees experience the benefits of representation on a limited range of issues, they will probably want to be represented on the full range of conditions of employment... The transition of employee associations into genuine trade unions in the public sector is suggestive of what may happen if the works-council strategy is embraced. Public sector labour-management relations in much of the United States and Canada has moved from joint consultation on a limited range of issues to collective bargaining on a broader range... (28).

In any event, a simple requirement that committee representatives be elected from among active union members in all unionized establishments should correct the mistaken impression that such committees are seeking to usurp unions' rightful role in the workplace.

On the whole, the joint committee approach strikes me as the best way of ensuring that tech change gets onto the industrial relations agenda without dictating what will happen once the agenda is set, in that it strikes a nice balance between callous government inaction and heavy-handed intervention. Furthermore, it represents no radical departure from existing precedents in such areas as health and safety, and thus should not have great difficulty in winning the acceptance of both labour and management once it is fully explained to both sides.

I would expect that most such committees, once fully established, would become to a large extent preventive, problem-solving mechanisms. This could potentially benefit both

management and labour. Our present, highly legalistic system, with its lengthy, detailed agreements, heavy resort to lawyers and third parties, and frequently extremely protracted negotiating sessions, imposes very high systems costs (of the sort just mentioned). Such costs benefit nobody, except possibly the legal profession. By contrast, a system which allowed tech change problems to be resolved earlier in the process, before elaborate arbitration proceedings were necessary or several members of the senior management team had had to spend their time on a case, would allow scope for very substantial savings, which could presumably be shared between labour and management.

As to how such committees would work in practice, I would suggest that they be comprised of equal numbers of labour and management representatives, that they be required in all workplaces employing 50 or more workers,[97] and that they should normally be expected to meet on a regular basis. An essential component of the relevant enabling legislation would have to be a dispute resolution procedure. Expedited or even job-site arbitration, comparable to that now in use in some industries in British Columbia, would be preferable to conventional arbitration in that it would allow for a quicker resolution of any impasses, which in turn could lead to both improved industrial relations and still lower systems costs.[98]

In addition to bread-and-butter issues such as job security and wages as they relate to innovation, the committees I have

envisaged would also deal with skills-related issues such as job reclassification, tech change-related training, health and safety issues such as VDTs, and human rights issues such as electronic workplace monitoring, as well as contracting-out. In legal terms, the committees would serve as a kind of minimum standards mechanism, comparable in some ways to union security laws already on the books in all Canadian jurisdictions. Such laws do not dictate the results of any negotiation; they simply seek to ensure that serious negotiation does in fact take place. Such is the aim here, within the more limited domain of technological change.

CONCLUSION

Both the descriptive evidence brought forward in the first section of this paper and the quantitative evidence discussed in the second section suggest that negotiated technological change clauses are relatively infrequent even in agreements covering 500 or more workers -- arguably a "privileged elite" with respect to such provisions. The quantitative section also showed that technological change provisions have not become notably more frequent since 1972, when tech change legislation was first put into effect. Both unions' failure to bring tech change issues to the bargaining table and management resistance to worker involvement in implementation of new technology may help explain the relative infrequency of tech change provisions in Canadian agreements.

In the legislative section of this paper, I have shown that even when unions have written tech change provisions into collective agreements, labour boards and arbitrators have generally, except to a limited extent in British Columbia, not enforced either federal or provincial legislation or agreement provisions. Some of the major problems confronting unions before arbitrators and labour boards have been the "opting-out" clauses included in the federal, Manitoba, and Saskatchewan labour acts; restrictive definitions of technological change; and the requirement that a "significant" number of employees be involved. Unions have had particularly little success in skills-related cases, whether they were seeking to win compensation for the "deskilling" effects of some technological changes or for the greater degree of skill required to perform other jobs following different kinds of technological change. And even in the handful of cases in which they have been successful before arbitrators or labour boards, most legal remedies have been "too little" and "too late" to constitute genuine "make whole" solutions.

The truth is that, as analysts like Cardin have known for at least twenty years, technological change is simply not easily handled within the Canadian industrial relations system as we have known it. Perhaps this is inherent from the very nature of both collective bargaining and technological change. The purpose of collective bargaining is to fix terms and conditions of employment for a given period of time (the length of the agreement in question). But tech change is by its very nature destabilizing,

bearing with it, as it does, the potential to overturn existing power balances between workers and employers (or for that matter within various classes of workers). Unless voluntary collective bargaining is complemented with various other kinds of mechanism, tech change, particularly at the rate at which it is now occurring, could pose a serious threat to the continued existence of collective bargaining. It is for this reason that I have recommended the mandatory joint committees described in the previous section. Such committees, in my view, have the potential to handle tech change issues far more efficiently and in far more proactive fashion that do current legislative arrangements.

Ultimately, of course, even as we admit that technological change is a kind of "special case" within the industrial relations system, we must also recognize that it cannot be considered in isolation, apart from other aspects of economic and social policy. Just as measures to promote innovation at the national level are unlikely to succeed practically in the absence of adjustment mechanisms to protect those potentially affected by such innovation, so measures for dealing with technological change are unlikely to be fully successful in the absence of a national commitment to a strong, active labour market policy and to full employment. While space does not permit a discussion of international tech change experience here, three basic points gleaned from a review of the international literature should be noted:

- Workers tend to be far more willing to cooperate in workplace change processes when they feel they have both a reasonable degree of job security and a genuine say in how such change is implemented;

- This greater degree of worker cooperation in turn helps promote more complete and more effective diffusion of new technology, essential for countries wishing to hold their own in today's brutally competitive international marketplace;

- In those countries which have most successfully adapted to new technology, specific national adjustment mechanisms for dealing with tech change have often gone hand-in-hand with active labour market and with full employment policies.[99]

It remains to be seen how Canada, with its decentralized industrial relations system and crazy-quilt pattern of labour law jurisdiction, will meet the many challenges posed by innovation. What this country's specific strategies will be like, five or ten years down the road, can only be guessed at what can be said, and this with certainty, is that if we do not modify our ways of thinking about work and the ways in which it is organized just as thoroughly as we are now starting to change the machines which do our work, we shall almost certainly find ourselves numbered among history's losers at the end of the day.

A number of promising experiments involving new forms of work organization and more cooperative labour-management relations have been reported by researchers such as Mears, Rankin, and Mansell.[100] Similarly, though the five-day week and eight (or eight-minus) hour day remain the norm, particularly in manufacturing, flexible hours, compressed work-weeks, and job-sharing (to mention just three of the better known innovative work scheduling methods) are becoming more frequent across Canada.[101] By and large, however, such innovations in work organization and scheduling remain the exception rather than the rule in Canadian workplaces. All too often, state-of-the-art technology has been (and is being) brought in without a corresponding commitment to change outmoded patterns of work organization and work scheduling. All too many managers and employers continue to regard technological change as a vested prerogative, and to believe that they can use new technology to increase productivity within the context of the essentially hierarchical labour management relations of the early industrial period. By the same token, all too many unions (and unionists) continue to sneer at all quality of worklife programs and other forms of organizational innovation, as at best attempts at window-dressing if not outright union avoidance strategies.[102] Such unionists have not, perhaps, sufficiently reflected on the fact that today's more highly educated workers, while still interested, as their parents were, in bread-and-butter issues such as money and job security, are often equally interested in work for its own sake and are apt to be very much attracted to QWL

programs and other innovations promising a more stimulating and humane work environment.

Henry Ford is best known today for his introduction of the assembly line into manufacturing. But had it not been for his concurrent introduction of the eight-hour workday in place of the ten- to twelve-hour day then standard, his assembly line strategy would almost certainly have failed.[103]

If we are to make effective use of the many new technologies being introduced each year, we must be no less diligent than Henry Ford in mating organizational to technological innovation. Such organizational innovations are not, as some managers and unionists of the old school would argue, frills, luxuries easily dispensed with when times get tough. Indeed, it is precisely when times are toughest that we need to be most innovative. Most available evidence shows that without corresponding organizational innovation, technological innovation simply will not work. While new machines are important, new organizational forms are still more important. Without an innovative use of <u>people</u> and their many capacities, all the shiny new machines in the would won't do a thing to bolster productivity and improve this country's comparative economic performance.

NOTES

1 As early as the early 1960s, debate raged in the United States over the possible impact of automation (as technological change was then referred to) on employment and the quality of working life generally. One of the American writers most concerned with the issue was Robert Heilbroner, some of whose work was reprinted in a 1967 American Assembly study on collective bargaining. Of course, in this country, the Woods Commission Task Force on Labour Relations was also concerned with the problem during the 1960s.

2 Indeed, organized worker resistance to the arbitrary imposition of technological change predates collective agreements of the modern variety. The Luddite movement carried out in England between 1811 and 1816, as well as related anti-technology movements in the agricultural sector, centered not so much on resistance to the new machines themselves, but to the changed workplace relationships resulting from the introduction of the machines. See Kevin Robins and Frank Webster, "Information Technology, Luddism and the Working Class," Chap. 9, vol. 1, Vincent Mosco and Janet Wasko (eds.), the Critical Communications Review, Norwood (New Jersey), Ablex, 1983, pp. 189-209. At page 195, Robins and Webster define Luddism as "... the attempt to subordinate the ravages of industrial capitalism to social, moral priorities."

3 Remark made by Prof. S. F. Kaliski of Queen's University, Spring 1985, during a labour economics class offered to students in the Queen's industrial relations program.

4 In the "Carrothers Commission Report," or, as it is more officially known, the Report of the Commission of Inquiry into redundancies and layoffs, by A. W. R. Carrothers et al. (Ottawa: Supply & Services, 1979), the authors at pp. 38-39 quote statistics compiled by Dr. Harvey Brenner, an American physician, on the relationship between the national unemployment rate and the incidence of such things as murder, suicide, alcoholism (as indicated by liver cirrhosis deaths), and prison admissions. Brenner found a strong positive correlation between the national unemployment rate and these various "social stress indicators," as he called them.

5 It is, of course, necessary to develop a social accounting system in order to take full and accurate account of such second-order costs. One of the most eloquent proponents of social accounting is Daniel Bell, especially in The Coming of Post-Industrial Society (New York: Basic Books, 1973), pp. 324-37. It is curious that the movement to develop social accounting systems and social cost indicators, which appeared

to have considerable momentum during the 1970s, did not manage to maintain that momentum.

6 "The Regulation of Inflation and Unemployment," in Industrial Relations, Berkeley, 25:1, Winter 1986, pp. 1-15.

7 On the importance of getting items such as technological change onto the national political agenda, see, among others, Herbert Schiller, Who Knows: Information in the Age of the Fortune 500, (Norwood, New Jersey, Ablex), 1981, especially p. 148.

8 For an overview of recent European, as well as Australian and Japanese experience, see the Research Report of the Labour Markets and Technological Change group of the Economic Council, Innovation and Jobs in Canada, Ottawa, 1987, pp. 124-127.

9 For some of the Canadian labour movement's major concerns on these issues, see the Canadian Labour Congress' Tech Change: A Handbook for Negotiations, Ottawa, CLC, 1983, especially pp. 23-30, 37-38.

10 A representative criticism here is that of Katherine McGuire, "Technological Change Clauses in Practice," Ottawa, CLC, 1983. At page 1, McGuire notes: "Unions have had little success in protecting members against the adverse effects of technological change. In part, this comes as a result of inadequate contract language. But more decisive is the failure of federal and provincial governments to protect workers through adequate provisions in labour codes."

11 See Patricia McDermott, "Canadian Labour Law and Technological Change: An Overview" (unpublished), 1985, pp. 3-4. The Ontario Crown Employees' Act, covering about 30,000 provincial government workers, is among several provincial labour acts which specifically exclude technological change from the list of bargainable issues.

12 For an eloquent critique of homeworking and the isolation it breeds, see Bob Kuttner, "The Declining Middle," in Atlantic Monthly, July 1983, pp. 60-72.

13 For virtually all of the past two decades, new or revised technological change clauses have been "indexed" in the section of Collective Bargaining Review entitled "Selected Benefit Changes for Settlements Reported," which directly follows a detailed listing of settlements and specific agreements/provisions. This index makes the researcher's life a good deal easier than it would otherwise be.

14 As will be noted later in the quantitative section of this paper, the pulp and paper industry has the highest frequency of technological change clauses of any industry in this country, at least of those industries which have 10 or more agreements in Labour Canada's "large agreements" file of agreements covering 500 or more workers. See Appendix 1-B for detailed time-series data on technological change in this industry.

15 A recent (1984) B.C. Telephone agreement which I have read contains an enumeration of literally dozens of situations in which contracting-out is specifically permitted.

16 Notable among these early studies, in addition to the Woods Commission's main report and the 1969 background study on arbitration prepared by Paul Weiler, is J.-R. Cardin's Canadian Labour Relations in an Era of Technological Change," Special Study No. 6, prepared for the Economic Council of Canada, (Ottawa: Supply and Services, 1967). At page 27, Cardin emphasizes "the setting-up of effective channels of communication which would signify a gradual abandonment of entrenched attitudes on both sides and a far more realistic role for the agreement itself." The fragmentation of bargaining units and absence of strong centralized labour and employer associations are among other obstacles Cardin sees to effective handling of technological change issues through the collective bargaining process.

17 For a fascinating discussion, see Richard B. Freeman, The Overeducated American, (New York: Academic, 1976).

18 "Your Dollar is Worth Only 94¢!" was probably the central Conservative theme of that election campaign. In the absence of a reference year, however, the slogan was perhaps less effective than it might otherwise have been.

19 "CLC Supports Labour Code Amendments" in Canadian Labour, 17:1, January, 1972, pp. 10-11.

20 Although the NDP's share of the popular vote dropped only about two points, from 17.2 per cent to 15.1 per cent, the surge in Liberal popularity was enough to cost the party 15 seats - a drop from 31 in 1972 to 16 in 1974. In Ontario, the party lost three seats (including Lewis'); in British Columbia, it lost nine. Following the election, Lewis retired from politics. In the view of the Britannica Book of the Year (1975 edition), the NDP were the real losers in this election, although the results were also a bitter pill for Conservative leader Robert Stanfield to swallow and signaled the end of his party leadership, as well as that of Lewis.

21 The postal dispute alone, involving some 17,693 workers, cost the country nearly 700,000 person-days of labour (Current Industrial Relations Scene in Canada, 1984 edition, Kingston, Queen's University Industrial Relations Centre, 1985, p. 414). The same source (p. 425) indicates that while the number of person-days lost to strikes has been declining steadily in manufacturing and construction since 1967, it has been increasing in services and public administration. In 1975, the total number of person-days lost was just under 11 million, or .53 per cent of total Canadian working time. This compares with just under 3 million working days lost, or .16 per cent of total working time in 1971, and 4.5 million days lost, or .19 per cent of working time in 1983. (See p. 424 of the 1984 Current Scene for the data just described.) At the same time (see ibid., p. 424), the average duration of strikes increased sharply in 1975, from 12.0 days in 1971 to 21.5 days in the latter year. Thus the tendency towards increased strike activity in the public sector appears to have gone along with a corresponding tendency toward longer and more frequent strikes in the economy as a whole. This in turn can be attributed, at least in large part, to the increase in unemployment and inflation characteristic of the period and to labour's negative reaction to wage-price controls imposed by the federal government in 1974.

22 This point about unions members' "threshold of awareness" was made to me in August 1985 by Katherine McGuire, a research official with the Communications Workers of Canada, during the course of a conversation about electronic monitoring, an issue which has not, thus far, been reflected in appropriate collective agreement provisions, despite its evident importance for telephone operators.

23 On the politicization of the Quebec labour movement, as compared to that in other provinces, see, among others, S. M. Jamieson, Industrial Conflict in Canada: 1966-75, Economic Council of Canada Discusssion Paper No. 142 prepared for the Centre for the Study of Inflation and Productivity, Ottawa, 1979, especially pp. 45-49. At page 46, Jamieson notes that "Far more than in other provinces, union ideologies and objectives have been committed to fundamental economic and social change beyond the immediate "bread and butter" issues that have been the main preoccupation of orthodox "business unionism" in other provinces. Quebec unions have acted as an independent and aggressive political force on the left, outside of and apart from the established party structure." At the same time, notes Jamieson, governments have historically been far more heavily involved with industrial relations issues in Quebec than elsewhere in Canada.

24 Some 800,000 workers stayed off the job on this day. See Jamieson, Industrial Conflict, p. 36, Table V.

It is possible that the recession and inflation characteristic of the mid-1970s influence tech change provision incidence in another way, by causing employers to purchase and introduce less new technology than they would otherwise have done, owing to difficult and extremely uncertain economic conditions. Given the tendency of North American unions to respond to immediate pressures rather than to take a long-term view on issues like tech change, such a decline in the introduction of new workplace technology might be expected to have led to reduced union concern with the issue. Unfortunately, I do not have available the evidence which would indicate definitively whether this was in fact the case.

25 According to the 1978 Current Industrial Relations Scene, December of 1977 saw a 9.5 per cent rise in the CPI, fuelled by a rise of almost 15 per cent in food prices. As well, unemployment continued to rise, reaching, in December 1977, what was then a post-war high of 8.5 per cent.

26 I am indebted to Barbara Hershorn, a classmate in the Queen's Industrial Relations program and a former officer of CUPE local 2424, for lending me a copy of the agreement described in the text.

27 I am grateful to the Research Department of this union for providing me with a detailed list of VDT provisions in CUPE agreements across Canada.

28 An examination of 20 large and 32 small telephone and telecommunications agreements active in Labour Canada's collective agreement library as of July 1985 showed that two of 20 large, and five of 32 small telephone-telecommunications agreements contained some kind of VDT provisions. This is certainly a much higher incidence than in the agreement pool generally, although the total number of telephone and telecommunications agreements contained in the pool are small enough that any frequency counts of individual provisions must be regarded with extreme caution. A further disaggregation of telephone from telecommunications agreement within the small agreements pool indicated that four of 13 telephone agreements (or 31 per cent) contained a VDT provision, but only one of 19 telecommunications agreements (or 5 per cent) did so. Yet the simple average frequency for the major tech change clauses normally coded by Labour Canada was higher within the telecommunications than the telephone sub group.

29 See pages 52-54 of this paper, in the quantitative section, for a more detailed analysis of VDT provisions in the small agreement sample.

30 I am indebted to David Dyson, a research analyst with the Manitoba Department of Labour, for providing me with this data on VDT provisions in that province's agreements.

31 See, among many others, Lawrence Archer, "I saw what you did and I know who you are," in Canadian Business, November 1985, p. 76 and following. At p. 83, Archer notes that Stephen Hollander, a computer designer, had recently told an Ontario Federation of Labour convention that "More than 100 pieces of equipment described by George Orwell in Nineteen Eighty-Four now exist."

32 In this connection, it is also worth noting that according to the Council's Working with Technology survey, innovation appears to be more frequent with larger firms (those employing over 500 workers). For instance, 98.9 per cent of the "large" establishments reported introducing some computer technology between 1980-85, as compared to 54.9 per cent of establishment employing 50 or fewer workers and 75.5 per cent for the sample as a whole. The fact that large establishments are more apt to introduce technological innovations may well have something to do with the greater frequency of technology clauses found in large bargaining units.

33 The Canadian Labour Congress has long advocated a one-year notice period. But according to the Labour Department data, only three agreements in the large agreement pool (well below 1 per cent of the total) covering 4,800 workers (0.2 per cent of all "large agreement" workers) contained a notice period of that length as of 1985.

34 See Canadian Labour Congress, Tech Change: A Handbook for Negotiations, (Ottawa, 1982).

35 In dealing with time-series data, we must assume that the data pool is more or less constant from year to year or that, at least, new agreements added to the pool are reasonably comparable to those deleted from it (as is the case when layoffs or plant closures reduce employment levels at a given workplace below 500).

36 The term is used to refer to industries employing a declining number of workers. This is evidently true for pulp and paper, at least within the large agreement pool. (See time series data in Appendix 1-B, which shows fewer workers covered by agreements in this industry in 1984, the last year for which worker data was available, than in 1971.) There are also fewer pulp and paper agreements in the large agreement pool than there were 14 years ago.

37 For a discussion of the relocation provision contained in a recent New Brunswick Telephone Company agreement, see J. Peirce, Toward a Tech Change Rating System, (Kingston: Queen's University Studies in Communication and Information Technology Working Paper No. 8, 1986), pp. 27-28. Transfers are also a crucial factor in the recent labour dispute at Saskatchewan Telephone. According to Vincent Mosco, a Queen's

University researcher who has been investigating the telephone industry, SaskTel has recently been centralizing such services as directory assistance and repair into the province's larger cities. Workers located in the smaller centres where these services were formerly done have been given the choice of moving to the larger centres or being laid off. As many of the workers have been unable to move for family reasons - this has been particularly true for women operators - the forced transfers have, in Mosco's view, amounted to constructive dismissals.

38 For more details about this measure of aggregate as opposed to individual technological change clause frequency, see Toward a Tech Change Rating System, op. cit., pp. 2-6.

39 Dennis Chamot and Kevin Murphy, "Technological Change Clauses in Collective Bargaining Agreements," in V. Mosco and J. Wasko (eds.), The Critical Communications Review, op. cit., vol. 1, pp. 245-278. Chamot and Murphy cite a variety of surveys showing that fewer than 20 per cent of American "large agreements" (those covering 1,000 or more workers) contained any type of technological change provision, and that about 10 per cent contained an advance notice clause. From this evidence, it would be safe to suppose that aggregate Canadian technological change frequency is at least twice that of aggregate American, if not three or four times greater.

40 When all ten Canadian provinces were included, the correlation was 0.82. When Prince-Edward Island was dropped (only four large agreements are from that province, and there is thus a basis for considering P.E.I. not statistically significant), the correlation coefficient was greater than 0.95.

41 In this correlation, I attempted to relate the incidence, within all 13 Canadian jurisdictions, of specific technological change provisions such as advance notice, notice of layoff, technological change related labour/management committees, and technological change related employment and earnings guarantees to comparable general provisions, not specifically related to technological change. To simplify the exercise, I used the simple average technological change frequency figure for each jurisdiction and the comparable simple average frequency for the related general clauses. The result was a correlation coefficient just over 0.50, which is not evidence of a strong relationship.

42 The Registrar of the Manitoba Labour Relations Board, a researcher with the Manitoba Department of Labour, and a trade union official with the Manitoba Federation of Labour were asked if they could explain this phenomenon. None could.

43 The correlation between guaranteed employment and earnings provisions and simple average technological change frequency,

nationwide, was well over 0.80 - notably higher than the comparable correlation coefficient for other technological change clauses such as training and advance notice.

44 For a detailed discussion of single-weighted and double-weighted frequencies, see Toward a Tech Change Rating System, pp. 7-14.

45 During an August 1985 conversation, Katherine McGuire, of the Communication Workers' Union, indicated that training provisions were a major priority for her union.

46 For instance, on the basis of a collective agreement analysis and other evidence, Elisabeth Plettenberg concluded in Technological Change (Ottawa: CUPE, 1972) that small bargaining units tended to be at an advantage in negotiating technological change clauses. "Employees in larger establishments were less likely to be covered by technological change provisions" (p. 20). But this seems less like a result of a "negative" size factor than of CUPE's generally high awareness of technological change issues, compared to that of industry in general. Here it should be noted that, while CUPE tends to have many quite small bargaining units, it also has a strong, centralized research department and other advantages which would normally more typically be found in large bargaining units. Thus the CUPE situation would not be the typical one for a small bargaining unit.

47 I suspect that the double-weighted figure, taking into account both the strength of individual provisions and the fact that unions may value some types of clauses more than others, is generally higher than the single-weighted one, which takes only the first of these facts into account because, by and large, unions tend to concentrate more on achieving provisions in those areas of greatest importance to them and their membership.

48 See Tech Change: A Handbook, op. cit.

49 The Council's survey, "Working with Technology," is one of the very few documents I have seen which attempts to get at the question of how often unions have put technology-related issues onto the bargaining table.

50 "CLC supports amendments" (see note 19).

51 Ottawa-Carleton Regional Transit Commission, 1982, 1 CLRBR at p. 172 (Dorsey).

52 The OC Transpo discussion of previous technological change cases is cited by McGuire in Technological Change Clauses in Practice, pp. 2-3.

53 Prince Rupert Grain Terminal Ltd., 9 CLRBR (NS) 1. Information about the disposition of other technological change cases brought to the Canada Labour Relations Board's attention was obtained by telephone from Board staff.

54 Information obtained through a telephone conversation with Janet Duff, Registrar of the Manitoba Labour Relations Board.

55 Information obtained through a telephone conversation and written communication with research staff at Saskatchewan Labour Relations Board.

56 These cases include Ackland Ltd., 1976, 1 CLBR 71; Tahsis Company Ltd., 1979, 2 CLRBR 377; Eurocan Pulp & Paper, 1982, BCLRB 62/82 at pp. 288-301, reconsidered in union's favour in 1983; and Carling O'Keefe Ltd. and Brewery, Winery and Distillery Workers, Local 300, Case 249/86, October 7, 1986, Moore (unpublished).

57 1 WLAC 71/272 at pp. 71/275, quoted in McGuire, Technological Change Clauses in Practice, p. 4.

58 1974, WLAC at 207; see especially p. 210. This case is quote by McGuire at p. 5 of Technological Change Clauses in Practice.

59 Canada Post Corporation and Canadian Union of Postal Workers, 1985, CUPW No. N-1000-GG-44, Swan.

60 Re Canadian Union of Postal Workers and Treasury Board, PSSRB No. 169-2 149, August 9, 1978, Beatty.

61 There have recently been some fascinating legal cases, especially in the United States, focusing on the extent to which computer software may be regarded as intellectual property and thus subject to copyright protections. For a good discussion of this issue, see William J. Nichols' The Work of Culture in the Age of Cybernetic Systems, Queen's University Studies in Communications and Information Technology, Working Paper No. 4, (Kingston: Queen's University, 1985), especially pp. 18-26. The issue has arisen most often in the context of video games programs.

62 Governing Council of University of Toronto and CUPE, Local 1230, Hinnegan (unpublished), January 1984.

63 See, for instance, Tech Change: A Handbook for Negotiations, pp. 8-9.

64 The Board ruled that due and proper notice had been given by the employer on August 31, 1984, in a letter sent after the union had filed its applications with the Board, and that therefore the employer would have to wait 120 days from

September 1, 1984 (the day on which the notice was presumably received by the union). But since the Board's decision was not handed down until December 12, 1984, this meant that the employer could implement the change less than three weeks after the decision, as early as January 1, 1985. The Board did find that the union's certification extended to represent employees at the new terminal. But in the circumstances, this was something of a pyrrhic victory for the union.

65 This is a central theme of the Economic Council's research report, Innovation and Jobs in Canada, cited in Note 8 above.

66 Re Canada Post Corporation and Canadian Union of Postal Workers, C.P.C. No. 83-2-3-8, CUPW No. 1000-G-19, March 1, 1985, Blouin. See also the very similar case (cited as well by Swan in the case described in Note 59 above) Re Canada Post Corporation and Canadian Union of Postal Workers, CP.C. No. 82-2-3-12, CUPW No. 1000-GG-12, June 29, 1983, Dulude.

67 Re Metropolitan Toronto Library Board and Canadian Union of Public Employees, Picher (unpublished), 1983.

68 Quoted in Patricia McDermott, "Canadian labour law and technological change: An Overview" (unpublished), 1985, p. 7.

69 See McDermott, "Overview," p. 8. Where there are two to nine employees, only a layoff of two or more will be considered significant; where there are 10 to 19, a layoff of three or more will be considered significant. This means, as McDermott notes, that the Saskatchewan law especially prevents the layoff of a single worker from being counted as significant.

70 Grain Services Union and Manitoba Pool Elevators, (Keller), (unpublished), September 6, 1985, cited 1985 CLLC.

71 1977, 2 WLAC at p. 259; this case is discussed by McGuire in Technological Change Clauses, pp. 10-11.

72 This "disentanglement" problem would become well-nigh insoluble under a proposed feature of the new B.C. Labour Act. In Sec. 42 of the proposed new B.C. Industrial Relations Reform Act (intended as the successor to the current B.C. Labour Code), one clause specifically states that "...technological change does not include normal layoffs resulting from a decrease in the amount of work to be done."

73 1980, LAC 2, 29, discussed in McGuire, Technological Change Clauses, p. 8.

74 1975, WLAC 900, discussed in McGuire, Technological Change Clauses, pp. 8-9.

75 Manitoba Museum of Man and Nature and Manitoba Government Employees' Association, Sigurdson (unpublished), 1986.

76 These reasons are not, however, elaborated on in the Board's decision. It should be noted that British Columbia's grounds for exclusion from unions are among the narrowest in Canada. For more details on the exclusion question as it affects technological change, see McDermott, "Overview," op. cit. For a general treatment of exclusions in the broader context of Canadian and international labour law, see J. Peirce, "Exclusions from Canadian Labour Law," master's essay for Queen's University Industrial Relations program (unpublished, to be completed in 1987).

77 The British Columbia definition is basically that of Blouin (see Note 66 above), who argued that a technological change exists if any one of the three relevant conditions has been fulfilled, rather than that of Beatty or Swan (Notes 59 and 60), who argued that all three must be fulfilled.

78 See Note 56. These cases represented the British Columbia Board's first detailed treatment of that province's technological change legislation.

79 This case is discussed in McGuire, Technological Change Clauses in Practice, p. 12.

80 See, for instance, Rayonier Canada Ltd., 1978, 1 WLAC 224, especially p. 235; this case is discussed by McGuire at pp. 6-7 of Technological Change Clauses and by McDermott at p. 6 of "Overview."

81 For instance, in City of Port Moody (1977, 1 WLAC 238), the arbitration board held that the layoff of two boat ramp attendants should be considered significant because it wiped out a portion of the bargaining unit. This ruling is in sharp contrast to the one made by CLRB Vice Chairman Brian Keller in the 1985 Manitoba Pool Elevators case discussed earlier (see Note 70). In the very recent Carling O'Keefe case (see Note 56), British Columbia Board Vice Chairman Wayne Moore offers a most useful discussion of the concept in his ruling in the union's favour.

82 To be sure, it may be that collective agreement analysis of skills provisions, of the sort I have undertaken in the small agreement analysis described earlier in the paper, may understate the incidence of skills provisions somewhat since some provisions which basically deal with skills may be discussed under a different heading, such as "wage rates" or "job requirements." All the same, I have never yet encountered anyone who thought that skills-related issues were handled adequately by the North American bargaining system.

83 See, among others, Tarantelli, "Regulation of Inflation and Unemployment," op. cit. In this connection, some of the work of Jeffrey Sachs is also quite relevant.

84 An excellent example of this is Sweden, where trade unions tend to support new technologies. In some industries, indeed, Swedish unions "conduct their own research and development. In such industries as printing, they have even been directly responsible for the introduction of new technologies. See Innovation and Jobs in Canada, pp. 126-127, and Robert Howard, "UTOPIA: Where Workers Craft New Technology," in Technology Review, April 1985, pp. 43-49.

85 See Note 16 and Cardin, Canadian Labour Relations, op. cit.

86 In Canadian Labour Relations, op. cit., Cardin makes this point quite eloquently. See especially pp. 44-52.

87 According to Working with Technology (cited in Table 10 of Chap. 6 of Innovation and Jobs in Canada, [research report]), some 80 per cent of the unionized establishments surveyed had introduced some new computer technology within the preceding five years, as opposed to 71.5 per cent of the nonunionized establishments. On the other hand, a larger percentage of employees in the latter (18.5 as compared to 13.6) were working with computers.

88 This legislation, in force only in the federal jurisdiction, Manitoba, Ontario, Newfoundland, Nova Scotia, Ontario, and Quebec, generally applies only to terminations involving 50 or more workers (10 in Nova Scotia). There may be other exclusions as well. For instance, some jurisdictions exclude those employed less than a certain period of time (typically either one or three months), while others exclude workers who are on strike or who have been locked out.

89 Alberta, Ontario, and the Maritime Provinces (Newfoundland excepted) are the Canadian jurisdictions excluding the largest number of classes of workers from unionization rights. For more detail, see McDermott, "Overview," op. cit, pp. 3-4.

90 Ibid.

91 A number of Canadian jurisdictions, including Ontario and New Brunswick, generally require part-timers working less than a given number of hours per week to form different bargaining units than full-time workers.

92 On the recent rapid growth of the secondary labour force in Australia, comprising in this case workers not covered by the dominant interest arbitration system of wage setting, see Stephen Deery, "New Technology, Union Rights and Management Prerogatives: The Australian Experience," in Labour and Society, 11:1, 1986, pp. 67-82.

93 See, for instance, Innovation and Jobs in Canada, pp. 109-111, for a discussion of the structural changes in the Canadian economy which are posing major challenges for trade unions wishing to retain their present level of membership.

94 The Canadian Labour Congress has long held this view and has expressed it frequently in its publications. In a representative example it suggested in a 1980 paper, "The Effects of Microelectronics and Income," that legislation would be needed in the areas of notice and consultation, severance pay provisions, retraining, relocation, and guarantee of pensions. In addition, the CLC recommended that no plant closure or major layoff of workers be permitted as a result of technological or other changes prior to a review by a public tribunal (see pp. 40-44). In addition, the CLC has proposed legislation providing for paid educational leave.

95 The federal government's task force on microelectronics produced a report entitled In the Chips: Opportunities, People, Partnership, Ottawa, Supply & Services Canada, 1982, in which joint labour/management committees for dealing with technological change issues were a pivotal recommendation. These committees were also recommended by the Ontario NDP in its 1984 Future of Work report, adopted as official party policy at the 1984 policy convention in Hamilton. The committee investigation of the effects of technological change was chaired by Michael Cassidy, now M.P. for Ottawa Centre.

96 "Should Works Councils be Used as Industrial Relations Policy?" in Monthly Labour Review, 108:7, July 1985, pp. 25-29.

97 Fifty workers is the "threshold figure" suggested in the recommendation put forward in In the Chips.

98 On the way in which the B.C. Code has worked in practice, see Paul Weiler, Reconcilable Differences: New Directions in Canadian Labour Law (Toronto: Carswell, 1980), and Joseph Weiler, "Grievance Arbitration: The New Wave" in J. Weiler and P. Gall, eds., The British Columbia Labour Code in the 1980's (Toronto: Carswell, 1984).

99 Innovation and Jobs in Canada, pp. 124-127, and Rianne Mahon, "Technological Change and Labour Market Policy: The United States, Japan, West Germany, and Sweden, "Economic Council of Canada, unpublished document 1986. Useful details on the Swedish system may be found in Folke Schmidt, Law and Industrial Relations in Sweden (Stockholm: Almqvist & Wiksell International, 1977).

100 In this connection, the work of such people as Jacquie Mansell, Tom Rankin, and Jan Mears on socio-technical systems

is most relevant. See, among others, Mansell's Workplace Innovation in Canada, published by the Economic Council (Ottawa: Supply and Services, 1987), as well as the earlier study by Mansell and Rankin, Changing Organizations: The Quality of Working Life Process, Ontario Quality of Working Life Centre Occasional Paper #14 (Toronto: 1983).

101 For a discussion of various alternative worktime arrangements, see Innovation and Jobs in Canada, pp. 96-107.

102 Mansell, Workplace Innovation.

103 See Robert Lacey, Ford: The Men and the Machine (Toronto: McClelland & Stewart, 1986), pp. 117-118.

Table 1

Frequency of Various Tech Change Provisions as Reported by Collective Bargaining Division of Labour Canada (Agreements Covering 500 or More Workers, Exclusive of Construction)

Provision	% of agreements containing provision	% of workers covered by provision
Advance notice/consultation	37.7	42.9
Training/retraining	30.9	31.0
Relocation allowance	4.1	9.1
Labour/management committee (tech change issues)	14.6	21.0
Employment security (tech change)	21.9	24.1
Notice of layoff (tech change)	12.4	14.0
Contracting-out (prohibitions only)	29.2	29.5

Source Collective Bargaining Division, Labour Canada, agreements covering 500 or more workers.

Table 2

Frequency of Major Technological Change Clauses in Canadian Agreements, Selected Years, 1972-85

Tech change provision	% of agreements covered (left); % of workers covered (right)											
	1972		1978		1980		1982		1984		1985 (May)	
Advance notice/ consultation	27.4	35.5	28.5	34.9	33.5	40.2	34.5	41.6	38.1	42.7	37.7	42.7
Training/retraining	22.7	28.1	21.7	27.8	25.5	29.9	28.6	32.5	31.1	31.5	30.9	31.4
Labour/management committee (tech change issues)	13.9	17.3	12.3	21.0	14.9	25.6	14.7	22.3	14.3	20.8	14.6	21.0
Employment security (tech change related)	12.1	15.2	18.1	23.8	19.9	24.7	21.2	24.1	21.9	24.0	21.9	24.0

Source Collective Bargaining Division of Labour Canada, agreements covering 500 or more workers.

Table 3

Frequency of Technological Change Clauses in Selected Industries,[1] 1985

Industry	No. of agreements	Advance notice	Training/ retraining	Relocation	Labour/ management committees	Guaranteed employment/ earnings	Notice of layoff	Contracting out (prohibitions only)	Simple average frequency
					(Per cent)				
Logging	10	40.0	40.0	None	None	20.0	10.0	10.0	17.1
Misc. metal mines	14	85.7	64.3	None	7.1	64.3	14.3	57.1	41.8
Pulp & paper mills	43	97.7	68.8	None	74.4	97.7	76.7	55.8	68.4
Iron & steel mills	12	58.3	58.3	8.3	None	66.7	16.7	50.0	36.9
Smelting & refining	15	73.3	86.7	6.7	33.3	73.3	None	40.0	44.8
Motor vehicle parts & accessories	13	30.8	53.8	None	30.1	None	None	15.4	18.7
Shipbuilding & repair	10	80.0	70.0	None	40.0	None	None	70.0	37.1
Communications equip. mfg.	12	33.3	50.0	8.3	None	16.7	None	25.0	19.0
Air transport	13	23.1	15.4	7.7	None	7.7	15.4	15.4	12.1
Railway transport	16	75.0	37.5	62.5	25.0	31.3	None	37.5	38.4
Urban transit systems	10	50.0	30.0	None	None	40.0	30.0	30.0	25.7
Telephone systems	19	68.4	42.1	21.1	15.8	10.5	10.5	36.8	29.3
Electric power	19	31.6	52.6	10.5	31.6	52.6	15.8	36.8	33.1
Grocery	27	29.6	29.6	None	None	14.8	7.4	7.4	12.7
Elementary & secondary schools	149	3.4	2.0	None	0.7	4.0	0.7	13.4	3.5
Post-secondary non-university education institutions	11	9.1	9.1	None	None	None	None	36.3	7.8
Universities & colleges	36	36.1	36.1	None	8.3	16.7	22.2	33.3	21.8
Hospitals	74	37.8	20.3	None	8.1	9.5	14.9	40.5	18.7
Hotels & motels	12	None	8.3	None	None	8.3	None	16.7	4.8
Other federal admin.	37	54.1	None	None	51.4	None	8.1	5.4	17.0
Provincial admin.	56	42.9	28.6	1.8	25.0	5.4	25.0	19.6	21.2
Local admin.	51	25.5	29.4	None	None	45.1	7.8	39.2	21.0
All above industries	659	36.9	28.4	3.2	15.5	22.2	13.8	28.1	21.1
All other industries	301	40.5	35.9	6.3	13.3	21.9	9.6	35.2	23.3

1 The figures express the percentage of agreements with the technological change clause. The "simple average frequency" was obtained by taking the mean of the technological change clause incidence in each industry.

Source Collective Bargaining Division of Labour Canada, agreements covering 500 or more workers.

Table 4

Simple Average Frequency

Technological Change Clauses, Highest and Lowest Average Rankings, by Industry (10 Agreements or More per Industry)

Highest	Per cent	Lowest	Per cent
Pulp & paper mills	68.4	Primary & secondary Educa.	3.5
Smelting & refining	44.8	Hotels & motels	4.8
Misc. metal mines	41.8	Post-secondary non-university education	7.8
Rail transport	38.4	Air transport	12.1
Shipbuilding & repair	37.1	Grocery	12.7

Source Collective Bargaining Division, Labour Canada (agreements covering 500 or more workers). Data current as of July, 1985. Simple average frequency was obtained by taking a simple arithmetic mean of the seven tech change clauses used in this study (see Table 3) throughout each industry.

Table 5

Frequency of Technological Change Clauses in Collective Agreements,[1] by Jurisdiction, Canada, 1985

	No. of agreements	Proportion of total agreements with each provision							
		Advance notice	Training/ retraining	Relocation allowance	Labour/ management committees	Guaranteed employment/ earnings	Notice of layoff	Contracting-out prohibitions	Simple average frequency[2]
		(Per cent)							
Newfoundland	17	52.9	52.9	-	5.9	29.4	23.5	52.9	31.1
Prince Edward Island	4	25.0	25.0	-	50.0	-	-	75.0	25.0
Nova Scotia	25	52.0	36.0	-	20.0	16.0	12.0	24.0	22.9
New Brunswick	26	23.1	19.2	3.8	19.2	15.4	3.8	50.0	19.2
Quebec	183	41.5	41.5	1.6	18.0	36.6	14.2	53.6	29.6
Ontario	310	24.5	22.3	0.3	9.1	15.1	9.1	22.0	14.7
Manitoba	43	65.1	51.2	2.3	-	20.9	11.6	25.6	25.2
Saskatchewan	25	20.0	44.0	4.0	12.0	16.0	12.0	16.0	18.9
Alberta	71	19.7	21.1	-	1.4	12.7	9.9	9.9	10.7
British Columbia	113	53.9	41.6	6.2	22.1	30.1	23.9	33.6	30.2
More than one jurisdiction	4	75.0	25.0	-	25.0	-	-	25.0	21.4
Federal	82	52.4	31.7	31.9	18.3	34.1	12.2	32.9	30.7
PSSRA[3]	49	53.1	2.0	-	44.9	-	10.2	8.2	16.9
Total	960	38.0	30.7	4.2	14.8	22.1	12.5	30.3	21.8

1 Covering 500 or more workers, exclusive of construction.

2 The "simple average frequency" was obtained by taking the mean of the technological-change-clause incidence in each jurisdiction.

3 Public Service Staff Relations Act.

Source Collective Bargaining Division of Labour Canada, agreements covering 500 or more workers. Data current as of July, 1985.

Table 6

The Three Types of Averages for Large and Small Agreements, Compared

	Large agreements (960 agreements covering 500 or more workers)	Small agreements (183 agreements covering fewer than 500 workers)
	(Per cent)	
Simple average:	21.7	13.2
Single-weighted:	16.0	8.3
Double-weighted:	18.4	9.5

For detailed calculations, see Appendices 2, 3.

Source Collective Bargaining Division of Labour Canada for large agreements; data current as of July 3, 1985. Personal sample of small agreement bank of Labour Canada, Collective Bargaining Division, conducted July-August, 1985. Data current as of July, 1985. Personal calculation of average frequency figures.

Table 7

Tech Change Clauses, Small and Large Agreement, Comparison

		Small (183 agreements)		Large (960 agreements)	
1501:	Advance notice/consultation				
1:	0-3 months:	8	(4.4%)	71	(7.3%)
2:	3-6 months:	17	(9.3%)	162	(16.8%)
3:	6-12 months:	3	(1.6%)	13	(1.3%)
4:	12 months or more:	none		3	(0.3%)
9:	Other, unspecified:	23	(12.6%)	115	(11.9%)
0:	No provision:	132	(72.1%)	596	(62.0%)
1502:	Training/retraining (T.C.)				
	Provision exists:	32	(17.5%)	295	(30.8%)
	No provision:	151	(82.5%)	665	(69.2%)
1503:	Relocation allowance (T.C.)				
	Provision exists:	none		39	(4.1%)
	No provision:			921	(95.9%)
1504:	Labour-Management Committee (T.C.)				
	Provision exists:	6	(3.3%)	139	(14.5%)
	No provision:	177	(96.7%)	821	(85.5%)
1505:	Guaranteed employment or $$ (T.C.)				
	Provision exists:	21	(11.5%)	212	(22.1%)
	No provision:	162	(88.5%)	748	(77.9%)
1506:	Notice of layoff (T.C.)				
1:	0-3 months:	6	(3.3%)	42	(4.3%)
2:	3-6 months:	3	(1.6%)	53	(5.5%)
3:	6-12 months:	1	(0.5%)	2	(0.29%)
4:	12 months or more:	none		-	
9:	Other unspecified:	4	(2.2%)	24	(7.5%)
0:	No provision:	169		839	(87.4%)
1507:	Tech change reopener				
	Provision exists:	1	(0.5%)	1	(0.1%)
	No provision:	182	(99.5%)	959	(99.9%)
1602:	Contracting out				
1:	Permitted:	2	(1.1%)	162	(16.8%)
2:	Prohibited outright:	4	(2.2%)	14	(1.4%)
3:	Prohibited if leads to layoffs:	25	(13.7%)	251	(26.1%)
4:	Prohibited to nonunion employer:	1	(0.5%)	12	(1.2%)
9:	Other (includes combination of 3 & 4 above):	13	(7.1%)	12	(1.2%)
0:	No provision:	138	(75.4%)	501	(52.2%)
1602:	23.5% of all agreements contain some kind of prohibition			30.9% of all agreements contain some kind of prohibition	

Source As in previous table.

Table 8

Frequency of General Clauses (Related to Technological Change), Canada, Small and Large Agreement Pools, 1985

	Small (183 agreements)	Large (960 agreements)
	(Per cent)	
Notice of layoff	49.6	57.6
Guaranteed employment/income	7.7	9.2
Moving allowance	9.3	22.7
Training clauses (not related to tech change)	31.1	64.7
Labour/management committees (general)	19.7	60.1

Source Labour Canada, Collective Bargaining Division, for large agreements (those covering 500 or more workers); personal sample of agreements held in Labour Canada's Collective Bargaining Library for small agreements.

Table 9

Frequency of "New Technology" Provisions Not Captured by Labour Canada, as Found in Small Agreement Pool

1701:	Definition of tech change		
1:	Definition referring to machinery only:	1	(0.5%)*
2:	Definition referring to machinery and work methods:	5	(2.7%)*
3:	Definition as per Canada Code:	4	(2.2%)
0:	No provision:	173	(94.5%)

*Excludes one letter of agreement, not counted in tabulation for sake of consistency with tabulation method used in evaluating large agreements.

1702:	Comprehensive employment security package (tech change related)		
	Provision exists:	3	(1.6%)
	No provision:	180	(98.4%)
1703:	Surveillance cameras		
	Provision exists:	None	
1704:	Electronic monitoring equipment		
	Provision exists:	None	
1705:	Video display terminals		
1:	Permitted:	None	
2:	Prohibited outright:	None	
3:	Consultation with union over installation, maintenance:	None*	
4:	Inspection and maintenance provision:	1	(0.5%)
5:	Rest breaks for operators:	None	
6:	Time limits for operators:	None	
7:	Eye or other relevant medical exams for operators:	None	
8:	Right of pregnant women to transfer:	1	(0.5%)
9:	Combination of two or more of above:	1	(0.5%)*
99:	Other, or combinations of additional:	1	(0.5%)
0:	No provision:	179	(97.8%)

*Excludes one letter of agreement.

1711:	Skills maintenance provision		
1:	Skill maintenance guaranteed:		
2:	Consultation or notification of union in event of skill change:	1	(0.5%)
3:	Machinery limited to certain staff or departments:	1	(0.5%)
0:	No provision:	181	(98.9%)
1719:	Other skill provisions		
1:	Workers not to be penalized for errors on new tech-change related assignments:	1	(0.5%)
9:	Other:	None	
0:	No provision:	182	(99.5%)

Source Personal sample of agreements held in library of Collective Bargaining Division, Labour Canada. Personal coding system.

Table 10

Worker Involvement in the Process of Technological Change

Industry	Per cent of firms with a formal mechanism for worker participation in:					
	Setting production or sales targets					
	At company level	At plant level	At department level	At working group level	Improving productivity/ quality	Adoption of new technology
Manufacturing						
Iron and steel	0	0	0	65	100	65
Metal stamping, pressing and coating	5	20	50	60	65	20
Hardware, tool and cutlery	30	30	50	70	90	50
Miscellaneous metal fabricating	5	25	20	0	40	25
Machinery and equipment	0	0	0	30	40	30
Office and store machinery	55	50	65	50	80	65
Communications equipment	15	15	20	25	55	5
Aircraft and aircraft parts	15	10	20	20	50	40
Plastics fabricating	25	30	40	30	70	35
Services						
Chartered banks	15	20	70	50	35	25
Trust companies	60	60	40	50	70	40
Life insurance	50	40	70	40	75	35
General insurance	25	20	40	40	45	10
Insurance brokers	65	80	80	80	80	55
Federal government	25	20	20	40	55	85
Provincial government	10	0	0	0	35	35
Local government	0	20	0	0	50	30
Telephone systems	50	40	40	60	60	55
Telegraph and cable systems	0	0	0	50	75	0
Food stores	0	0	0	0	0	0
General merchandise stores	--	--	--	--	--	--
Computer services	25	35	50	40	60	60
Management and business consultants	10	20	70	35	70	50

Figures rounded to nearest 5 per cent.

Source Ontario Task Force on Employment and New Technology, 1985.

Table 11

Management's Perception of Appropriate Roles for Workers in Decision-Making Regarding New Technology

Industry	Per cent of firms identifying these roles as appropriate for workers							
	No involvement	Information only	Advance notice	Explanation referring to job security	Discussion (limited dialogue)	Prior consultation	Explanation/ set-up of training	Full involvement
Manufacturing								
Iron and steel	35	65	0	0	0	0	35	35
Metal stamping, pressing and coating	30	10	0	10	5	30	5	20
Hardware, tool and cutlery	5	40	0	5	20	25	0	20
Miscellaneous metal fabricating	30	15	0	15	0	0	0	35
Machinery and equipment	25	0	0	0	0	65	15	15
Office and store machinery	0	25	25	0	0	40	0	30
Communications equipment	55	25	0	15	5	20	5	5
Aircraft and aircraft parts	10	0	0	10	10	45	25	10
Plastics fabricating	5	40	30	15	35	15	15	25
Services								
Chartered banks	25	15	0	25	0	15	0	60
Trust companies	15	0	0	30	0	10	0	45
Life insurance	0	0	0	0	40	20	20	60
General insurance	0	15	0	15	15	0	0	60
Insurance brokers	30	60	0	30	0	30	0	15
Federal government	0	20	15	0	15	40	0	25
Provincial government	15	20	0	20	25	55	25	0
Local government	10	25	10	10	10	20	0	30
Telephone systems	40	20	0	20	20	60	20	0
Telegraph and cable systems	50	50	0	0	0	50	0	0
Food stores	--	--	--	--	--	--	--	--
General merchandise stores	--	--	--	--	--	--	--	--
Computer services	0	0	25	0	25	25	50	25
Management and business consultants	0	40	0	0	0	0	50	10

Figures rounded to nearest 5 per cent.

Source Ontario Task Force on Employment and New Technology, 1985.

Appendix 1-A

Highest and Lowest Frequencies, Individual Tech Change Clauses, by Industry (10 agreements or more per industry)

Advance notice: highest (%)		Lowest (%)	
1	Pulp & paper: 97.7	1	Hotels/motels: None
2	Misc. metals: 85.7	2	Prim & sec. ed.: 3.4
3	Shipbuilding: 80.0	3	Post-sec. non-univ. ed.: 9.1
4	Rail transport: 75.0	4	Air transport: 23.1
5	Smelting/refining: 73.3	5	Municipal admin.: 25.5

Training/retraining: highest (%)		Lowest (%)	
1	Smelting/refining: 86.7	1	Federal admin.: None
2	Pulp & paper: 68.8	2	Prim & sec. dd.: 2.0
3	Misc. metals: 64.3	3	Hotels/motels: 8.3
4	Motor vehicle manuf.: 53.8	4	Post-sec. non-univ. ed.: 9.1
5	Electrical energy: 52.6	5	Air transport: 15.4

Relocation: highest (%)		Lowest (%)
1	Rail transport: 62.5	14 industries contain no relocation provisions
2	Telephone: 21.1	
3	Electrical energy: 10.5	
4	Smelting/refining and iron & steel mills: 8.3	
5	Air transport: 7.7	

Labour-Man. comm: highest (%)		Lowest (%)
1	Pulp & paper: 74.4	9 industries contain no labour-management committee provisions
2	Federal admin.: 51.4	
3	Shipbuilding: 40.0	
4	Smelting/refining: 33.1	
5	Motor vehicle manuf.: 30.1	

Guar. employment/earings: highest (%)	Lowest (%)
1 Pulp & paper: 97.7 2 Smelting/refining: 73.3 3 Iron & steel mills: 66.7 4 Misc. metals: 64.3 5 Electrical energy: 52.6	Motor vehicle manufacturing, shipbuilding, post-sec. non-univ. ed., and federal admin. contain no guar. employment provisions 2 Prim & sec. ed.: 4.0 3 Prov. admin.: 5.4 4 Air transport: 7.7 5 Hotels/motels: 8.3

Notice of layoff: highest (%)	Lowest (%)
1 Pulp & paper: 76.7 2 Urban transport: 30.0 3 Prov. admin.: 25.0 4 University ed.: 22.2 5 Iron & steel mills: 16.7	7 industries contain no notice of layoff provisions

Contracting-out (prohibitions only): highest (%)	Lowest (%)
1 Shipbuilding: 70.0 2 Misc. metals: 57.1 3 Pulp & paper: 55.8 4 Iron & steel mills: 50.0 5 Hospitals: 40.5	1 Fed. admin.: 5.4 2 Grocery: 7.4 3 Logging: 10.0 4 Ed. (prim & sec): 13.4 5 Air transport and motor vehicle manuf.: 15.4

Appendix 1-B

Time Series: Pulp and Paper Industry (SIC 271), Technology Change Clauses, Selected Years 1969-85

Type of agreement	Agreements			Workers		
	Number of agreements	With (A) or without (B) provision	Percentage of total	Number of workers	With (A) or without (B) provision	Percentage of total
1969 - Total	27			30,683		
Advance Notice/Consultation						
A		23	85.2		27,334	89.1
B		4	14.8		3,349	10.9
Training/Retraining						
A		20	74.1		20,541	66.7
B		7	25.9		10,142	33.1
Relocation Allowance						
A		2	7.4		1,850	6.0
B		25	92.6		28,833	94.0
Labour-Management Committee						
A		14	51.9		19,704	64.2
B		13	48.1		10,979	35.8
Employment Security						
A		8	29.6		6,548	21.3
B		19	70.4		24,135	78.7
Notice of Layoff						
A		19	70.4		24,212	78.9
B		8	29.6		6,471	21.1
1970 - Total	37			45,063		
Advance Notice/Consultation						
A		35	94.6		43,596	96.7
B		2	5.4		1,467	3.3
Training/Retraining						
A		29	78.4		33,563	74.4
B		8	21.6		11,500	25.6
Relocation Allowance						
A		1	2.7		1,430	3.2
B		36	97.3		43,633	96.8

Appendix 1-B (Cont'd.)

Type of agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1970 (Cont'd)						
Labour-Management Committee						
A		25	67.6		31,938	70.9
B		12	32.4		13,125	29.1
Employment Security						
A		12	32.4		9,668	21.5
B		25	67.6		35,395	78.5
Notice of Layoff						
A		29	78.4		37,934	84.2
B		8	21.6		7,129	15.8
1971 - Total	38			45,620		
Advance Notice/Consultation						
A		37	97.4		44,680	97.9
B		1	2.6		940	2.1
Training/Retraining						
A		31	81.6		35,044	76.8
B		7	18.4		10,576	23.2
Relocation Allowance						
A		1	2.6		1,430	3.1
B		37	97.4		44,190	96.9
Labour-Management Committee						
A		27	71.1		32,944	72.2
B		11	28.9		12,676	27.8
Employment Security						
A		11	28.9		8,566	18.8
B		27	71.1		37,054	81.2
Notice of Layoff						
A		31	81.6		39,015	85.5
B		7	18.4		6,605	14.5

Appendix 1-B (Cont'd.)

Type of agreement	Agreements			Workers		
	Number of agreements	With (A) or without (B) provision	Percentage of total	Number of workers	With (A) or without (B) provision	Percentage of total
1972 - Total	38			46,326		
Advance Notice/Consultation						
A		37	97.4		45,386	98.0
B		1	2.6		940	2.0
Training/Retraining						
A		31	81.6		35,750	77.2
B		7	18.4		10,576	22.8
Relocation Allowance						
A		1	2.6		1,265	2.7
B		37	97.4		45,061	97.3
Labour-Management Committee						
A		28	73.7		33,500	72.3
B		10	26.3		12,826	27.7
Employment Security						
A		12	31.6		9,236	19.9
B		26	68.4		37,090	80.1
Notice of Layoff						
A		31	81.6		39,711	85.7
B		7	18.4		6,615	14.3
1978 - Total	47			43,395		
Advance Notice/Consultation						
A		43	91.5		40,415	93.1
B		4	8.5		2,980	6.9
Training/Retraining						
A		31	66.0		26,880	61.9
B		16	34.0		16,515	38.1
Relocation Allowance						
A		1	2.1		1,140	2.6
B		46	97.9		42,255	97.4

Type of agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1978 (Cont'd)						
Labour-Management Committee						
A		32	68.0		31,395	72.3
B		15	32.0		12,020	27.7
Employment Security						
A		43	91.5		40,335	92.9
B		4	8.5		3,060	7.1
Notice of Layoff						
A		35	74.5		33,785	77.8
B		12	25.5		9,610	22.2
1980 - Total	45			42,705		
Advance Notice/Consultation						
A		44	97.8		42,005	98.4
B		1	2.2		700	1.6
Training/Retraining						
A		31	68.9		26,990	63.2
B		14	31.1		15,715	36.8
Labour-Management Committee						
A		34	75.6		34,245	80.2
B		11	24.4		8,460	19.8
Employment Security						
A		43	95.6		40,915	95.8
B		2	4.4		1,790	4.2
Notice of Layoff						
A		34	75.6		33,590	78.7
B		11	24.4		9,110	21.3
Contracting Out (prohibitions only)*						
A		20	44.4		20,330	47.6
B		25	55.6		22,325	52.4

Appendix 1-B (Cont'd.)

Type of agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1982 - Total	46			43,380		
Advance Notice/Consultation						
A		45	97.8		42,720	98.5
B		1	2.2		660	1.5
Training/Retraining						
A		34	73.9		30,355	70.0
B		12	26.1		13,025	30.0
Labour-Management Committee						
A		33	71.7		33,045	76.2
B		13	28.3		10,335	23.8
Employment Security						
A		45	97.8		42,230	97.4
B		1	2.2		1,150	2.6
Notice of Layoff						
A		35	76.1		35,015	80.7
B		11	23.9		8,365	19.3
Contracting Out*						
A		25	54.3		24,325	56.1
B		21	46.7		19,055	43.9
1984 - Total	44			41,040		
Advance Notice/Consultation						
A		43	97.8		40,390	98.4
B		1	2.2		650	1.6
Training/Retraining						
A		34	77.2		29,665	72.3
B		12	22.8		11,375	27.7
Labour-Management Committee						
A		32	72.8		31,810	78.8
B		14	27.2		9,230	21.2

Type of agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1984 (Cont'd)						
Employment Security						
A		43	97.8		40,140	97.8
B		1	2.2		900	2.2
Notice of Layoff						
A		33	75.0		33,355	81.3
B		11	25.0		7,685	18.7
Contracting Out*						
A		24	54.6		23,105	56.3
B		20	45.4		17,935	43.7
1985 - Total	43			Worker data not available at this time.		
Advance Notice/Consultation						
A		42	97.7			
B		1	2.3			
Training/Retraining						
A		33	76.7			
B		10	21.2			
Labour-Management Committee						
A		32	74.4			
B		11	25.6			
Employment Security						
A		42	97.7			
B		1	2.3			
Notice of Layoff						
A		33	76.7			
B		10	23.3			
Contracting Out*						
A		24	55.8			
B		19	44.2			

*Figures prior to 1980 exclude contracting-out, which was not broken down into "permitted" or "prohibited" classifications prior to that year.

Appendix 1-C

Telephone-Telecommunications Industry (SIC 295), Technology Change Clauses, Selected Years 1969-85

Type of agreement	Agreements			Workers		
	Number of agreements	With (A) or without (B) provision	Percentage of total	Number of workers	With (A) or without (B) provision	Percentage of total
1969 - Total	11			18,811		
Advance Notice/Consultation						
A		1	9.1		1,110	5.9
B		10	90.9		17,701	94.1
1970 - Total	15			48,514		
Advance Notice/Consultation						
A		3	20.0		10,521	21.7
B		12	80.0		37,993	78.3
1971 - Total	15			48,490		
Advance Notice/Consultation						
A		6	40.0		37,602	77.5
B		9	60.0		10,888	22.5
Notice of Layoff						
A		2	13.3		7,320	15.1
B		13	86.7		41,770	84.9
1972 - Total	16			50,018		
Advance Notice/Consultation						
A		6	37.8		37,960	75.9
B		10	62.2		12,058	24.1
Employment Security						
A		1	6.3		550	1.1
B		15	93.7		49,468	98.9
Notice of Layoff						
A		2	12.5		7,320	14.6
B		14	87.5		49,468	85.4

Appendix 1-C (Cont'd.)

Type of Agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1978 - Total	20			68,340		
Advance Notice/Consultation						
A		4	20.0		23,580	34.5
B		16	80.0		44,760	65.5
Training/Retraining						
A		4	20.0		17,375	25.4
B		16	80.0		50,965	74.6
Relocation Allowance						
A		2	10.0		19,100	27.9
B		18	90.0		49,240	72.1
Labour-Management Committee						
A		1	5.0		11,100	16.2
B		19	95.0		57,240	83.8
Employment Security						
A		3	15.0		20,100	29.4
B		17	85.0		48,240	70.6
Notice of Layoff						
A		3	15.0		12,665	18.5
B		17	85.0		55,675	81.5
1980 - Total	20			71,840		
Advance Notice						
A		10	50.0		42,480	59.1
B		10	50.0		29,360	40.9
Training/Retraining						
A		5	25.0		19,550	27.2
B		15	75.0		52,290	72.8

Appendix 1-C (Cont'd.)

Type of Agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1980 (Cont'd)						
Relocation Allowance						
A		3	15.0		20,800	29.0
B		17	85.0		51,040	71.0
Labour-Management Committee						
A		2	10.0		10,540	14.7
B		18	90.0		61,300	84.3
Employment Security						
A		2	10.0		17,400	24.2
B		18	90.0		60,940	84.8
Notice of Layoff						
A		2	10.0		10,900	15.2
B		18	90.0		60,940	84.8
Contracting Out (with prohibitions)*						
A		9	45.0		20,965	29.2
B		11	55.0		50,875	70.8
1982 - Total	20			77,560		
Advance Notice/Consultation						
A		12	60.0		61,245	79.0
B		8	40.0		16,315	21.0
Training/Retraining						
A		7	35.0		23,155	29.9
B		13	65.0		54,405	70.1
Relocation Allowance						
A		4	20.0		22,360	28.9
B		16	80.0		55,200	71.1

Type of Agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1982 (Cont'd)						
Labour-Management Committee						
A		1	5.0		10,000	12.9
B		19	95.0		67,560	87.1
Employment Security						
A		2	10.0		17,400	22.4
B		18	90.0		60,160	77.6
Notice of Layoff						
A		2	10.0		17,400	22.4
B		18	90.0		60,160	77.6
Contracting Out (with prohibitions)*						
A		8	40.0		20,870	26.9
B		12	60.0		56,690	73.1
1984 - Total	21			79,535		
Advance Notice/Consultation						
A		13	61.9		63,535	79.9
B		8	38.1		16,000	20.1
Training/Retraining						
A		8	38.1		24,865	31.2
B		13	61.9		54,670	68.8
Relocation Allowance						
A		4	19.0		24,000	30.2
B		17	81.0		55,535	69.8
Labour-Management Committee						
A		2	9.5		15,200	19.1
B		19	90.5		64,335	80.9

Appendix 1-C (Cont'd.)

Type of Agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1984 (Cont'd)						
Employment Security						
A		2	9.5		18,800	23.6
B		19	90.5		60,735	76.4
Notice of Layoff						
A		2	9.5		12,150	15.3
B		19	90.5		67,385	84.7
Contracting Out*						
A		7	33.3		19,980	25.1
B		14	66.7		59,555	79.9
1985 - Total	20			79,815		
Advance Notice/Consultation						
A		13	65.0		64,200	80.4
B		7	35.0		15,615	19.6
Training/Retraining						
A		8	40.0		25,085	31.4
B		12	60.0		54,730	68.6
Relocation Allowance						
A		4	20.0		25,740	32.2
B		16	80.0		54,075	67.8
Labour-Management Committee						
A		3	15.0		24,340	30.5
B		17	85.0		55,475	69.5
Employment Security						
A		2	10.0		20,540	25.7
B		18	90.0		59,275	74.3

Type of Agreement	Agreements: Number of agreements	Agreements: With (A) or without (B) provision	Agreements: Percentage of total	Workers: Number of workers	Workers: With (A) or without (B) provision	Workers: Percentage of total
1985 (Cont'd)						
Notice of Layoff						
A		2	10.0		12,150	15.2
B		18	90.0		67,665	84.8
Contracting Out (with prohibitions)*						
A		7	35.0		19,980	25.0
B		13	65.0		59,835	75.0

*Figures prior to 1980 exclude contracting-out, which was not broken down into "permitted" or "prohibited" classifications prior to that year.

Notes Simple average frequency, 1969-71: too few clauses to enumerate on this scale.
(per cent) 1972: 9.4
1978: 14.2
1980: 23.6
1982: 25.7
1984: 25.9
1985: 27.9 (June)

Appendix 2

1) Simple average (Sum of "Yes" answers of Table 1, divided by 7 x 960): 21.7%

2) Single-weighted average. Calculated as above, except for advance notice, notice of layoff, and contracting out clauses, which are calculated as follows (use data from Table 2):

   a) Advance notice: Score ¼ "credit" for notice period of 0-3 months, ½ credit for notice period of 3-6 months, ¾ credit for notice period of 6-12 months, full credit for notice period of 12 months or longer, and 0.2 (1/5) for notice period classified as "other." Multiply the number of responses in each category times the credit value to come up with the "weighted sum," in this case 134.5.

   b) Notice of layoff: Use an identical procedure with the values under this category. Multiply the number of responses in each category times the indicated credit value to come up with the "weighted sum," in this case 43.3.

   c) Contracting out: Score no credit for a "permitted" clause, full credit for a "prohibited" clause, ¾ credit for a "prohibited if leads to layoff" clause, and 0.2 (1/5) credit for an "other" clause. Multiply the number of responses in each category to come up with the "weighted sum," in this case 211.35, or 211.4 rounded to the nearest tenth.

Substitute the weighted sums for the simple sums given above, then add up all sums and divide by 7 x 960 (total number of provisions times the total number of agreements in the pool) as above.

389.2-685 (weighted sums plus non-weighted sums) equals 1074.2
1074.2 equals 15.985%, or 16.0% rounded.

6720.0

Note: Single-weighted average will always be smaller than simple one, and will often be smaller than double-weighted one. Other provisions may also be broken down into different "positive" responses for the purpose of single-weighting, but the nature of the clauses makes it difficult to assign anything like accurate weighting values in most other cases.

3) Double-weighted average. Single-weight the average as above, but then take different values for each provision, as follows:

   3 each: Advance notice, contracting out, training-retraining, guaranteed employment/earnings.

2: Notice of layoff.

1: Relocation allowance, labour-management committee.

Multiply the single-weighted averages for the first group of clauses by 3, for the second group, by 2, and for the third group, by 1. To calculate the double-weighted average, divide the double-weighted sum by 3x4 - 2x1 - 1x2 times 960, or 16 x 960, or 15,360.

Double-weighted sums are as follows:

Advance notice:	134.5 x 3, or 403.5
Notice of layoff:	43.3 x 2, or 86.6
Contracting out:	211.4 x 3, or 634.2
Training-retraining:	295 x 3, or 885
Relocation:	39 x 1, or 39
Labour-management committee:	139 x 1, or 139
Guaranteed employment or earnings:	212 x 3, or 636

Summing the above, we obtain 2823.3 as our double-weighted sum.

Dividing the double-weighted sum by the weighted product (15,360) given above, we obtain 18.38 %, or 18.4 %, rounded. As suggested above, this figure is slightly higher than the single-weighted figure obtained earlier; this is because advance notice, guaranteed employment or earnings, and contracting out, all quite common provisions, are heavily weighted in the double-weighting scheme in use here.

Now we may proceed in precisely the same fashion to calculate simple, single-weighted, and double-weighted averages for our small agreement pool.

Source Personal sample of agreements in Collective Agreements Library, Collective Bargaining Division of Labour Canada. Personal Calculations.

Appendix 3

Method of Calculation, Frequency Measures, Small Assessment Pool

Advance notice:	Yes 51	(27.9 %)
	No 132	(72.1 %)
Notice of layoff:	Yes 14	(7.7 %)
	No 169	(92.3 %)
Contracting out:	Prohibited fully or partially: 45	(24.6 %)
	Permitted or no provision: 138	(75.4 %)
Training-retraining:	32	(17.5 %)
	151	(82.5 %)
Relocation:	none	
Labour-management committee, T.C.	Yes 6	(3.3 %)
	No 177	(96.7 %)
Guaranteed employment or earnings' tech change	Yes 21	(11.5 %)
	No 162	(88.5 %)

The simple average is obtained by dividing the sum of all "Yes" answers, which is 169, by 7 times the number of agreements, or 1281. Performing the indicated division, we arrive at a simple average of 13.19 %, or 13.2 rounded. This figure, as one might expect from the comparison of individual tech change clause frequencies in Table 1, is notably lower for the small agreement pool than for the large agreement one.

Next, using the same procedure as above, we may calculate internally weighted sums for advance notice, notice of layoff, and contracting out provisions. Doing so, we arrive at weighted sums of 17.35 (17.4), 4.55 (4.6), and 25.85 (25.9), respectively.

Now, substituting these weighted sums for the simple sums above, we arrive at the complete sum as follows: 47.9 (weighted sums)-59 (non-weighted sums) equals 106.9.

To arrive at our single-weighted average, we divide the above weighted sum by 183 x 7, or 1281; the result is a single-weighted average of 8.345 %, or 8.3 % rounded to the nearest tenth. The difference between this figure and its large agreement counterpart (16.1 %) is most striking indeed.

Finally, to arrive at our double-weighted average, we single-weight as above and then multiply the results of each clause by its "significance" factor of 3,2, or 1, as in the previous example with the large agreements. The double-weighted sums are as follows:

Advance notice:	17.4 x 3, or 52.2
Notice of layoff:	4.6 x 2, or 9.2
Contracting out:	25.9 x 2, or 51.8
Training-retraining:	32 x 3, or 96
Relocation:	none
Labour-management committee:	6 x 1, or 6
Guaranteed employment or earnings' tech change:	21 x 3, or 63.

Summing the above, we obtain 278.2 as our double-weighted sum.

The denominator for the necessary final division is arrived at in exactly the same way as it was with the large agreement pool, by multiplying 16 (the sum of the "significance values" of each clause) by 183, the total number of agreements in the data pool. This gives us a denominator of 2928.

Dividing the double-weighted sum by this denominator, we obtain a result of 9.5013% -- 9.5% rounded to the nearest tenth. Again, this is slightly higher than the single-weighted average, but far lower (little more than half as large) as the equivalent value for the large agreements.

Source As in previous table.